



# 12<sup>th</sup> Congress of AFJO

Association France-Japon d'Orthopédie

*‘From the New Points of View’*

**31 May and 1 June 2013**

**Shiran Kaikan, Kyoto, Japan**

**Program and Abstracts**



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## Invitation

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Dear Colleagues,

It is our privilege and pleasure to invite you to the 12<sup>th</sup> congress of AFJO in Kyoto.

After the big success of the Bordeaux meeting in 2011, Kyoto, is the ideal setting to enhance the spirit of friendship between French and Japanese members of AFJO.

Dr. Chiaki Tanaka and I have been fully prepared to organize a congress with fulfilling scientific program, comfortable atmosphere, and rich hospitality. Especially, Chiaki has been very enthusiastic for making management for the congress with an extraordinary skill and power.

I have no experience with oversee fellowship in France, but my four younger colleagues had an opportunity to study abroad in France in the past by the oversea study program of SOFJO etc. I hope we encourage a mutually rewarding relationship during this congress.

Kyoto is special because it reigned as national capital for more than a 1000 years, which was the center of activity throughout the formative years when what we think of as Japanese culture was born, developed and refined. We have prepared special events for participants. We believe all the participants will enjoy this congress through the scientific and cultural program.

We are very much looking forward to welcoming you to Kyoto in May 2013.



Hirokazu Iida, MD, PhD

President of the 12<sup>th</sup> Congress of AFJO

Professor and Chairman, Department of Orthopaedic Surgery, Kansai Medical University



Dear Colleagues,

It is a great honor for me to organize the 12<sup>th</sup> Congress of AFJO with Prof. Hirokazu Iida. We are very happy to invite you to this Congress to be held May 31 and June 1, 2013 in Kyoto.



Thanks to Prof. Takao Yamamuro and Prof. Jacques Duparc, I had an opportunity to study orthopaedic surgery in France. I began to work in Bichat Hospital as 'Résident Etranger des Hôpitaux de Paris' in 1988. Twenty five years have already passed. I could start my professional training of all the activities including surgery, emergency and 'la garde' in Bichat. Then I moved to Cochin Hospital. I learned a lot of things about hip surgery from Prof. Marcel Kerboull. During my stay in Cochin I passed one month in Lyon. I studied the critical points of knee surgery, especially about the patellar instability in the department of Prof. Henri Dejour. After return to Japan, I concentrated my work on Hip and Knee surgery. Besides the orthopaedic surgery, I was fascinated with the French culture, the French life style and the French way of thinking. However I am not a simple 'Francophile'. Through my experience in France, I 'rediscovered' Japan more favorably than before.

'From the new points of view' many papers were submitted. I am very happy because many of my French friends participate with this congress. Three 'Special Lectures' were selected concerning hip, knee and spine surgery. We invite all of you to our congress with great pleasure. We wish you know the cultural aspects of Kyoto in addition to scientific progress. We hope that all the participants will appreciate our scientific program and our cultural program through this congress.

I am most grateful to many implant makers, many pharmaceutical companies and many SOFJO members for their financial support.

Chiaki Tanaka, MD, PhD

President of the 12<sup>th</sup> Congress of AFJO

Chairman of the Department of Orthopaedic Surgery, Kyoto City Hospital

Clinical Professor of School of Medicine, Kyoto University



## **Organizing Committee**

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<b>Congress President</b>	Hirokazu Iida Chiaki Tanaka
<b>Secretary General</b>	Akira Kobayashi
<b>Chair</b>	Akira Kobayashi
<b>Members</b>	Hirokazu Iida, Chiaki Tanaka, Yoshiki Semoto, Hirotsugu Ohashi, Toyonori Sakamaki, Toshikazu Kubo, Kazuo Kaneko, Yuji Yasunaga, Kiyoshi Aoki, Kenta Fujiwara
<b>Advisory Members</b>	Kanji Shichikawa, Toshinobu Onomura, Takao Yamamuro

### ***Local Organizing Committee***

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<b>Chair</b>	Hirokazu Iida Chiaki Tanaka
<b>Members</b>	Akira Kobayashi, Yoshiki Semoto, Hirotsugu Ohashi, Toyonori Sakamaki, Toshikazu Kubo, Kazuo Kaneko, Yuji Yasunaga, Yoshitaka Matsusue, Shuichi Matsuda, Satoshi Iida, Hideaki Shiratsuchi



## Congress at a glance

### May 31<sup>th</sup>

	INAMORI Hall	YAMAUCHI Hall	Annex 2F Conference Room 1	Annex BF1
8:30	8:30 Opening Remarks			
8:40				
9:00	Hip 1 Primary THA			
9:30				
10:00	Coffee Break 1 at Lobby			
10:10	Hip 2 Revision THA			
10:30				
11:00				
11:05	Special Lecture 1 Dr. Luc Kerboull			
11:30				
12:00		12:00 Luncheon Seminar 1 Pr. Olivier Guyen	12:00 Luncheon Seminar 2 Pr. Shuichi Matsuda	
12:30				
13:00	13:00 Poster Discussion at Lobby			13:00 Business Meeting
13:30				
14:00	14:00 Special Lecture 2 Dr. Pierre Roussouly			
14:30				
15:00	14:50 Spine 1			
15:30				
15:30	15:30 Spine 2	15:30 Hip 3		
16:00				
16:30	Coffee Break 2 at Lobby			
16:30	16:25 Spine 3	16:25 Hip 4 Dual Mobility		
17:00				
17:00	17:00 Foot			
17:25				

### June 1<sup>st</sup>

	INAMORI Hall	YAMAUCHI Hall	Annex 2F Conference Room 1	Annex BF1
8:30	8:30 Hand and Elbow	8:30 Hip 5 Direct Anterior Approach		
9:00				
9:05	9:05 Knee 1 TKA	9:05 Hip 6 Difficult Issues in THA		
9:30		9:40 Shoulder		
10:00	Coffee Break at Lobby			
10:20	10:20 Special Lecture 3 Pr. Philippe Neyret			
11:00				
11:05	11:05 Knee 2	11:05 Hip 7		
11:30				
12:00				
12:30		12:15 Luncheon Seminar 3 Dr. Luc Kerboull	12:15 Luncheon Seminar 4 Dr. Mutsumi Matsushita	
13:00				
13:25		13:20 Closing Remarks		



## Venu

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- *Shiran Kaikan*

**No.1 on the attached Map**

**Registration, Scientific Congress at May 31th and June 1st**

<http://www.shirankai.or.jp/e/facilities/access/index.html>

〒606-8302 Kyoto-shi, Sakyou-ku, Yoshida Ushinomiya-chou 11-1

Tel +81 75 753 9336 Fax +81 75 753 9457



- *Hosomi Museum*

**No.2 on the attached Map**

**Registration and Welcome Cocktail Party at May 30th**

<http://www.emuseum.or.jp/eng/index.html>

6-3 Saishoji-cho Okazaki, Sakyo-ku, Kyoto

Tel +81 75 752 5555 Fax +81 75 752 5955



- *Inquiry and Information about 12<sup>th</sup> AFJO 2013*

**12<sup>th</sup> AFJO Organizing Office**

[afjo2013@hirakata.kmu.ac.jp](mailto:afjo2013@hirakata.kmu.ac.jp)

[http://www.sofjo.gr.jp/afjo\\_e.html](http://www.sofjo.gr.jp/afjo_e.html)





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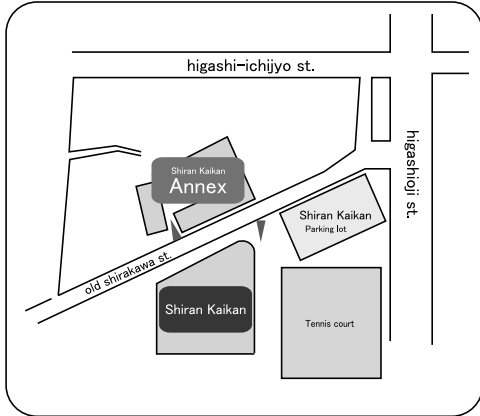
### KYOTO MAP

- 1 Shiran Kaikan 芝蘭会館  
Shiran Kaikan Annex 芝蘭会館別館
- 2 Hosomi Museum 細見美術館
- 3 Kiyomizudera Temple 清水寺  
Joju-in Temple 成就院
- 4 Kyoto Station (JR) 京都駅
- 5 Kyoto Hotel Okura  
京都ホテルオークラ
- 6 Kyoto Royal Hotel & Spa  
京都ロイヤルホテル&スパ
- 7 Hotel Alfa Kyoto  
ホテルアルファ京都
- 8 The Westin Miyako Kyoto  
ウェスティン都ホテル京都

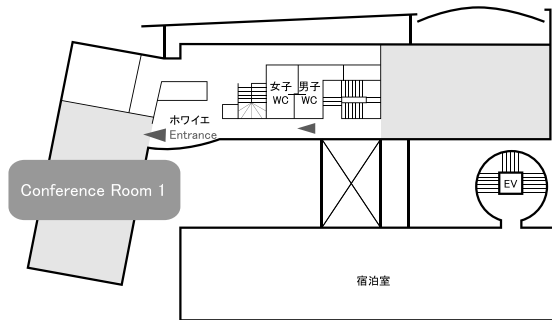


# Map

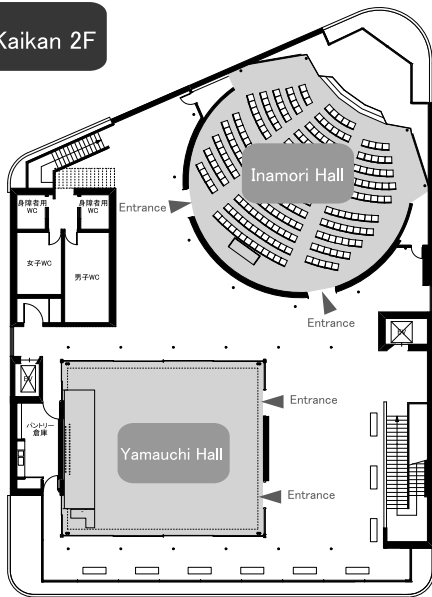
Meeting place placement



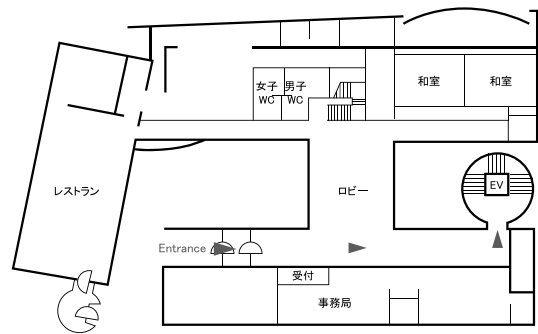
Annex 2F



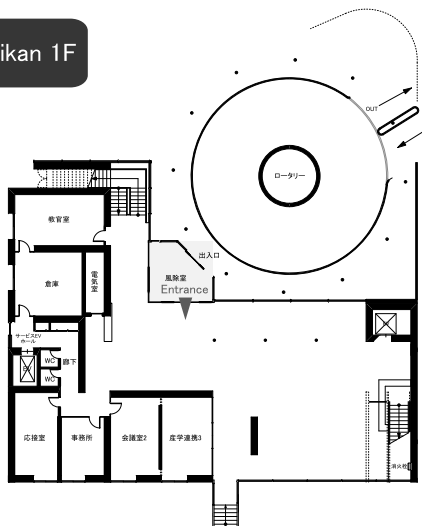
Shiran Kaikan 2F



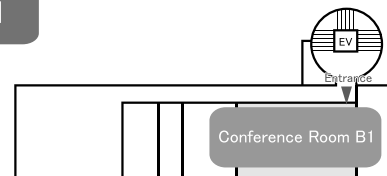
Annex 1F



Shiran Kaikan 1F



Annex B1





## ***Instructions for the presenters***

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### **For Speakers of Oral Presentation**

1. Please do your presentation in English.
2. Presentation time
  - Special Lecture: 45 min. including discussion
  - Free paper: 6 min. and discussion 2 min.

Please be punctual and carefully follow the allotted time limits.
3. Presentation Timekeeping — the yellow lamp indicates one minute remaining: the red lamp indicates the end of your presentation time.
4. When the presenter ahead of you takes the stage, please be seated in the standby seat.

### **Data Presentation**

- 1) Only USB flash drives and CD-Rs are accepted.
- 2) All speakers are requested to come to the PC Preview Desk at least 30 minutes before their presentations to check if the data functions properly on the equipment provided.
- 3) Windows 7 OS, Microsoft PowerPoint 2003/2007/2010 are the only operating system available for the presentations.
- 4) If your presentation data is linked to other file (i.e. still or moving images, graphs, etc.), those linked files should also be saved in the same folder, and the links checked beforehand.
- 5) Please name the file as Program no. (or session name) \_presenter name, ppt/pptx.
- 6) If you have prepared the presentation data on Macintosh, please bring your own computer.
- 7) If your presentation data has movie/audio files, please bring your own computer.
- 8) The Secretariat is responsible for destroying all copies of any data after the session.

### **If you bring your own PC**

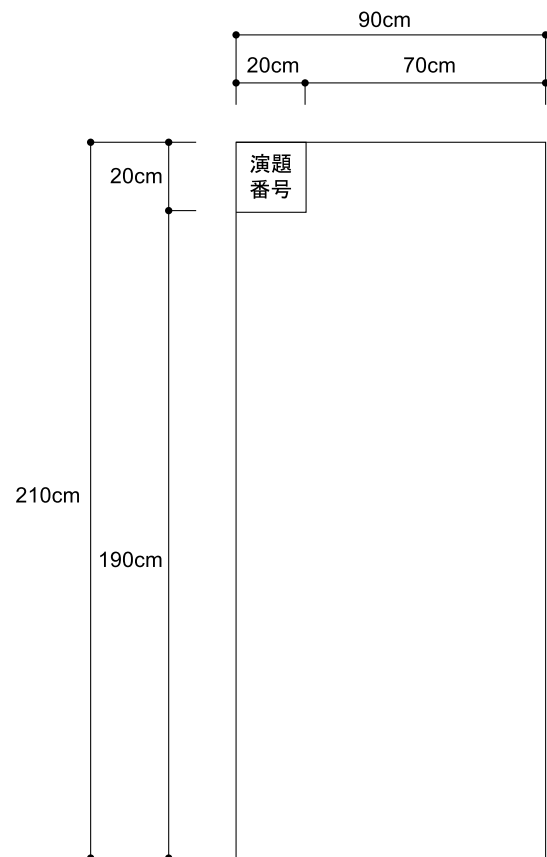
- 1) Prepared projectors have a Mini D-sub 15 pin PC cable connector.  
If your PC is Macintosh or Windows PC does not compatible with this cable connector, please bring an adaptor to connect your PC to the Mini D-sub 15 pin PC cable connector.
- 2) Please bring your AC adapter with you.
- 3) The resolution of the LCD projector XGA (1024 × 768). If your computer requires a resolution setting to be changed, please change this setting beforehand.
- 4) Please turn off “sleep” or “power saver”, “screensaver” setting.
- 5) Please also bring your presentation data on a media (USB flash drives and CD-R) as a backup file.



### For Authors of Poster Presentation

1. Please prepare your poster in English.
2. Panel Size is 90 cm wide by 210 cm high.
3. Individual presentation time will not be provided, however all presenters in the poster session should be in front of each poster and handle questions during the following time.  
May 31, 13:00–14:00
4. Please display your posters by yourself with the pins witch will be available at poster session.
5. Poster setup and removal will be conducted on the schedule below.  
Please remove your poster during the time indicated below.  
Posters not removed by 12:00 on June 1 will be discarded by the Secretariat.

<b>Setup</b>	May 31	8:00–11:00
<b>Removal</b>	June 1	11:00–12:00



### Correspondence

The 12ème Réunion de l'AFJO Secretariat

**E-mail: [afjo2013@hirakata.kmu.ac.jp](mailto:afjo2013@hirakata.kmu.ac.jp)**



## Program of 12<sup>th</sup> Congress of AFJO

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### Special Lectures

20

#### Special Lecture 1 May 31<sup>th</sup>, 11:05–11:50

Moderator: C. Tanaka

Femoral Impaction Grafting using the Charnley-Kerboull Cemented Stem  
 – Surgical technique and 2 to 16-year follow-up results –  
 Luc Kerboull  
 Centre Médico-Chirurgical Paris V, Paris, France

#### Special Lecture 2 May 31<sup>th</sup>, 14:00–14:45

Moderator: Y. Semoto

Role of Pelvis Tilt Orientation  
 Pierre Roussouly  
 Croix rouge française-CMCR des Massues, Lyon, France

#### Special Lecture 3 June 1<sup>st</sup>, 10:20–11:05

Moderator: A. Kobayashi

Contribution of Lyon School in Patello-femoral Disorders Management  
 Philippe Neyret  
 Hôpital de la Croix Rousse, Dept de Chirurgie Orthopédique et Traumatologique, Lyon, France

### Luncheon Seminars

22

#### Luncheon Seminar 1 May 31<sup>th</sup>, 12:00–13:00

Moderator: C. Tanaka

Dual Mobility Cup: Past, Present and Future  
 Olivier Guyen  
 Dept. of Orthop. Surg., Edouard Herriot Hospital, Univ. of Lyon, France

#### Luncheon Seminar 2 May 31<sup>th</sup>, 12:00–13:00

Moderator: H. Shiratsuchi

Knee Stability and Implant Design of Total Knee Arthroplasty  
 Shuichi Matsuda  
 Dept. of Orthop. Surg., Kyoto University

#### Luncheon Seminar 3 June 1<sup>st</sup>, 12:15–13:15

Moderator: C. Tanaka

Personalized Instrumentation for TKA; Comparative Study with the Conventional Instrumentation  
 Luc Kerboull  
 Centre Médico-Chirurgical Paris V, Paris, France

#### Luncheon Seminar 4 June 1<sup>st</sup>, 12:15–13:15

Moderator: T. Tsuboyama

Problems of Osteoporotic Fractures  
 Mutsumi Matsushita  
 Dept. of Orthop. Surg., Kurashiki Central Hospital



Session Hip 1

25

**Primary THA May 31<sup>th</sup>, 8:40–9:55**

**Moderators: H. Ohashi, J.-P. Courpied**

1. Effect of stem design for post-operative radiological findings – Composite beam vs. Taper-slip –  
Hiroshi Fujita  
Institute for Joint Replacement, Dept. of Orthopedic Surgery, Kyoto Katsura Hospital
2. Comparisons on radiographic findings in cemented THA using conventional bone cement and interface bioactive bone cement (IBBC) with HA 25 to 30 years after surgery  
Hiroyuki Oonishi  
Tominaga Hospital, Osaka, Japan
3. Can we augment the acetabular bone stock in cementless THA?  
Toshihisa Kajiwara  
Dept. of Orthop. Surg., Yokohama Minami-kyousai Hosp., Yokohama, Japan
4. Long term results of Opti-Fix Plus total hip system with the conventional polyethylene liner  
Masazumi Saito  
Dept. of Orthopaedics, Graduate School of Medical Science, Kyoto Prefectural Univ. of Medicine
5. Can short stems be considered as bone preserving implants? About 68 short metaphyseal cementless stems (Proxima, Depuy)  
Pascal Bizot  
Dept of Bone Surgery, Univ of Angers, France
6. Long-term survival of Cementless THA using Metasul-28 mm Articulation in Active Patients less than 50 years old  
Christian Delaunay  
Clinique de l'Yvette, 91160, Longjumeau, France
7. Matched Ceramic-Ceramic versus Ceramic-Polyethylene on the contralateral hip: A 30-Year Study  
Philippe Hernigou  
Hospital Henri Mondor, Creteil, France
8. Prospective study of a self locking straight modular and cementless femoral stem (H-MAX M 12 options of modular necks) clinical and radiographic results  
Olivier Ray  
Clinique du Parc Lyon, France
9. HA-coated Corail® Stem Long-Term Results Based upon the 27-Years ARTRO Group Experience  
Jean-Charles Rollier  
Argonay Private Hospital, France

Session Hip 2

30

**Revision THA May 31<sup>th</sup>, 10:10–11:00**

**Moderators: H. Iida, L. Sedel**

10. Impaction bone grafting with mixture of hydroxyapatite granule in revision total hip arthroplasty for acetabular bone deficiency  
Satoshi Iida  
Dept. of Orthop. Surg., Matsudo City Hosp. Chiba, Japan



11. Reconstruction of acetabulum using Regenerex acetabular augment in THA  
Fumiaki Inori,  
JR Osaka Tetsudo Hospital, Osaka, Japan
12. Acetabular Reconstruction using Kerboull-type reinforcement plate  
Chiaki Tanaka  
Dept. of Orthop. Surg., Kyoto City Hosp. Kyoto, Japan
13. Acetabular reconstruction using the Ganz reinforcement ring with dual mobility socket in revision total hip arthroplasty ‘About 41 cases’  
Dominique Chauveaux  
Dept of Orthop; Surg, Univ. of Bordeaux, FRANCE
14. Revision of acetabular component in young age population  
Laurent Sedel  
Hopital lariboisiere and university of paris 7 Denis Diderot, Paris, France
15. Femoral calcar reconstruction using metal mesh and impacted morcellised allograft in revision total hip arthroplasty  
Toshiki Iwase  
Dept. of Orthop. Surg., Hamamatsu Medical Centre, Shizuoka, Japan

## Session Spine 1

33

**Spine Pelvis Hip**    **May 31<sup>th</sup>, 14:50–15:25**    **Moderators: S. Fujibayashi, A. Durandeu**

16. Three dimension global views of the patient’s posture: the EOS imaging system sheds new light on sagittal, frontal and cross-sectional balance of the trunk  
Jean-Yves Lazennec  
Dept Orthop, La Pitie Salpetrière Hospital, APHP, Paris, France
17. THA patients in standing and sitting positions: the low dose “full body” EOS® imaging system provides new information about “normal” hip function and potential THA failures  
Jean-Yves Lazennec  
Dept Orthop, La Pitie Salpetrière Hospital, APHP, Paris, France
18. The whole-spine MRI test in 10 minutes as a primary screening or spine dock for spinal disorders  
Junji Kamogawa  
Shiraishi Hospital, Spine & Sports Center
19. Magnetic resonance imaging evaluation of the effects of surgical invasiveness on paravertebral muscles following muscle-preserving interlaminar decompression (MILD)  
Hitoshi Tonomura  
Dept. of Orthop., Graduate School of Medical Science, Kyoto Prefectural Univ. of Medicine

## Session Spine 2

35

**May 31<sup>th</sup>, 15:30–16:10**    **Moderators: M. Fujiwara, P. Rousouly**

20. Operative Indication Score (STERUMAN) a support tool for making and sharing clinical decisions  
Shinobu Takahashi  
Shiga Spine Center, Hino Memorial Hospital, Shiga, Japan



21. Treatment of Spinal Fracture Associated with Ankylosing Spinal Hyperostosis  
Riya Kosaka  
Dept. of Orthop. Surg., Hirakata City Hospital, Osaka, Japan
22. Selective short fusion with TLIF for degenerative lumbar scoliosis  
Kozo Hara  
Shiga Spine Center, Hino Memorial Hospital, Shiga, Japan
23. Clinical result of muscle-preserving interlaminar decompression (MILD) for lumbar spinal canal stenosis  
a minimally invasive microscopic procedure for lumbar spinal canal stenosis  
Yoichiro Hatta  
Dept. of Orthop., Japanese Red Cross Kyoto Daini Hospital
24. Hemilateral Lumbo-Iliac Fixation with Double Pedicle and Iliac Screws for Unstable Sacroiliac Injuries  
Masatoshi Fujiwara  
Nishikobe Medical Center, Hyogo, Japan

### Session Spine 3

38

May 31<sup>th</sup>, 16:25–17:00

Moderators: S. Takahashi, J.-Y. Lazennec

25. Timing of implant removal in high-risk patients with deep wound infection after posterior spinal instrumentation  
Taketoshi Kushida  
Dept. of Orthop. Surg., Kansai Medical Univ. Japan
26. Benefit of surgical treatment for rheumatoid cervical spine in patients over the age of 70  
Kanji Mori  
Dept. of Orthop. Surg., Shiga Univ. of Medical Science, Shiga, Japan
27. A drain placement procedure and the frequency of postoperative epidural hematoma in muscle-preserving interlaminar decompression (MILD)  
Tomohisa Harada  
Spine Center, Rakuwakai Marutamachi Hosp. Kyoto Japan
28. Cortical bone trajectory for lumbar pedicle screws a report of 13 cases  
Masayuki Sugimoto  
Dept. of Orthop. Surg., Nagahama City Hosp. Shiga Japan

### Session Foot

40

May 31<sup>th</sup>, 17:00–17:25

Moderators: Y. Tanaka, A. Durandeu

29. Diagnosis of Schwannoma at the foot  
Alain Durandeu  
Université Bordeaux Segalen, Bordeaux, France
30. Results of Ceramic Artificial Talus for Aseptic Talar Necrosis  
Yasuhito Tanaka  
Nara Medical University, Nara, Japan





31. New approaches cast correction therapy for pes cavovarus deformity  
Takeshi Kinjo  
Okinawa Prefectural Nanbu Medical Center and Children's Medical Center

### Session Hip 3

42

**May 31<sup>th</sup>, 15:30–16:10**

**Moderators: S. Iida, C. Delauney**

32. In Vivo Implant Fixation of Carbon Fiber-Reinforced PEEK Acetabular Cups in an Ovine Model  
Ichiro Nakahara  
Dept. of Orthop. Surg., Osaka National Hospital, Osaka, Japan
33. A new method of radiographic evaluation for cup anteversion in total hip arthroplasty  
Yoko Miura  
Funabashi Orthopedic Hospital, Chiba, Japan
34. Intraoperative landmark for the stem anteversion in total hip arthroplasty  
Tadashi Tsukeoka  
Chiba Rehabilitation Center, Chiba, Japan
35. Usefulness of standing anteroposterior radiograph of the hip for socket wear measurement in total hip arthroplasty  
Comparative study of conventional with highly cross linked polyethylene  
Masaaki Maruyama  
Dept. of Orthop. Surg., Shinonoi General Hospital, Nagano, Japan
36. Differential wear of standard and highly cross linked polyethylene acetabular component Prospective randomized study of 75 THA, at 8 years of follow-up  
Alain Durandeu  
Université Bordeaux Segalen, Bordeaux, France

### Session Hip 4

45

**Dual Mobility May 31<sup>th</sup>, 16:25–17:00**

**Moderators: K. Kaneko, J.H. Caton**

37. Prevention of dislocation after THA for fractures is different with dual mobility or constrained liners in very old patients  
Yasuhiro Homma  
Hospital Henri Mondor, Creteil, France; Juntendo Univ., Tokyo, Japan
38. Primary Total hip arthroplasty using dual mobility results at 10 years follow-up  
Herve Chavane  
Edouard Herriot Hospital, Lyon, France
39. Combination of dual Mobility and navigation in primary Total Hip Arthroplasty (THA)  
Olivier Tayot  
Clinique du Parc, Lyon, France
40. Is the dislocation risk decrease with dual mobility cup Quattro<sup>®</sup> type after Charnley THA  
Jacques H. Caton  
Clinique Orthopédique E. de Vialar, Lyon, France



Session Elbow and Hand

47

June 1<sup>st</sup>, 8:30–9:05

Moderators: E. Shiota, M. Levadoux

41. Surgical technique for small fragments of radius distal fractures using break-away screw  
Kiyohito Naito  
Department of Orthopaedic Surgery, Juntendo University Shizuoka Hospital
42. The effect of elbow flexion angle on elbow laxity in overhead throwing athletes  
Momoko Ashida  
Hirakata city Hospital, Osaka, Japan
43. Morphology and Histology of the collapsed lunate in advanced Kienböck disease  
Yasuo Ueba  
Department of Orthopedic Surgery, Kyoto University
44. Arthroscopic hammoc tendon graft interposition (AHTGI) associated with large styloidectomy in SLAC wrist stage I and II  
Michel Levadoux  
Department of Hand Surgery Private Hospital St Roch

Session Knee 1

49

TKA June 1<sup>st</sup>, 9:05–10:05

Moderators: S. Matsuda, Ph. Hernigou

45. The comparisons of 15 to 30 year-clinical results of alumina ceramic and Co-Cr (PCA) total knee arthroplasty – in X-ray findings and retrieval cases –  
Ikuo Kawahara  
Tominaga Hospital, Osaka, Japan
46. Long-term Follow-up of Total Knee Arthroplasty with Hydroxyapatite-coated Components  
Arata Watanabe  
Ibaraki Seinan Medical Center Hospital, Ibaraki, Japan
47. Obliquity of the tibial cut predictive of tibial loosening in TKA: three-dimensional radiographic analysis  
Jean-Baptiste Néron  
CHRU of Tours, University of Tours, Tours, France
48. Fixed-bearing and mobile-bearing total knee arthroplasties are equivalent after tibial osteotomy  
Philippe Hernigou  
Hospital Henri Mondor, Creteil, France
49. Results of metallic wedges and press fit stem for filling tibial osseous defects in TKA  
Jean Louis Rouvillain  
CHU La Meynard Université Antilles Guyane, France
50. Utility of the pre-cut trial for a precise gap making system in total knee arthroplasty  
Ryutaku Kaneyama  
Funabashi Orthopedic Hospital, Chiba, Japan
51. The correlation between preoperative flexion contracture and intraoperative extension, flexion gap in total knee arthroplasty  
Hidetaka Higashi  
Funabashi Orthopedic Hospital, Chiba, Japan



## Session Knee 2

53

**June 1<sup>st</sup>, 11:05–12:05**
**Moderators: Y. Matsusue, Ph. Neyret**

52. Surgical treatment of permanent dislocation of the patella – a report of three cases  
Tadayuki Hoshi  
Komatsu Orthopaedic Clinic, Ibaraki, Japan
53. Three-dimensional Transfer of The Tibial Tuberosity for Patellar Instability with Patella Alta  
Shuhei Otsuki  
Osaka Medical College, Osaka, Japan
54. Extended Indications in Unicompartmental Arthroplasty  
Philippe Neyret  
Hôpital de la Croix Rousse, Dept de Chirurgie Orthopédique et Traumatologique, Lyon, France
55. 90-Day Morbidity in Patients Undergoing Primary TKA with Discontinuation of Warfarin and Bridging with LMWH  
Jean Pierre Courpied  
Cochin Hospital, Paris, France
56. Painful medial knee compartment syndrome in over-45 year-olds  
Frederic Dubrana  
CHU Cavale Blanche, Brest, France
57. How transforming a semi tendinous ACL graft into a BT transplant; original technique  
Olivier Ray  
Clinique du Parc Lyon, France
58. Evaluation of an original technique of ACL composite (Bone Tendon) grafting using semitendinosus: A prospective Study versus classical Hamstring ACL grafting. 6 months FU evaluation (Clinical and Rx)  
Olivier Ray  
Clinique du Parc Lyon, France

## Session Hip 5

57

**Direct Anterior Approach**
**June 1<sup>st</sup>, 8:30–9:05**
**Moderators: K. Oinuma, P. Vie**

59. Total Hip Arthroplasty Using Direct Anterior Approach for Displaced Femoral Neck Fracture  
Hiroyuki Yoshii  
Funabashi Orthopedic Hospital, Chiba, Japan
60. Total Hip Arthroplasty Using Direct Anterior Approach for failed internal fixation of femoral neck fracture  
Shota Hoshika  
Funabashi Orthopedic Hospital, Chiba, Japan
61. Effectiveness of Direct Anterior Approach in Minimally Invasive Total Hip Arthroplasty  
Yudo Hachiya  
Hachiya Orthopaedic Hospital, Nagoya, Japan
62. Advantages of orthopedic table to perform direct anterior approach in THR  
Pascal Vie  
Clinique du Cedre, Bois-Guillaume, France



Session Hip 6

59

**Difficult Issues in THA**

**June 1<sup>st</sup>, 9:05–9:40**

**Moderators: K. Shitoto, L. Kerboull**

63. Preoperative Evaluation of One or Two-Stage Revision Total Hip Arthroplasty  
Kenichi Oe  
Dept. of Orthop. Surg., Kansai Medical Univ. Osaka Japan
64. Improved technique for subtrochanteric shortening osteotomy in total hip arthroplasty with severe hip dysplasia  
Takeshi Sawaguchi  
Dept. Orthop. Surg. Toyama Municipal Hosp, Toyama Japan
65. Total Hip Arthroplasties for Highly Dislocated Hips  
– How Long Is The Safety Amount of Leg Lengthening –  
Hiroyuki Makita  
Dept. Orthop. Surg., Kanagawa Prefectural Ashigara-kami Hospital, Kanagawa, Japan
66. Total hip arthroplasty with subtrochanteric shortening osteotomy for Crowe grade 4 using direct anterior approach  
Kazuhiro Oinuma  
Funabashi Orthopedic Hospital, Chiba, Japan

Session Shoulder

61

**June 1<sup>st</sup>, 9:40–10:05**

**Moderators: E. Shiota, M. Levadoux**

67. Clinical Results of Arthroscopic Superior Capsule Reconstruction for Irreparable Rotator Cuff Tears  
Teruhisa Mihata  
Dept. of Orthop. Surg., Osaka Medical College
68. Partial thickness lateral bursal side subscapularis tendon tears affect LHB lesions  
Takashi Kobayashi  
Dept. of Orthop. Surg., KKR Hokuriku Hosp. Kanazawa Japan
69. High risk of subsequent fractures but little treatment of osteoporosis in elderly patients after proximal humeral fracture  
Yoichi Koike  
Dept. of Orthopaedics, Japanese Red Cross Sendai Hospital, Miyagi, Japan

Session Hip 7

63

**June 1<sup>st</sup>, 11:05–12:05**

**Moderators: Y. Yasunaga, Ph. Hernigou**

70. Resolution of posttraumatic symptomatic stage I osteonecrosis following implantation of autologous bone marrow after femoral neck fracture  
Yasuhiro Homma  
Hospital Henri Mondor, Creteil, France; Juntendo Univ., Tokyo, Japan
71. Subchondral insufficiency fracture of femoral head – classification by clinical and radiological features –  
Keiichi Kawanabe  
Kobe City Medical Center General Hospital



72. Osteoarthritis change after Salter pelvic osteotomy for DDH  
– Long term results of Salter pelvic osteotomy over 30 years –  
Shigeru Yanagimoto  
Saiseikai Central Hospital, Tokyo, Japan
73. Multimodal management of complex acetabular fractures  
Laurent Sedel  
Hopital Lariboisiere and university of Paris 7 Denis Diderot, Paris, France
74. Dual SC Screw; a novel device of internal fixation for femoral neck fractures  
Takafumi Hiranaka  
Dept. of Orthop. Surg. and Joint Surgery Centre, Takatsuki General Hospital, Osaka, Japan
75. A New Analysis with 3-D CT for the Trochanteric Femoral Fracture  
Moto'o Yasuma  
Yamachika Memorial Hospital, Kanagawa, Japan



## Special Lectures

1

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### Femoral Impaction Grafting using the Charnley-Kerboull Cemented Stem SURGICAL TECHNIQUE AND 2 TO 16-YEAR FOLLOW-UP RESULTS

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Luc Kerboull<sup>1</sup>, Moussa Hamadouche<sup>2</sup>

<sup>1</sup>Marcel Kerboull Institute, 2a Avenue de Ségur 75007, Paris, France

<sup>2</sup>Department of Orthopaedic and Reconstructive Surgery, Service A, Centre Hospitalo-Universitaire Cochin- Port Royal, 27 Rue du Faubourg St Jacques, 75014, Paris, France.

We report on 129 consecutive femoral impaction grafting revisions using a Charnley-Kerboull stem of standard length after a mean follow-up of 8.2 years (2 to 16 years). Extramedullary reinforcement was associated to the impaction grafting procedure, using allograft cortical struts in forty-nine hips and cerclage wires in thirty hips. One hip had an intraoperative fracture of the femur. No postoperative femoral fracture occurred. Two stems subsided of 5 and 8 mm, respectively, and were considered as radiologic failures. No revision of the femoral component was performed. The survival rate at nine years of the femoral component, using radiologic failure as the end-point, was 98%. This study demonstrated that impaction grafting using a Charnley-Kerboull stem is associated with a low rate of subsidence. Moreover, systematic reconstruction of distal bone deficiencies or weakness with bone allograft cortical struts appeared efficient to prevent the occurrence of femoral fracture up to 16-year follow-up.

#### INTRODUCTION

The treatment of extensive femoral bone defects related to implant loosening following total hip arthroplasty remains one of the most debated issues. The use of a larger and/or longer cemented implant has been shown to be ineffective with survival of 75% at 8 years in the Swedish register.<sup>1</sup> Currently, two main surgical options are employed to restore bone stock in order to allow a stable and lasting fixation of the new implant. The first one consists of implanting a long uncemented femoral component to obtain distal fixation and proximal bone regeneration.<sup>2,3</sup> The second is based upon immediate restoration of bone stock provided by allograft bone, under massive or morselised form, in association with a cemented femoral component of variable length. Difficulties related to the availability of massive allografts have restricted their indications that are now limited to major femoral cortices deficiencies.<sup>4</sup> On the other hand, since its first description by the Exeter Group in 1991,<sup>5</sup> the favorable results of femoral impaction grafting reported by several authors have made this technique an accepted method.<sup>6-18</sup> However, the high prevalence of perioperative femoral fractures and postoperative stem subsidence remain a cause for concern.<sup>19-25</sup> Our experience with femoral impaction grafting started in 1989. From 1991, we used specialized instrumentation specifically designed for impaction grafting using Charnley-Kerboull stems of standard length. In addition, area of proximal and distal femoral cortical defects and thinning were systematically reinforced using extramedullary allograft cortical struts or wires prior to the endomedullary reconstruction. We hypothesized that these technical modifications in association with a femoral component that was not designed to subside within the cement mantle would decrease the prevalence of perioperative fractures and stem migration. To test this hypothesis, we retrospectively reviewed our experience of femoral impaction grafting in 129 hips with special emphasis on perioperative complications and stem subsidence after a minimal two-year follow-up



## 2

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## Role of pelvis tilt orientation

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Pierre Roussouly

Croix rouge française-CMCR des Massues

Sagittal positioning of the pelvis characterized by the rotation around the femoral heads is measured by the Pelvis Tilt Angle (PT). This angle is designed between the vertical axis and a line running from the centre of the bi-femoral axis and the centre of the sacral end. The angle between sacral plateau and horizontal is the Sacral Slope (SS). Geometrically and functionally both angles PT and SS are linked: a posterior rotation of the pelvis (increasing PT= retroversion) induces a decreasing SS. Decreasing PT (anteversion) induces an increasing SS. Sacral plateau inclination and femoral head positioning are linked by a shape angle: the Pelvic Incidence (PI); It is designed by the line between the centre of femoral heads and the centre of the sacral plateau and the perpendicular to the sacral plateau. There is a mathematical relation:  $PI=PT+SS$ . The normal range of PI is 35° to 85°.

In spinal pathology, a loss of lumbar lordosis or an increasing kyphosis is compensated by a posterior tilt of the pelvis. A small PI limits PT when a high value of PI allows a large PT. Big retroversion of the pelvis is possible only with high PI. Big retroversion of the pelvis induces hips hyper extension, acetabulum anteversion, and knees flexum.

In conclusion there is a direct link between degenerative spinal pathologies, and lower limbs joints orientation.

## 3

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## Contribution Of Lyon School In Patello-femoral Disorders Management

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Philippe Neyret, Elvire Servien, Sébastien Lustig

Dept de Chirurgie Orthopédique et Traumatologique Hôpital de la Croix Rousse, 69004 Lyon France

In the Lyon school, after the 6th Journées Lyonnaises de Chirurgie du Genou entitled “pathologie fémoro patellaire” held in Lyon under the direction of Henri Dejour and Gilles Walch, we considered two periods :

- Before 1987, with mainly the Roux Elmslie period but also Hauser, Goldthwait, Maguet procedures.
- After 1987, the “menu à la carte” aimed to correct the anatomical abnormalities: trochlea dysplasia, patella alta, abnormal Trochlear Groove –Tibial Tuberosity distance or abnormal patellar tilt.

This algorithm was modified recently, taking into account the MPFL insufficiency and a new algorithm will be presented.



## Luncheon Seminars

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### DUAL MOBILITY CUP: PAST, PRESENT AND FUTURE

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Olivier Guyen

Edouard Herriot Hospital Orthopaedic Department – Pavillon T Lyon, France

The dual mobility concept has first been described in 1976 by Pr Gilles BOUSQUET in France. Such a concept results of the combination of the Charnley low friction arthroplasty concept and the McKee-Farrar large femoral head concept. With the interposition of a mobile polyethylene component between the prosthetic head and an outer metal shell (highly polished inner bearing), such an implant provides 2 bearings (inner and outer bearings).

Total hip arthroplasty (THA) instability remains a challenging situation and constrained implants have been reported as the most popular option over the last 10 years. However such implants have been reported with high stresses transmission at the interfaces, leading to accelerate wear, osteolysis and loosening. In addition, constraining devices have been reported with high potential for mechanical failure because of the complexity of such implants. We report an 11% failure rate at 28.4 months follow-up at Mayo Clinic with the use of a tripolar constrained implants, and described multiple mechanisms of failure.

Because of the limitations of the current options to manage recurrent total hip arthroplasty dislocation the dual mobility concept has gained renewed attention in France and Europe over the last 10 years. The original design of the Bousquet's dual mobility cup has been altered in order to improve ROM and stability, and the second generation of dual mobility implants has become commercially available in 2000. Very encouraging clinical results on stability explain the increasing use of such implants not only in Europe, but also currently worldwide.

We report mechanical studies designed to test a dual mobility hip implant range of motion (ROM) to impingement and stability using computational simulation and experimental methods. Dual mobility implants significantly increase the head to neck ratio and allowed ROM substantially greater than conventional implants. Because the increase of motion was substantial in situations at risk for dislocation, dual mobility implants represent an attractive surgical option to manage recurrent dislocation and prevent dislocation in selected patients.

We report excellent long-term clinical results at our institution with the use of a dual mobility implant in revision procedures for total hip instability, and in primary THAs in patients at risk for dislocation. Very low complication rates have been observed. These reports are in agreement with the results of the French Orthopedic Society (SOFOT) Symposium held in 2009 devoted to the dual mobility concept.

Given these reports, dual mobility implant compares favorably with other options proposed to manage instability (especially constraining devices) and is currently becoming the most popular option worldwide.

Recently, the use of highly cross-linked polyethylene with dual mobility implants has been proposed in order to improve longevity with higher resistance to wear. Longer follow-up is required in order to determine the value of such an option.





## 2

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## Knee stability and implant design of total knee arthroplasty

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Shuichi Matsuda

Kyoto University

When total knee arthroplasty is performed, we remove medial and lateral menisci, ACL, and sometimes PCL. Therefore, knee stability should be achieved by the remaining ligamentous structure and articular surface geometry. Varus-Valgus and rotational stability can be mainly obtained by proper tensioned collateral and capsular ligament. However, anterior-posterior stabilizing mechanisms should be built in the knee prostheses.

Post-cam mechanism has been developed to maintain posterior stability and to promote posterior rollback of the femur. Clinical studies have shown that post-cam mechanism plays the theoretically expected roles, but recently, severe wear and breakage of the post has been reported. In our laboratory studies, very high contact stresses were found at the post in deep knee flexion. Deep-dish tibial insert is another mechanism to restore posterior stability. It is easy to use and does not require additional bone resection, but rollback movement of the femur is not achieved by this mechanism. Without rollback of the femur, knee flexion would be interfered and greater quadriceps force is required to extend the knee due to decreased lever arm effect.

Recently, some knee implants are designed to guide medial pivot motion of the knee. These designs have some constraint for the medial side and give more freedom for the lateral compartment. One particular design incorporated the twisted post and the convex lateral tibial plateau to guide the lateral femoral condyle to move more posteriorly. Since the medial pivot motion is not only close to the normal knee motion but also related to “normal feeling” of the postoperative patients, it seems to be beneficial to have medial pivot motion after TKA. However, how far we should guide the knee motion is another important question. Too much constraint on the medial side would impede high flexion because the medial condyle of the femur also moves backward in deep knee flexion. Also, excessive posterior movement of the lateral femoral condyle would increase tension of the soft tissue, which possibly causes clinical problems such as ITB syndrome. We should continue biomechanical and clinical research to solve these problems. Especially, I would like to emphasize more precise surgical techniques, such as rotational alignment and ligament balancing, are absolutely necessary to control knee motion in combination with modification of surface geometry.

## 3

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## Patient Personalized Instrumentation for TKA; Comparative Study With the Conventional Instrumentation

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Luc Kerboull

Centre Médico-Chirurgical Paris V

We present a new technique for TKA implantation which utilizes patient-specific femoral and tibial positioning guides developed from MRI to offer an individualized approach to total knee replacement. This is a prospective non controlled study which aims to analyse the precision of this technique, its advantages and inconvenients in comparison with the conventional instrumented technique.

**Material** The MRI provides a consistent three-dimensional data set of the patient's anatomy which allows for 3D axis identification. The ideal position and sizing is performed by the surgeon on this 3D model and the patient specific guides are manufactured in advance in order to reproduce the bone cuts corresponding to this positioning and implant size. There are no intramedullary nor extramedullary instruments during the surgery.

**Method** We compared 20 patients operated with this technique with 20 patients operated with the conventional technique. The hypothesis was a difference  $<2^\circ$  between the 2 techniques. The measured parameters were: HKS, HKA, tibial slope, femoral rotation on CT Duration, bleeding, pain on VAS and morphine consumption, active flexion, KSS, Oxford score, recovery of independent walking and delay of return to home. Both groups were identical for gender, age, BMI, etiology, comorbidities, pain and rehabilitation protocols.

**Results** There were no significant differences on HKA, HKS angles, femoral rotation, active flexion, pain, length of hospital stay. The surgery with the patient specific instruments was 10 minutes shorter than the conventional one ( $p < 0,05$ ) and the bleeding was inferior with a ratio of 1/3 ( $p = 0,02$ ). There were no complications with this technique and the use of the conventional guides were never necessary with the patient specific instrumentation.

**Discussion and Conclusion** The patient specific instrumentation for TKA has a precision identical to that of the conventional technique, including for femoral rotation and ligament balance. The advantages of this method are: Reduced per and post operative bleeding Shortening of the operative procedure It is reproducible, including for less experimented surgeons and allows teaching and assistance in a lower technological institution. The number of implant sizes is much inferior (2/9) just as the quantity of instruments to be sterilised. These advantages induce a cost reduction which could be inferior to the price of the procedure.



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## Problems of osteoporotic fracture

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Mutsumi Matsushita

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In recent years, cases of osteoporotic fragility fractures are increasing. Although a decreased incidence of fractures is observed especially after introduction of pharmacotherapy in many countries, the incidence is still increasing in Japan at present. Because of the low introduction rate of preventive therapy for subsequent fractures after an event of a fracture (secondary prevention), Japan Osteoporosis Society adopted “Cut the chain of fractures” as a main theme of its annual meeting last year. Although attempts have been made to treat fractures efficiently by using a regional liaison pathway for femoral neck fractures, etc., introduction of secondary preventive therapy has not been necessarily promoted. The osteoporosis liaison service, which was started in the United Kingdom, facilitates introduction of secondary preventive therapy for fractures through cooperation among healthcare professionals other than orthopedists. Since last fall, training courses have been provided for non-physician healthcare professionals in Japan. At our hospital, 7 non-physician healthcare professionals who had received the training formed a liaison team and started activities, such as holding enlightenment seminars and providing instructions to hospitalized patients. In the future, the team plans to continue to follow up patients and to provide patient compliance instruction after transfer to other hospitals through the regional liaison pathway for femoral neck fractures. Another problem of osteoporotic fractures is the difficulty in diagnosis and treatment of fractures, which is seen especially in cases of vertebral fractures. In the fields of outpatient and emergency care, ultra-low-energy fractures that are not caused by falling account for more than a half of osteoporotic fractures, and the rate of cases requiring magnetic resonance imaging for definitive diagnosis reaches 30% at present. Furthermore, the increase in patients unresponsive to conservative therapy, such as those with subsequent vertebral collapse, delayed union, pseudarthrosis, and delayed paralysis, is recognized as a major problem in the field of spine surgery. Although surgical treatment is necessary in those patients, the current situation does not allow much room for optimism regarding postoperative course due to problems concerning adjacent vertebral bodies. Ultimately, the best treatment is to prevent intractable cases that require surgical treatment. However, no definite conservative therapy is known at present. Among anti-osteoporotic drugs, many of which have anti-resorptive activity, only teriparatide has osteogenic promoting activity. While the drug is expected to produce both fracture-preventive and fracture healing-promoting effects, reports on its clinical use are increasing. Since we experienced a case of L5 radiculopathy (talipes equinus) due to lumbar fracture showing complete response, we have aggressively used teriparatide in cases of delayed union or pseudarthrosis of vertebral fractures and observed the marked effects of the drug. Although our experiences are still limited, we expect that administration of teriparatide to patients with delayed union of osteoporotic vertebral fractures at the appropriate time may reduce patients who will receive surgical treatment.



## Session

1

### Effect of stem design for post-operative radiological findings

– Composite beam vs. Taper-slip –

Hiroshi Fujita, Tomoo Okumura, Satoru Yamamura, Yasuyuki Mizuno, Makoto Yoshida  
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**“Purpose”** One of the drawbacks of cemented total hip arthroplasty (THA) is aseptic loosening after long period, major reason for which is bioinertness of PMMA bone cement. To improve longevity of THA, interface bioactive bone cement (IBBC) technique which is characterized with smearing hydroxyapatite (HA) granules just before cementation has been used in our institute.

**“Objective”** Smooth-surfaced triple-tapered Titanium-alloy stem (T) and Exeter stem (E) have been used consecutively in the different period. Objective of the present study was thoroughly comparing two stems clinically and radiologically.

**“Method”** The present study includes 38 hips of T and 40 hips of E. Mean postoperative follow up period was 7.7 years for T and 6.2 years for E. Radiolucent line (RL) was determined as clear line with sclerotic demarcation and cancellisation as without it.

**“Results”** Pre- and postoperative evaluation using Merle d'Aubigné score were 8.1 (2.2, 2.2, 3.7) and 16.0 (6.0, 5.2, 4.8) points for T and, 8.1 (2.2, 2.2, 3.7) and 16.4 (6.0, 5.6, 4.8) for E, respectively. Postoperative cementing grade using Barrack's classification was classified as A for 30 hips in T and 39 hips in E, and as B for 8 hips in T and 9 hips in E. Neither osteolysis nor loosening was observed in both groups. No RL at bone-cement interface, focal osteolysis, cement fracture, was observed. Cortical hypertrophy (CH) was observed in 7 hips of T and 5 hips of E (NS). Cortical hypertrophy (CH) localized beyond stem tip was observed in all hips of T and in 1 hips of E ( $p < 0.05$ ). Cancellisation was observed in 17 hips of T and 16 hips in E (NS).

**“Conclusion”** The present study revealed excellent medium-term result was obtained using both stems fixed with IBBC technique. CH was observed more distally in T compared with E.

2

### Comparisons on radiographic findings in cemented THA using conventional bone cement and interface bioactive bone cement (IBBC) with HA 25 to 30 years after surgery

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Masaru Ueno<sup>2</sup> and Ryoko Iwata<sup>3</sup>

<sup>1</sup>Tominaga Hosp., Osaka Japan

<sup>2</sup>Kyocera Medical Corporation

<sup>3</sup>Olympus Terumo Biomaterials Corporation

#### [Materials and Methods]

To improve the longevity of conventional bone cement, HA granules were interposed between bone and bone cement at cementation (IBBC). In group 1 (1982), IBBC and conventional bone cement (Non-IBBC) were used in 12 and 80 joints respectively. In group 2 (1985-1986), in the same patients Non-IBBC in one hip and IBBC in the other hip were used in 25 patients. In group 3 (1986-1987), IBBC was performed in 285 joints. Radiographic findings in were compared.

#### [Results and Discussions]

In group 1, in IBBC, the appearance rate of radiolucent line and osteolysis were extremely low. In Non-IBBC, osteolysis, radiolucent line and loosening appeared in large areas. In group 2, in IBBC, radiolucent line and osteolysis were extremely low, however in non-IBBC, they were very high. In group 3, the appearance rate of radiolucent line and osteolysis were extremely low. Even in the case of polyethylene wear in high degree, very few osteolysis appeared. In histology, very thick and rich bone formation with HA granules was found around the bone cement.

#### [Conclusion]

For extremely long term longevity of THA, the eternal existence of the osteoconductive materials between bone and implant is the most important. At present IBBC is fulfilled in this aim.



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Can we augment the acetabular bone stock in cementless THA

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**PURPOSE:** The aim of this study was to review the clinical and radiographic results of our characteristic bulk bone – grafting in conjunction with a cementless cup treatment for dysplastic hips.

**METHODS:** The study group comprised 135 consecutive patients (150 hips) in whom degenerative joint disease secondary to developmental dysplasia, had been treated with primary total hip arthroplasty between April 2002 and December 2010. One hundred and seven hips were classified as grade 1; 32 were as grade 2; six were grade 3 according to the classification of Crowe. The mean age at operation was 61 years (35 to 87). The mean duration of follow-up was 6 years (2 to 10).

**RESULTS:** Inclination of the acetabular component averaged 42.5° (31 to 50). The center of the hip was placed an average of 21.2 mm proximal to the interteardrop line. At the time of the latest follow-up, all but one grafts had united. One acetabular component was revised because of recurrent dislocation. There were no deep infections or clinically evident pulmonary emboli.

**CONCLUSION:** Golf club-shaped bulk femoral head autograft can achieve placing the socket at the true anatomical acetabular level and augmenting the acetabular bone stock.

4

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Long term results of Opti-Fix Plus total hip system with the conventional polyethylene liner

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Masazumi Saito, Keiichiro Ueshima, Mikihiro Fujioka, Yoshiki Nishikubo, Shigehiro Inoue and  
Toshikazu Kubo  
Dept. of Orthopaedics, Graduate School of Medical Science, Kyoto Prefectural Univ. of Medicine, Kyoto, Japan

The purpose of this study was to evaluate the long term results of Opti-Fix Plus total hip system with the conventional polyethylene liner. We retrospectively studied 70 patients (80 hips) who underwent cementless primary total hip arthroplasty using Reflection cup and Opti-Fix Plus stem between 1996 and 2002 in our hospital. The conventional (non cross-linked) polyethylene liner was used in all hips. The mean follow-up was 11.5 years (10 to 15). Clinical results were evaluated with the Japanese Orthopaedic Association (JOA) hip score. The incidence of revision surgery was recorded. Bone changes and femoral head penetration was assessed on plain radiographs. The mean postoperative JOA hip score was 82.1 points, significantly improved compared with the preoperative score. 15 hips underwent revision surgery, 12 hips were exchanged polyethylene liner. Acetabular components were revised in 2 hips, femoral component was revised only one hip. Osteolysis around the proximal stem was frequently observed. The mean linear wear rate was 0.17 mm per year. In this system, the excessive wear of conventional polyethylene liner and osteolysis around the proximal stem were the major problems. We underwent exchange of polyethylene liner at high rates. However, implant stability was relatively favorable.



## 5

## CAN SHORT STEMS BE CONSIDERED AS BONE PRESERVING IMPLANTS? About 68 short metaphyseal cementless stems (Proxima, Depuy)

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The potential advantages of short stems are bone preservation, stress shielding reduction and easier revision. The aim of the study was to analyze the results of a short metaphyseal cementless stem (Proxima, Depuy).

**Material and method:** We review 68 primary THR using a Proxima stem, performed in 52 patients (31 men, 21 women) between 2006 and 2011 in 3 different centers. The mean age at the procedure was 49 years (24-79). All procedures were performed using a posterolateral approach and a cementless cup.

**Results:** No patients were lost to follow up. One patient deceased at 4.5 years postoperatively. 6 patients (9%) sustained revision for recurrent dislocation (1 hip), ceramic insert fracture (1 hip), pain (2 hips) and stem loosening (2 hips). Removal of the stem has been performed in 5 patients at 20 months (14-32) and always very difficult because of its large flare. One trochanterotomy was necessary. Graft of the femoral metaphysis was performed in all cases, using autograft, allograft or bone substitutes. 4 cementless standard stems and one cemented stem were used for the revision. At a mean follow up of 40 months, the mean Merle d'Aubigné and Harris scores increased from 10.9 and 52 to 17.5 and 95 respectively at the last follow up and the Womac index decreased from 40 to 17. The radiological results showed no loosening nor migration but significant stress shielding in nearly 50% of the cases.

**Conclusion:** Although this short metaphyseal cementless stem may provide stable bone fixation at short term, its implantation and removal does remain difficult. Therefore, it may be not considered as a bone saving stem.

## 6

## Long-term survival of Cementless THA using Metasul-28 mm Articulation in Active Patients less than 50 years old

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<sup>3</sup>Dept. of Orthop. Surg., Hôpital Salengro, Univ. of Lille, France

**Background:** In young and active patient, main concern with longer life expectancy is the longevity of the total hip arthroplasty (THA).  
**Aim:** To report the results of a multicenter, retrospective series of 83 cementless THAs in 73 patients implanted with a metal-on-metal articulation.

**Methods:** All patients were less than 50 years old (average age: 41 years) and 80% of the patients had an activity level graded Devane grade 4 or 5 at the time of the index procedure. A 28 mm Metasul articulation was used with 3 different titanium alloy acetabular components: 59 press-fit cups (19 hydroxyapatite coated) and 24 grit-blasted threaded cups.

**Results and Discussion:** At the most recent follow-up (mean, 11 years), the average Merle d'Aubigné score improved from 11.1 points to 17 points and 70 patients (96%) had an excellent result. There was no radiographic evidence of acetabular component loosening at the last available radiographic control. However, 10 acetabular components showed radiographic evidence of lucency limited to 1 zone. Two THA required revision, complete in one for late deep infection and partial in another for limited peri-acetabular osteolysis due to polyethylene wear debris. The 13-year survivorship with the endpoint of revision (i.e., exchange of at least one prosthetic or bearing component) for any reason and for aseptic loosening was 93.2% and 100%, respectively.

**Conclusion:** Metasul bearings with cementless acetabular components remain promising in this "high risk," active and younger patient population. However, additional follow-up strategies are recommended to determine any possible long-term deleterious effects associated with the dissemination of metallic ions.



7

## Matched Ceramic-Ceramic versus Ceramic-Polyethylene on the contralateral hip: A 30-Year Study

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<sup>1</sup>Univ. Paris East France

<sup>2</sup>Juntendo Univ. Tokyo Japan

**Introduction:** We reviewed 126 patients with bilateral THA (one ceramic-ceramic and the contralateral ceramic-polyethylene) who had surgery between from 1978 to 1985.

**Methods:** The diagnosis was osteonecrosis. All the femoral heads were alumina 32 mm and made by the same manufacturer (CeraVer Osteal, Roissy, France). All the cups (alumina-AL or polyethylene-PE) and femoral implants were made by the same manufacturer. We evaluated the long-term clinical and radiographic results, rates of revision, reason of revision, and survival of the THA. Osteolysis was measured on anteroposterior pelvic X-rays and with three dimensional volume based on CT scans at the most recent follow-up. The minimum followup was 32 years (30 to 35) with a mean FU for PE hips of 29 years (27-31), and a mean FU for AL hips of 32 years (30-34)

**Results:** At the most recent followup in the AL/AL group 35 among 126 hips (28%) had revision, and in the PE group, 47 among 126 hips (37%) had revision. Most of the revisions were performed for aseptic loosening of the cup. Among the 35 hips with revision in AL group no re-revision was necessary; among the 47 hips with revision in PE group 10 re-revisions necessary. Three allografts used in AL group, and 35 necessary in the 57 revisions or re-revisions in the PE group. With PE liners, the cumulative risk of dislocation was 2% at one year, with an increasing rate of late dislocation to elevate to 13% at 30 years for patients who were alive and had not had a revision by that time, versus 2% at 30 years for AL cups (no late dislocation). In PE hips the average linear wear was 0.05 mm per year (range, 0.03-0.09 mm/year), and in AL hips 13 µm per year (range, 0.00-0.20 µm /year). On PE hips, 100% of osteolytic lesions on acetabulum and femur radiographs, versus 5% for AL hips at final FU. There were only 2 stem revisions among 252 hips at 30 years follow-up.

**Conclusion:** with the first generation of alumina, better survivorship without osteolysis, easier revision, no re-revision, and no late dislocation were the advantages of AL/AL bearing surfaces at 30 years follow-up.

8

## Prospective study of a self locking straight modular and cementless femoral stem (H-MAX M 12 options of modular necks) clinical and radiographic results

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**METHODS:** 153 patients (164 hips) underwent total hip arthroplasty (THA) with H-MAX M stem (Lima Corporate) during 2008-2010. They were 72 (44%) women and 92 (56%) men, 67y (30-89). Etiologies were usual (coxarthrosis principally). Preoperatively, the average CCD angle and femoral offset were 131° (114°-165°) and 50 (26-70) mm. Lateralized necks were employed in 61% of implants, whereas standard ones only in 39%. Stems were implanted with cementless press-fit cups, mainly with ceramic-ceramic bearings. Clinical and radiological evaluation were performed preoperatively, at discharge and at 6, 12, 24 and 36 months.

**RESULTS:** At 36 months, HHS improved from 43±14 (8-89) preoperatively to 94±6 (80-100). Restoration of joint biomechanical parameters was accomplished in all cases with adequate correction of preoperative CCD angle and LLD. Implants had effective osseointegration. Only 2 (1%) cases of non-progressive asymptomatic radiolucent lines (1 mm) were detected in Gruen zones 1 and 7.3 (2%) cases of subsidence (<10 mm) and 1 (0.5%) revision due to diaphyseal fracture were reported. Neither loosening nor neck fractures were observed in this study.

**CONCLUSION:** The modular H-MAX M stem is an effective solution for THA, providing accurate anatomical reconstruction, especially for Hard on Hard Bearings.



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## HA-coated Corail® Stem Long-Term Results Based upon the 27-Years ARTRO Group Experience

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Argonay Private Hospital, France

This study reports long-term results of HA-coated Corail® stem at 27 years follow-up.

The Corail® stem designed in 1986 was fully hydroxyapatite-coated. Bioactive coatings may contribute to the durability and stability by significantly reducing osteolysis and the risk of delayed aseptic loosening. Hydroxyapatite also improves clinical results significantly in providing superior stability thanks to osteointegration.

Even if the uncemented fixation benefits using HA-coated implants are now widely acknowledged and established, at the time of the original design, it was experimental.

This study, conducted over a 27-years period, has greatly contributed to demonstrate the unmatched reliability of Corail® stem, in terms of functional and radiological outcome. In the long run, preservation of the long-term stability and excellent bone trophicity will further increase the durability of the implant, with not any thigh pain.

The survivorship was 96.3% at 27 years follow-up with revision for aseptic loosening at endpoint.

This study confirms the very long-term HA-coated Corail® stem reliability.



## 10

### Impaction bone grafting with mixture of hydroxyapatite granule in revision total hip arthroplasty for acetabular bone deficiency

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#### Materials and Methods

We reviewed 25 hips in 25 patients undertaken acetabular revision for AAOS type 2, 3, 4 bone deficiency with impaction bone grafting. The grafted materials were chipped allograft with 5-8 mm diameter mixed in 30% volume of hydroxyapatite granules with 5 mm diameter. There were 1 man and 24 women; their average age at the operation was 69 years. The mean follow-up period was 4.3 years (1.5-7). Bone deficiency was clarified in AAOS classification type 2: 9 hips, type 3: 15 and type 4: 1. Solitary revision of the cup was performed in 11 hips and combined revision of the stem in 14. We evaluated the clinical and radiographic results including any complications.

#### Results

23 hips demonstrated stable fixation of the cup. Aseptic loosening developed in 1 hip with AAOS type 4 bone defect (pelvic discontinuity). Re-revision was performed for this case after 2.1 years after the operation. Excluding 1 patient with radiographic loosening, 22 patients had no pain and one complained slight pain at the latest followup.

This technique has provided stable reconstruction for acetabular bone loss and can supplement the volume and augment the mechanical strength of bone grafts.

## 11

### Reconstruction of acetabulum using Regenerex acetabular augment in THA

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Reconstruction of large acetabular bone defect in dysplastic hip cases or revision cases are usually difficult. Regenerex acetabular augments (Biomet, Warsaw, IN) were developed to occupy these bony defects. On this paper, we will report the short term results of our experience and tips of usage.

We operated 9 hips of 9 cases performed THA with Regenerex acetabular augment in our institution. The revision for aseptic loosening were 6 and for Girdlestone hip after infected THA were 3. Indication criteria of acetabular bony defect was from 2A to 3B in Paprosky's classification without pelvic discontinuity. Operation time, bleeding, complications, JOA score, and radiographic results were evaluated. Mean follow up period was 16.5 month (14~20.5). Averaged JOA score was improved from 57 to 83 points and no complications such as infection, dislocation and neuroparalysis were observed. As radiographic evaluation, hip center was caudally shifted almost 14 mm, and both migration and loosening of Regenerex acetabular augment was not observed. As for bone regeneration, obvious radial trabecular pattern was admitted in only one case 6 month after the operation.

'Regenerex acetabular augments' have a lot of size variations and assure initial mechanical strength. Moreover, its original titanium continuous porous structure has ability to progress early bone regeneration. These results indicated that Regenerex acetabular augment is one of valuable options for reconstruction of acetabular defects.





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### Acetabular Reconstruction using Kerboull-type reinforcement plate

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Kerboull-type acetabular reinforcement plate is a special device to reconstruct the cemented cup in the acetabulum. It is a reconstruction guide and a reinforcement device. We are using this device for several situations of acetabular reconstruction. For the bone defects we have been using autografts, artificial bone (HA: hydroxyapatite) and allografts. 162 hips were reconstructed with this device. These hips were divided into three groups depending on the graft materials used in the weight-bearing area. Group A using autografts were 15 hips, Group B using artificial bone were 72 hips and Group C using allografts were 75 hips. Mean follow-up period was 11 years and 2 months (5-17 years) in Group A, 8 years 7 months (1-18 years) in Group B and 4 years 8 months (1-15 years) in Group C. Survival rate (end-point: revision for aseptic loosening) at 10 years was 89.5% in Group A, 96.8% in Group B and 100% in Group C. Kerboull-type reinforcement plate is a very useful device for acetabular reconstruction with autografts, HA and allografts.

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### Acetabular reconstruction using the Ganz reinforcement ring with dual mobility socket in revision total hip arthroplasty 'About 41 cases'

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The placement of the acetabular component in revision total hip arthroplasty often involves the use of a reinforcement ring. Ganz ring has been used for mild to severe bone defects for a long time. However, too much hip dislocations occur after the revision surgery. So we chose to associate dual mobility socket with Ganz ring since 2004. The aim of our study was to assess the stability of these acetabular reconstructions and to assess its benefits in terms of prevention of hip dislocations.

We carried out a retrospective review of mid-term clinical and radiological results about 41 THR, performed between 2004 and 2007. An acetabular bone reconstruction was associated in 60.9% of the procedures. The mean following time was 5.8 years (4 to 7 years). 2 patients were dead, we lost contact with 3 others. 4 patients needed another revision: (3 infections, 1 aseptic loosening of the ring). We did not find any loosening between the socket, the cement and the ring. Kaplan-Meier survival estimation was 97.4% after 7 years. (a failure was defined as any aseptic acetabular loosening, either found on the radiographies or leading to revision). The overall dislocation rate was 2.4%.

Cemented metal-backed spherical cups inside the ring do not seem to alterate the fixation, especially between socket, cement and ring. Moreover, dual mobility clearly decreases the risk of instability.

These results show that this surgical procedure should be widely used. A longer following time is now needed to confirm these encouraging results.



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REVISION of acetabular component in young age population

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Laurent Sedel

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In young patients, revision is always a challenge. We consider as a goal to use a ceramic on ceramic material for any situation. Either it is possible to use a regular material, either in Paprosowski 3 or 4, this is impossible.

**Special materials**

Since 4 years we have some special metal back with multiple holes and thicker shell (ceraver\*) to insure a proper fixation of the ceramic liner.

We can now use pubic screws in some cases which give an excellent and stable fixation. We start by placing the first screw in the pubic ramus, and perform an Xrays control. After impaction, other screws are implanted as needed, depending of the remaining bone. This gives an excellent and stable fixation.

**Preliminary results**

We will present the first 25 cases using this special tool.

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Femoral calcar reconstruction using metal mesh and impacted morcellised allograft in revision total hip arthroplasty

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**Aim:** The aim of the present study is to assess mid-term results after femoral revision comprising reconstruction for calcar segmental defect using metal wire mesh and impacted morcellised allograft.

**Methods:** We performed 26 femoral revisions with calcar reconstruction in 24 patients. The average follow-up period was 5 years and 1 month. All surgeries were performed using a cemented polished collarless tapered stem. The segmental calcar defect was reconstructed with metal wire mesh with doubled stainless wires. Merle d'Aubigné and Postel hip scores were recorded for clinical assessment. Antero-posterior hip radiographs were analyzed pre-operatively, and post-operatively. Radiolucent lines, stem subsidence, and change of stem axis were recorded. Kaplan-Meier survival analyses were performed with any re-operation of the femoral component or aseptic loosening as endpoints.

**Results:** The mean Merle d'Aubigné and Postel hip scores improved from 10.4 points before the operation to 14.7 points at the final follow-up. No radiolucent lines and no stem axis changes were detected. Twenty-five of 26 hips showed less than 2 mm of stem subsidence at the final follow-up. Both hips of one patient underwent a one stage stem exchange because of an infection. No cases showed aseptic loosening up to and including the last follow-up. The Kaplan-Meier survival analysis revealed that the survival rate at five years after revision was 88.0% with any type of re-operation as the endpoint and 100% with aseptic stem loosening as the endpoint, respectively.

**Conclusion:** Reconstruction using metal wire mesh and tightly impacted morcellised allograft is a favorable method for the correction a calcar segmental defect.



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**16****Three dimension global views of the patient's posture: the EOS imaging system sheds new light on sagittal, frontal and cross-sectional balance of the trunk**

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A comprehensive assessment of each patient and in particular of the complex including the spine, pelvis, and lower limbs is essential for understanding each individual's postural adaptation. Monitoring the course of these patients and planning treatment strategies, surgical or not, can thus be rationalized and optimized. The EOS imaging system opens a new era for the global evaluation of the entire skeletal system in functional positions with a very low dose of irradiation. The simultaneous capture of anteroposterior and lateral images enables a three-dimensional surface reconstruction of the skeletal segments and the automatic calculation of all relevant orthopedic clinical parameters. EOS provides a unique solution to assess the adaptations in standing sitting or squatting positions. Length discrepancies caused by abnormal pelvic position or rotational changes of lower limbs can be qualitatively and quantitatively evaluated. Changes of frontal and sagittal balance of the posture during life, for example in the aging process, can be quantified and monitored. Evaluation and follow-up of postoperative results after surgery can be performed with a specific interest for joints replacements as the lack of significant artifacts with metal prostheses allows precise measurements of implants position.

The EOS imaging system is revolutionizing our understanding of hip-spine and hip/knees relations as it points out new information about "normal" spine, hips and knees, total hip or knee replacements dysfunction or failures and global imbalance of body posture.

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**17****THA patients in standing and sitting positions: the low dose "full body" EOS® imaging system provides new information about "normal" hip function and potential THA failures**

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Although the hip is a highly mobile joint, conventional imagery of THAs is still based on the static AP view of the pelvis in standing or supine position to assess cup orientation, which is an essential risk factor for prosthesis instability and wear. In addition, current imaging of THA underestimates the analysis of the pelvic and subpelvic sectors as part of the balance of the trunk.

Variations in pelvic tilt are an important phenomenon as it may significantly modify the cup orientation and the prosthetic hip biomechanics. Stiffness in the lumbar spine, progressive pelvic posterior tilt (pelvic extension) with aging spine or lumbosacral fusion are significant risk factors for THA subluxation and dislocation due to the lack of adaptation of the acetabulum from a standing to a sitting position.

Despite its great accuracy, CT scan imaging cannot be routinely performed as it is a costly method, which exposes patients to a significant dose of radiations. Moreover, the CT scan has to be performed in the supine position, which is an intrinsic limitation as the functional orientation of the cup is increasingly emphasized in the recent literature; that points out the potential interest of standing and sitting X-rays. The EOS® system is an innovative slot-scanning radiograph system allowing the acquisition of high definition images while the patient is in standing or sitting position. With simultaneous AP and lateral views, the EOS system allows a complete functional investigation for the measurements of pelvic and acetabular parameters with a low radiation dose.



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The whole-spine MRI test in 10 minutes as a primary screening or spine dock for spinal disorders

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**Aims**

There were no reports with the routine whole-spine MRI in patients with low-back pain or other spinal symptom. The aims of this report are both 1) to make a diagnosis of spinal disorders briefer and 2) to introduce a health screening test as a Spine Dock.

**Methods**

We used 1.5-T MRI unit. MRI was undertaken using T2-weighted imaging and T1-weighted. We connected the three MR images onto one sagittal plane at midpoint of spinous process, using "Stitching" application of the workstation, and made the entire whole spine imaging. It consists of 5 portion, that is, cerebellum and brain stem, cervical, thoracic, lumbar and sacrum. A total of 19 minutes was required to produce both sagittal T2 and T1 whole-spine images, and 10 minutes for T2 only.

We have investigated 250 patients (108 female, 140 male, the average was 69 years old) suffering from chronic pain or neuralgia (>12 weeks) examined by this method. We divided into three major category (A; Alignment, B; Bone, C; Canal stenosis) and two minor category (D; Disk, E; Enlargement of bone or cartilage).

**Results**

A category; Alignment abnormality 77% and Spondylolisthesis 23%. B category; Compression fractures 24% and Modic change 23%. C category; Canal stenosis 80%. D category; Degenerative disk disease 57%. E category; OPLL, OYL and ASH 14%.

**Conclusions**

We recommend this method for four following advantages. 1) This imaging test requires only 10-20 minutes. That is a simple and easy method without radiation exposure. 2) The patients don't have to take a burdensome or painful test. 3) We can evaluate the whole spine at a glance on one film. 4) This can lead to preventive or health medicine (spine and cerebellar dock), especially serious spinal disorders (red flags) such as spinal canal stenosis, multiple compression fractures and OPLL/OYL/ASH. Furthermore, we can diagnose spinocerebellar degeneration (SCD) unexpectedly.

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Magnetic resonance imaging evaluation of the effects of surgical invasiveness on paravertebral muscles following muscle-preserving interlaminar decompression (MILD)

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**Aim of this study.** To determine the extent of damage to the paravertebral muscles following muscle-preserving interlaminar decompression (MILD) using magnetic resonance imaging (MRI) to evaluate changes in the multifidus muscle (MF).

**Methods.** Thirty-four patients who had lumbar spinal canal stenosis (LSCS) treated with MILD were retrospectively investigated. A total of 61 decompressed disc levels and 34 non-decompressed levels were assessed. MRIs were obtained before surgery, and at three and 12-18 months after surgery. The rate of paravertebral muscle atrophy was evaluated to compare the area of the MF in the T2-weighted axial plane (intervertebral disc level). Changes in muscle signal intensity were also recorded.

**Results.** The rate of MF atrophy was 4.0% at the decompressed levels and 2.1% at the non-decompressed levels. There were no changes of signal intensity in the MF between the pre- and post-operative periods. In decompressed levels, muscle atrophy and signal intensity were significantly improved from three months to 12-18 months after surgery.

**Conclusions.** The extent of paravertebral muscle injury after MILD is satisfactory. The midline interlaminar approach used in this technique may prevent local denervation and irreversible damage to the paravertebral muscles. These results indicate that MILD is useful to treat LSCS less invasively.



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## Operative Indication Score (STERUMAN) a support tool for making and sharing clinical decisions

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**[Purpose]** Operative indications often differ from surgeon to surgeon in orthopedic and spinal surgery. This unclear aspect of treatment proposals has been left poorly addressed. A new philosophy 'Operative Indication Score' is now available to clarify the surgeons' decision-making process.

**[Methods]** The sum of values given to 8 attributes, including severity of symptoms, tendency of status, effectiveness of surgery, risk of surgery, urgency, mental status of the patient, ability of the surgical team, and negative relationships, was so designed to indicate the relative strength of operative indication, and this was applied to patients undergoing or considering spinal surgery.

**[Results]** The Score succeeded in demonstrating diverse distribution of the relative strength of operative indications in a visible manner. The majority of the patients undergoing spinal surgery were of moderate or weak indications, whereas strong (definite) indications were seen in 12%. Unfavorable clinical results tended to be associated with weak surgical indications. The mental subset had significant relationships with the short-term clinical outcome.

**[Conclusion]** This unique psychological tool can help not only surgeons to make and propose clinical decisions in a comprehensive (rational) manner rather than on impulse or intuition, but also patients and colleagues to share the process of clinical decision-making.

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## Treatment of Spinal Fracture Associated with Ankylosing Spinal Hyperostosis

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Ankylosing spinal hyperostosis (ASH) is disorders characterized by extensive ossification of the spinal column, which is susceptible to fracture even after minor trauma, and may cause neural damage with potentially devastating consequences. We conducted a retrospective review of 16 patients with spinal fracture associated with ASH with a mean follow-up of 11 months to describe the clinical and therapeutic features of these injuries with a special reference to the fracture site. Eighteen spinal fractures in 16 patients (9 male, 7 female, mean age 78.3 years) were documented. Fracture site was classified into 2 groups; within ankylosing vertebrae in 4 patients (group-A) and at the upper/lower transitional area of ankylosis to mobile segments in 12 patients (group-T). Most of these injuries were located in thoracolumbar region (62.5%), and delayed manifestation of neurological impairment was frequent (62.5%). Surgery was performed on 7 patients, consisting primarily of multilevel posterior instrumentation with or without vertebroplasty. Overall mortality was 16.7%. All 4 fractures in group-A demonstrated "reverse-Chance" type injury, and were more likely to exhibit neurological impairment (75.0%) and undergo operative management (100%). In contrast, although majority of fractures initially presented compression type in group-T (91.7%), neurological compromise during treatment was not rare (58.3%), and 3 patients received surgery (25.0%). Transverse fracture in patients with ASH had been reported to be at high risk for pseudoarthrosis and neurological impairment. The current study documented that even in patients with compression-type fractures apart from ankylosing vertebrae, great care should be paid for possible deterioration of neurologic status if conservative treatment was selected.



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Selective short fusion with TLIF for degenerative lumbar scoliosis

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We investigated the outcomes of selective short fusion with TLIF for mild-to-moderate degenerative lumbar scoliosis (DLS). Twenty-five patients who underwent 1- or 2-level TLIF for DLS having the Cobb angle of 10 to 33 degrees were reviewed retrospectively. There were 9 males and 16 females, aged 52 to 89 years with the mean of 72. The follow-up period was 6 to 19 months. The JOA lumbar score improved from an average of 14.2 (range 4-21)/29 points preoperatively to 24.5 (15-29) postoperatively. The coronal and sagittal alignments were stable and acceptable during the follow-up period in all patients. The bone-union rate at TLIF was 88%, and the other 12% were considered as stable non-union at the latest follow-up. Proximal junctional degeneration progressed in 4 patients and compression fracture in a distant vertebra occurred in 2, but no patient required an additional surgery during the follow-up period. There was no wound infection or life-threatening general complication. Among various preoperative parameters, the patients' age was the sole factor which significantly influenced the final outcome as measured by the JOA score. Adjacent-level degeneration did not affect the outcome during the specified period.

In conclusion, selective TLIF yields satisfactory short-term results in patients with mild-to-moderate degenerative lumbar scoliosis whose primary pathology, despite the whole lumbar deformity, can be specified as instability and/or spinal canal stenosis in short segments. Those patients having severe spinal malalignment, on the other hand, are not candidates for this strategy.

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Clinical result of muscle-preserving interlaminar decompression (MILD) for lumbar spinal canal stenosis a minimally invasive microscopic procedure for lumbar spinal canal stenosis

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**(The aim of this study)** The aim of this study was to report the clinical outcomes of less invasive surgery for lumbar spinal canal stenosis (LSCS), muscle-preserving interlaminar decompression (MILD).

**(Method)** The 44 patients with LSCS were included in this study. There were 13 women and 31 men, and the mean patient age was 66.8 years. The postoperative follow-up period ranged from 60 to 104 months (mean 72.8 months). Pre- and postoperative Japanese orthopaedic association (JOA) score and radiological evaluation were recorded. Neurological improvement was demonstrated in all patients. The mean recovery rate calculated with pre- and postoperative JOA score was 69.5%. There was no change of lumbar alignment and intervertebral range of motion.

**(Operative procedure)** This lumbar procedure was performed through a midline incision under operation microscope. Partial drilling of the spinous processes, and split of the supra- and interspinous ligaments provided a minimally invasive interspinous approach. The ligamentum flavum was totally removed, and decompressions are accomplished.

**(Conclusion)** In MILD for the lumbar spine, damage to the posterior stabilizing structures such as the intervertebral facet joints, paravertebral muscles, thoracolumbar fascia, supra- and interspinous ligaments could be minimized. Neurological improvement and lumbar stability were maintained for 5 years.



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## Hemilateral Lumbo-Iliac Fixation with Double Pedicle and Iliac Screws for Unstable Sacroiliac Injuries

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Four patients with acute unstable sacro-iliac (SI) fracture-dislocations and sacral fractures were treated with “Lumbo-Iliac Fixation with Double Pedicle and Iliac Screws”. These four patients consisted of 3 men and a woman, with ages ranging from 16 to 43 years. One patient had bilateral SI fracture dislocations (Denis, zone I), another patient had a Denis zone I lesion, two others had Denis zone II lesions. Three patients with unilateral lesions had limb length discrepancies of 25 mm, 21 mm and 20 mm before correction. All patients underwent follow-up studies for more than 12 months.

There were no patients who sustained any neurological complications, skin irritation, infection or reduction loss during or after operation. No patients had vertical translation of more than 2 mm, but only one patient had a slight external rotation deformity of 15°. Three patients had full scores of 18 and one had that of 17 according to Merle d’Aubigne’s. No patients complained of low back pain.

It is generally agreed that open reduction & internal fixation is functionally better than conservative treatment for unstable SI fracture-dislocations and sacral fractures. Anterior or posterior plating, SI screws, threaded sacral bars, spinal instrumentation and their combinations are proposed for the stabilization of the posterior SI instability. Spinal instrumentation which can reduce and stabilize the posterior element vertically and horizontally is thought to be an advantageous method, but an ideal method has not been unequivocally decided. We’d like to discuss whether our method may be an effective treatment for unstable sacroiliac injuries.



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Timing of implant removal in high-risk patients with deep wound infection after posterior spinal instrumentation

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**Purpose:** Eradicating deep wound infection after instrumented spinal fusion may require several debridements. Repeated procedures in high-risk may cause deterioration of their general condition. The purpose of this study is to determine the optimum timing of the decision regarding implant removal.

**Methods:** We retrospectively examined serial changes in C-reactive protein (CRP) levels, white blood cell (WBC) counts and % neutrophils in association with the time from initial debridement to resolution of infection or removal of implants in 23 patients who developed deep wound infection after spinal posterior instrumentation.

**Results:** Fourteen patients were successfully treated with a single debridement (non-removed group), 7 did not respond to initial debridement and required implant removal (removed group), and 2 died of sepsis without implant removal. CRP levels and WBC counts remained significantly higher in the removed group 7 to 14 days after the first debridement, and there were significant intergroup differences in % neutrophils 4 to 14 days after initial debridement.

**Conclusions:** Our results suggest that in high-risk, the decision to remove implants should be made within 7 to 14 days after the first debridement and can limit deterioration of the general condition.

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Benefit of surgical treatment for rheumatoid cervical spine in patients over the age of 70

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Rheumatoid cervical spine can induce several manifestations including neurological compromise. Surgical treatments are widely indicated for such conditions; however they carry high rate of perioperative complications even in younger patients. It is well known that mortality rate of patients with rheumatoid arthritis (RA) is higher than that of the general population; however there is few study that focused exclusively on elderly RA patients receiving cervical spine surgery. It is therefore still unclear whether surgical treatment for rheumatoid cervical spine is of any value in elderly RA patients.

The aim of the present study is to investigate clinical features and surgical outcomes of elderly RA patients receiving cervical spine surgery and to discuss the feasibility of surgical treatment.

We retrospectively investigated surgically treated consecutive 11 patients over the age of 70 at the time of surgery in our institution. Changes of neck pain, neurological symptoms, activity of daily living (ADL) score, perioperative complications, cause of death and rate of implant failure were studied.

Good pain relief was achieved in all patients. All patients gained ADL score except for one case, who developed serious depression after surgery. Implant failure was observed only one case. No surgically related death was confirmed.

Surgical intervention for rheumatoid cervical spine appears to be beneficial, even in patients who are already approaching their statistical life expectancy, i.e., over the age of 70, in pain relief and improving ability to engage in ADL.





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## A drain placement procedure and the frequency of postoperative epidural hematoma in muscle-preserving interlaminar decompression (MILD)

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**Aims:** Muscle-preserving interlaminar decompression (MILD) is one of the less invasive surgery for lumbar canal stenosis (LCS). The purpose of this study is to present our drain placement procedure, and to evaluate the position of drain and the frequency of epidural hematoma after MILD.

**Methods:** Seventy-four patients with LCS who underwent MILD were retrospectively reviewed. One intervertebral level was decompressed in 24 cases, two levels in 33 cases, three levels in 13 cases, and four levels in 4 cases. 145 intervertebral levels were decompressed in all. After decompression, the drain was placed in proper location using an original blunt drain guide-pin, which is bended in an arc. During closing the surgical wound site, saline was suctioned continuously through the drain to prevent the obstruction of drain and the formation of hematoma. Postoperative anteroposterior and lateral radiographs were used to evaluate the position of drain, and magnetic resonance imagings one week after surgery were used for the assessment of epidural hematoma after MILD.

**Results:** In 127 intervertebral levels (87.6%) of the total, the drains were placed at expected location. Epidural hematoma was found in 52 intervertebral levels (35.9%), but there were no cases in need of further surgery.

**Conclusion:** A drain placement procedure with an original drain guide-pin provided the proper drain location. Epidural hematoma was found in about one-third of all

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## Cortical bone trajectory for lumbar pedicle screws a report of 13 cases

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Cortical bone trajectory (CBT) is reported to be a less invasive and more rigid procedure than posterior pedicle screw fixation. Between June 2012 and March 2013, 13 patients with various degenerative lumbar spinal diseases underwent this method combined with laminoplasty. It took four hours for operation with the bleeding of 105 g. Seven women and 6 men with an average of 72.7 (range, 57-84 yr old) were treated with the following diagnoses, lumbar canal stenosis, spondylolytic spondylolisthesis, osteoporotic compression fracture, recurrent ganglion deriving from facet joint and adjacent disc problem. Clinical symptoms of severe back pain, leg pain and gait disturbance were improved by 68.5%. Four of 5 women over sixties were diagnosed as osteoporosis with DEXA (<70% of YAM) and a pair of pedicle screws were cut out in one of these patients.



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### Diagnosis of Schwannoma at the foot

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Schwannomas are rare and the most common tumours of the sheath of peripheral nerve. The diagnosis is usually straight forward, but may be delayed for many years in a schwannoma of the posterior tibial nerve. The symptoms are often attributed to entrapment neuropathy or to lumbosacral radiculopathy.

**Materials and methods:** we describe 12 patients with a schwannoma of the tibial nerve and one with metatarsal interosseous schwannoma. The mean time to diagnosis was 19 month (2-180 month). All the patient complained of pain. A Tinel sign was detected in all 13 patients. MRI confirmed the diagnosis in all cases.

**Results:** Microsurgical resection of the lesion abolished the neuropathic pain. Surgical resection of the tumor is safe and effective. Final analysis of the resected specimen confirmed the schwannoma diagnosis. We have no case of tumour recurrence.

**Discussion and Conclusion:** The diagnosis of nervous tumour is difficult in front of a sciatic pain. THE MRI allows an operative planning and allows a microsurgical resection.

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### Results of Ceramic Artificial Talus for Aseptic Talar Necrosis

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**Background:** Advanced talar necrosis is difficult to be treated. We have devised two types of ceramic artificial talus for talar aseptic necrosis and report these results.

**Methods:** From 1999 to 2006, 27 ankles with aseptic necrosis of the talus had been replaced by ceramic artificial prosthesis. There are 3 men and 24 women, with mean age of 66 years. The bonding between ceramic talar prosthesis and talar neck was performed by bone cement (10 ankles; first type). Based on the results with loosening between talar neck and prosthesis, we made the prosthesis without anchor (second type) combined with talar neck and replaced it for 17 ankles without bonding. They were assessed by AOFAS ankle/hindfoot score system. Mean follow-up period was 86 months.

**Results:** The total mean AOFAS score in the first type improved from 42 before operation to 80 after the operation. However 2 revision surgery were performed using whole body prostheses. Those in the second type improved from 46 to 79. Also 6 ankles needed revision surgery due to aseptic loosening between the neck and prosthesis.

**Conclusion:** AOFAS scores showed satisfactory results. However talar dome prosthesis preserving the head of the talus sometimes causes loosening at the neck of the talus. The whole talar body prostheses would be helpful for solving this problem.

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**New approaches cast correction therapy for pes cavovarus deformity**

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Pes cavovarus is a rare deformity usually caused by a neurological disorder (Charcot-Marie-Tooth [CMT] disease in two-thirds of cases). Deformation characteristics of the forefoot pronation, high medial longitudinal arch and varus of the heel. Although tendon transfers, plantar-fascia release, osteotomies have generally been enforced as for the treatment of pes cavovarus deformity, the consensus of medical treatment is not yet obtained.

For a case of the CMT who had pes cavovarus foot, we got a good result trying to cast correction. New Orthotic therapy may be able to reduce the number of operations. There is a possibility that can be time-saving to the appropriate age to keep the foot without pain in absence of contracture.



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In Vivo Implant Fixation of Carbon Fiber-Reinforced PEEK Acetabular Cups in an Ovine Model

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Carbon fiber-reinforced polyetheretherketone (CFR/PEEK) is theoretically superior as a material for use in cementless hip prostheses over metals. When considering the clinical introduction of CFR/PEEK cementless hip prostheses, achieving in vivo stable fixation of implants with the surrounding bone is of primary importance. Since there have been no reports on cementless fixation of CFR/PEEK cups, we investigated in vivo fixation of cementless CFR/PEEK acetabular cups up to 52 weeks after implantation in an ovine model. CFR/PEEK mono-block cups with a 28-mm outer diameter and a 22-mm inner diameter were designed based on ovine CT data. The cups had a rough textured surface on the outside and an HA layer. As a control, rough textured titanium alloy (Ti) cups were used in combination with polyethylene inserts. Total hip arthroplasty was performed unilaterally and the CFR/PEEK cup or the Ti cup was implanted by a pressfit technique. Fifteen CFR/PEEK cups and 3 Ti cups were harvested between 12 weeks and 52 weeks postoperatively. Fixation to the surrounding bone was evaluated radiographically (X-ray and  $\mu$ CT) and histologically.

In 5 cups, direct contact between bone and the cup surface was observed on radiographs and histology, and achievement of bone ongrowth fixation was confirmed in the 5 cases. Fibrous tissue interposition between cup surface and bone was noticed in the remaining 10 CFR/PEEK cups and all the 3 Ti cups.

Although further modification of cup design to enhance initial mechanical stability is necessary to maximize the potential for osseointegration in this ovine model, bone ongrowth fixation was firstly achieved in the CFR/PEEK acetabular cup even under the weight bearing condition.

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A new method of radiographic evaluation for cup anteversion in total hip arthroplasty

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**Purpose**

We introduced a new method to measure cup anteversion of total hip arthroplasty (THA), using plain lateral films. To compare the results of this new method and of computer templating soft, we investigated the accuracy of this new method.

**Methods**

Postoperative radiographs of 116 hips, taken from May 2011 to April 2012 were analyzed. Postoperative radiographs were taken at 3 months after THA operations. All THAs were performed using direct anterior approach, and a target cup alignment were 40° as a cup inclination and 15° as a cup anteversion. The standard method for evaluation of cup anteversion is measurements from lateral plain films, using film edge orientation. Our new method employed an ischial axis, which is a tangential line from a greater sciatic notch to lesser sciatic notch, as anatomical landmarks with a lateral radiographs. We also measured cup anteversion from plain radiographs of AP view, using computer templating soft. We compared the results with new radiographic method using ischial axis and with computer templating soft.

**Results**

The average angle of anteversion was 21.3° with new method, and 21.2° with computer templating soft. The results with a new method using an ischial axis had high correction coefficients with those with computer templating soft.

**Conclusion**

A new method using ischial axis was more consistent measurement of cup anteversion than the historical method, not to be affected by pelvic inclination. This method is easy, accurate and low-cost for measurement of cup anteversion without CT scan or computer templating softs.



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### Intraoperative landmark for the stem anteversion in total hip arthroplasty

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The purpose of this study was to confirm whether the line connecting the trochanteric fossa and the middle of the medial cortex of the femoral neck (T line) could be a useful intraoperative reference guide on the cutting surface of the femoral neck for reproducing the true femoral anteversion. The institutional review board allowed a retrospective review of CT images of 33 normal femora (33 patients) in our CT database. We performed virtual THA using nonanatomic straight stem on the 3D CT-based preoperative planning software at the three different cutting heights of 5 mm, 10 mm, or 15 mm above the lesser trochanter. The anteversion of the stem implanted parallel to the T line was measured. The anteversion of the stem using the T line was not affected by the height of the osteotomy and the mean value was close to the true femoral anteversion. We found strong positive correlations between them at each cutting heights ( $r=0.82$ ,  $0.84$  and  $0.92$  respectively). An anteversion using a T line on the cut surface is compatible with a true femoral anteversion.

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### Usefulness of standing anteroposterior radiograph of the hip for socket wear measurement in total hip arthroplasty Comparative study of conventional with highly cross linked polyethylene

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**BACKGROUND:** Although most radiographs used for polyethylene wear measurements have been taken with the patient in the supine position in order to assess penetration by the femoral head into the acetabular polyethylene socket, we have questioned the effect of weight-bearing on the position of the head within the socket. The current study aimed to determine the effect of weight bearing, i.e. standing on the two-dimensional radiographic position of the femoral head within the socket.

**METHODS:** A total of three hundred and fifty patients (three hundred and eighty three hips) who had had a total hip arthroplasty had digital radiographs made a set of anteroposterior radiographs for each patient: one radiograph was made with the patient supine and one was made with the patient standing in full weight bearing on the replaced hip. The patients were divided into the following two groups: 1) seventy-five patients (eighty-three hips) with conventional polyethylene (CON) (group-1); 2) two hundred and seventy-five patients (three hundred hips) with highly cross-linked polyethylene (XPL) (group-2). The set of radiograph was taken at three weeks postoperatively and at the time of semiannual follow-up. The average ceramic femoral head penetration was measured with radiographs taken in the standing or supine position at the final follow-up and compared with those of three weeks postoperatively. A single researcher with use of a computerized measurement system performed all measurements on the radiographs of the two-dimensional position of the head. Follow-up period were  $13.5\pm 1.0$  (range.  $11.0-15.5$ ) years in group-1 and  $7.6\pm 2.1$  (range.  $5.0-12.6$ ) years in group-2.

**METHODS:** Three hundred and fifty patients (Three hundred and eighty three hips) who had had a total hip arthroplasty had digital radiographs made a set of anteroposterior radiographs for each patient: one radiograph was made with the patient supine and one was made with the patient standing in full weight bearing on the replaced hip. The set of radiograph was taken at three weeks postoperatively and at the time of semiannual follow-up. The average femoral head penetration depths were measured with radiographs taken in the standing or supine position at the final follow-up and compared with those of three weeks postoperatively. A single researcher with use of a computerized measurement system performed all measurements on the radiographs of the two-dimensional position of the head.

**RESULTS:** Linear penetration rates in group-1 were  $0.172\pm 0.069$  mm/year in supine position and  $0.178\pm 0.069$  mm/year in standing position ( $p<0.05$ , paired t-test;  $r^2=0.88$ ), and the rates in group-2 were  $0.029\pm 0.024$  mm/year and  $0.035\pm 0.027$  mm/year respectively ( $p<0.0005$ , paired t-test;  $r^2=0.16$ ). The mean ceramic head penetration rate in XPL socket showed 80 to 83% reduction compared with those in CON.

**CONCLUSIONS:** We found significant difference between the average total ceramic femoral head penetration between supine and standing radiographs in using both CON and XPL socket.



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Differential wear of standard and highly cross linked polyethylene acetabular component  
Prospective randomized study of 75 THA, at 8 years of follow-up

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**Background:** highly crosslinked polyethylene have appeared with the aim of prolonging the life expectancy of the THA by reducing the wear rate of the acetabular component.

**Materials and methods:** this is a prospective, randomized study on the choice of acetabular component. On a period of four years, the same operator implanted 100 total hip replacement as first line. All femoral stems were of Charnley with a head 22,2 mm. Radiographs of the pelvis were performed after surgery, after 1 year and at the latest follow-up. Each radiograph was analysed using a computerized software. Clinical evaluation was performed at the latest follow-up from PMA and Oxford hip score.

**Results:** at 8 years of FU, 75 prothesis have been analyzed. The average wear of acetabular PEHR (Durasul TM) was reduced 36,5% per year by the conventional polyethylene ( $p < 0,005$ ). The results of clinical score were good for both group.

**Discussion:** this study finds similar results to those in the literature. PEHR properties vary according to their fabrication method, by increasing the irradiation to reduce wear, we cannot avoid disadvantage of the mechanical properties of PEHR, the main problem of longevity is not the wear but the occurrence of osteolysis leading to loosening and times.



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## Prevention of dislocation after THA for fractures is different with dual mobility or constrained liners in very old patients

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**Introduction:** Total hip arthroplasty (THA) has been efficacious for treating hip fractures in healthy older patients. However, in these patients with fractures a widely variable prevalence of dislocation has been reported, partly because of varying durations of follow-up for this specific end-point. The purpose of the present study was to determine the early post-operative risk of dislocation in these patients with fractures and to investigate if dual mobility or constrained liners decrease the risk of dislocation.

**Methods:** Between 2008 and 2011, 373 patients with neck fracture underwent primary THA using a dual mobility (128 hips) or a constrained (245 hips) liner. The mean age of the patients was 85 years (46 to 101). (Dual mob: mean 84, 46 to 101); (constrained: mean 86, 66 to 99). Dislocations during the post-operative period were compared for patients younger or older than 85 years old.

**Results:** There were no differences in the mortality rates or in loosening rates among the treatment groups. The rate of dislocation (1.6%) was the same for patients younger than 84 years old, but was higher in the group with dual mobility (8.7% dislocation) compared with constrained liners (2% dislocation) for patients older than 85 years. This may be explained by the mechanism of prevention for dislocation that is unrelated to muscle function in constrained liner contrary to the mechanism of dual mobility.

**Conclusion:** Dual mobility or constrained liners in these patients is an effective technique to prevent post operative hip dislocation but the post-operative risk of dislocation for patients with hip fractures is greater with dual mobility than with constrained liners when patients are older than 85 years.

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## Primary Total hip arthroplasty using dual mobility results at 10 years follow-up

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Primary total hip arthroplasty (THA) is one of the most successful procedures in modern orthopaedic surgery. However, dislocation remains a troublesome complication with a reported prevalence ranging from 1% and 5% in the literature.

In order to prevent such a complication both at short and long terms we have been using dual mobility for more than 10 years. The two goals of this study are:

- to assess the effectiveness of the dual mobility to prevent dislocation
- and to analyze the long term clinical and radiological results

### Materials and methods:

We report a retrospective study of a continuous series of 230 primary THA in 218 unselected patients performed at 2 institutions between January 2000 and December 2002, using a single design of dual mobility implant (Saturne<sup>®</sup> cup, from AMPLITUDE<sup>®</sup> company, Neyron, France).

At latest follow-up, 108 patients died of unrelated causes, 21 patients were lost to follow-up, leaving 89 patients (100 THA) available for the study.

Clinical evaluation was performed using POSTEL-MERLE-D'AUBIGNE (PMA) and HARRIS (HHS) hip scores. Radiological evaluation was performed by two senior surgeons.

### Results:

At a minimum 10 years follow-up, PMA score and HARRIS hip score significantly improved. One late dislocation was reported and successfully managed by closed reduction, and 2 revisions of the dual mobility implant for deep infection have been performed.

### Conclusion:

These long term results with the use of a dual mobility implant for primary THA in our practice demonstrate the reliability of the dual mobility concept. We therefore advocate the use of dual mobility for primary THA, especially for patients at risk for dislocation.



## Combination of dual Mobility and navigation in primary Total Hip Arthroplasty (THA)

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**Introduction:** stability and lower limb long length restoration are the 2 most important points to assure a good short and long-term result in a primary THA. We made a study to appreciate the combination of a dual mobility cup (to assure the stability) and a computer assisted surgery (to assure the restoration of the length of the lower limb).

**Method:** Between 2008 and July 2012, in 263 consecutive primary THA a dual mobility cup with a cementless stem have been implanted with navigation (Amplivision<sup>®</sup>, Amplitude, France) by the same surgeon. After inserting the cup (Saturne<sup>®</sup>, Amplitude) flush to the bone the navigator record the position and control the 3D positions of the stem (offset, rotation, recess) and the long length of the lower limb. Operative time, long length discrepancy and dislocation have been noted.

**Results:** Average operative time was 76 minutes (60 to 100). At the average follow-up of 2,1 years (4 months to 5 years), there was one case of dislocation (0,38%, traumatic intra prosthetic dislocation at 6 months after a fall) and 5 long length discrepancies (1,9%) from 4 to 6 mm not requiring a compensatory sole.

**Conclusion:** Dual mobility associated with Navigation is useful to prevent the 2 most frequent complications of THA.

## Is the dislocation risk decrease with dual mobility cup Quattro<sup>®</sup> type after Charnley THA

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**Introduction:** Primary or recurrent dislocation is one of the most important complications after THA. The rate of this complication (cumulative risk) increase with time: 2% at 1 year to 7% at 25 years for Morrey (1); 2,2% at 1 year to 6% at 10 years for Berry (2) and 3,8% at 1 year to 10,4% at 25 years for J.H. Caton (3) with 6,9% revisions. Today in United States, the most common causes of revision (22,5%) is instability with dislocation of the hip (Bozic et al. (4))

**Material and method:** To evaluate this risk with a dual-mobility cup we have conducted a retrospective review of 363 patients to answer to 3 questions: Does Dual Mobility Cup (DMC) decrease the dislocation risk? Does DMC cup increase wear risk? What are the reasons for revisions? During 3 years (2000 to 2002), 363 patients are operated on for osteoarthritis (OA), osteonecrosis (ONA) or fracture of the hip. On this series all patients received a cemented femoral stem Charnley's type with a 22,2 mm head: 105 Quattro<sup>®</sup> Dual Mobility Cup with a metallic head; 182 friction torque metal on polyethylene with a metallic head; 76 friction torque zirconium/polyethylene with a ceramic head. The mean follow-up of these patients was 10 years and the operations were conducted by only a single senior surgeon.

**Results:** The overall revision rate was 9,3% (n=182) for the metal on Polyethylene torque, 10,5% (n=76) for the zirconium on polyethylene torque, 1,9% (n=105) for the Quattro<sup>®</sup> Dual Mobility Cup. (The overall revision rate of THA without Dual Mobility Cup was 9,68%.) The overall results on dislocations and revision for dislocation was 8,5% for THA Charnley type without Dual Mobility Cup and only 1% for the THA Charnley type with Quattro<sup>®</sup> Dual Mobility Cup with a statistically significant difference (P value: 0,02).

**Discussion:** In France, the rate of revision for dislocation is 10,4% (SOFCOT Symposium 2010-2011), 15% for England and Wales (National Joint Registry 2011 (5)) and 30,6% for the New Zealand Joint Registry (6). In our series, there is low revision rate with Quattro<sup>®</sup> Dual Mobility Cup than with conventional THA. For us, Quattro<sup>®</sup> Dual Mobility Cup is a very secure and effective technique in THA Charnley for old patients with OA, ONA, hip fractures or patients with high risk of dislocation affected by neurologic diseases or cognitive impairment.

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## Surgical technique for small fragments of radius distal fractures using break-away screw

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**[Introduction]** Most of the surgical treatment of distal radius fractures has been performed by volar locked plate (VLP). However, in the distal radius fracture with small fragments that can not be kept good reduction by VLP, combination between VLT and wires or screws may be used. We will present our surgical technique with the break-away screw for these small fragments in distal radius fractures.

**[Patients and Methods]** In 2012, we treated 32 patients with distal radius fractures. Of these 32 patients, 5 patients had small fragments that can not be kept good reduction by VLP alone. Three had radius styloid process fracture (Chauffeur) and two had fragments of the volar labrum. One case with displaced fragments of the volar labrum, the break-away screws were used for volar fragments beyond watershed line fixation. In the other four cases, screw fixations were performed under the small incision.

**[Discussion]** Fixation with the break-away screw will be able to get strong compression force in the fracture site. Furthermore, this screw can be inserted only in soft tissue exposure for guide wire insertion, and screw stump can be embedded in the soft tissue or bone. From the above reasons, this technique will be less invasive to the surrounding tissue and available for fixation of small fragments and osteosynthesis in deep operative field.

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## The effect of elbow flexion angle on elbow laxity in overhead throwing athletes

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Ultrasonography (US) is used for the clinical evaluation of elbow valgus laxity in overhead-throwing athletes. The examination is mostly performed at the elbow 90° flexion position, because of the maximum valgus torque during the throwing motion occurs near at the elbow 90° flexion. However, no study has evaluated the laxity influenced by the elbow flexion position via US. This study aimed at investigating the effect of elbow flexion on valgus laxity in uninjured population.

This study population comprised 12 uninjured volunteers (24 elbows; average age, 25.9 years). US was performed for each elbow at 30° and 90° flexion positions, with shoulders abducted at 90° in their maximum external rotation in supine position. The degree of joint laxity was quantified by measuring the width of the medial joint space under the influence of gravity-induced stress.

The laxity at 90° elbow flexion in the dominant and non-dominant arms was significantly greater (3.4±0.5 mm and 3.7±0.6 mm, respectively) than that at 30° flexion (2.9±0.6 and 3.1±0.7, p=0.025).

These results indicate that elbow flexion has a significant effect on the elbow valgus laxity, and the laxity at 90° elbow flexion is greater than that at 30° flexion.



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### Morphology and Histology of the collapsed lunate in advanced Kienböck disease

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**Purpose:** The aim of this study is to report the structural changes of the collapsed lunates in advanced Kienböck disease.

**Materials and Methods:** Twenty-four collapsed lunates were excised at the time of tendon -ball implantation procedure for advanced Kienböck disease. Each specimen was examined macroscopically to compare with preoperative radiograms and CT images. Then, they were prepared for histological investigations under a polarized microscope and a regular light microscope.

**Results:** Articular cartilages of the collapsed lunate were consistently attenuated or disappeared. The proximal articular cartilage facing the radius was generally more affected than the distal articular cartilage facing the capitate. There was one major fracture in addition to multiple minor fractures in the collapsed lunate. Fracture patterns were classified into 3 types according to the direction of the major fracture, namely horizontal, vertical and dual oblique fracture type. Histological investigation revealed the intermixed mosaic pattern of viable and necrotic areas in the collapsed lunate. Active new bone formation was observed at the junction between the viable and necrotic area.

**Conclusion:** Morphological and histological investigations on the excised lunate provided us invaluable information relevant to the etiology and treatment of advanced Kienböck disease.

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### Arthroscopic hammoc tendon graft interposition (AHTGI) associated with large styloidectomy in SLAC wrist stage I and II

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**Introduction:** The surgical management of Post traumatic radiocarpal arthritis is difficult and the different surgical palliative solutions (Four Corner Fusion FCF and Proximal Row Carpectomy PRC) offer controversial results. Interposition arthroplasty is an old historic treatment in case of degenerative articular evolution. The authors present an arthroscopic technique of interposition between Distal radius and proximal row for the management of SLAC wrist stage I and II. The early results of this new palliative treatment are announced and analyzed.

**Technique:** The surgery is performed in outpatient surgery tourniquet and loco-regional anesthesia. After autologous tendon graft harvest, a classic wrist arthroscopic approach is realized in the radio-carpal space. A large styloidectomy is performed and one extremity of tendon graft is sutured on the styloid with a bony anchor. The free extremity is inserted into the radio-carpal articulation and attached on the dorsal capsule before returning to the styloid in order to be tightened like the string of a hammock.

**Material and method:** 15 patients have been operated with this method between 2010 and 2012 for the management of SLAC wrist. There was 12 males, mean age 61yo, ROM was noted before surgery also the level of pain and the strength with a jamar dynamometer. All the patients have been operated by the same surgeon and the follow up was realized at 1, 3, 6 and 12 months.

**Results:** All the patients are satisfied except two of them who were re-operated for anchor removal and partial carpal arthrodesis. But all considered that the pain widely decreased. Three complications have been noted: 1 CRPS, two carpal tunnel syndrome. Objective evaluation of pain decreased from 7/10 to 11/10. A small number of patient declared a rare wrist pain occurring in few cases of hard handwork. Grip strength increased 30%.

**Conclusions:** The management of SLAC wrist stage I and II is a real difficult surgical challenge. The classic palliative methods (PRC, and FCF) give controversial results. The AHTGI offers a less invasive alternative method which can be considered as a first step in the treatment of SLAC stage I and II. This surgery allows a classic palliative salvage procedure if necessary without any increased morbidity. The first clinical results make this new technique full of promise. A larger number of cases with a longer follow up will be necessary to confirm this first idea.



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### The comparisons of 15 to 30 year-clinical results of alumina ceramic and Co-Cr (PCA) total knee arthroplasty – in X-ray findings and retrieval cases –

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#### [Materials and Methods]

1981 to 1988, mainly cementless alumina ceramic TKP was used in 137 joints. 1990 to 1993, cemented alumina TKP was used in 94 joint. 1986 to 1989 and cement Co-Cr TKP was used in 59 joints. X-ray findings were compared. The changes of the surface in retrieval cases were observed.

#### [Results and Discussion]

In cementless alumina TKP, loosening and radio-lucent line were found in high rate in early stage, however in cemented TKP in extremely low rate. The appearance rates of the radio lucent line, osteolysis and loosening, of cemented alumina TKA were less than that of Co-Cr TKA. In retrievals, polyethylene surface of the alumina TKP was smooth and that of the Co-Cr TKP was rough and lots of fibrils were found. The surface roughness of alumina was hollow and that of the Co-Cr was protruded. The wear rates of polyethylene on ceramics and on Co-Cr were 0.026 mm/year and 0.063 mm/year, respectively.

#### [Conclusion]

In alumina TKP cement fixation is indispensable. The polyethylene wear on the alumina was 2 to 3 times less than that on Co-Cr.

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### Long-term Follow-up of Total Knee Arthroplasty with Hydroxyapatite-coated Components

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The objective of this study was to examine the long-term clinical and radiological outcomes of total knee arthroplasty performed using hydroxyapatite-coated components (HA-TKA).

#### Methods

Between February 1994 and January 1996, HA-TKA was performed for 10 knees of 6 patients by using the Deltafit knee system (Stryker®). Six knees were available for clinical and radiological assessment at a mean follow-up period of 13.8 years (range, 11-17 years). Clinical outcomes were evaluated by the Japanese Orthopaedic Association (JOA) score preoperatively and at the final follow-up. Radiological evaluation was performed using lateral radiographs of the femur as well as anteroposterior (AP) and lateral radiographs of the tibia. Radiolucent lines of the implant-bone interface were classified into 5 zones, and each zone received a score (0, 1, and 2) based on the extent of the appearance of clear zones.

#### Results

Mean preoperative JOA scores for OA and RA were 52.5 and 49.5, respectively; at the final follow-up, the scores improved to 85.0 and 88.0, respectively. On radiography performed at the final follow-up, no clear zones of the femoral implant were observed. The average total score for the radiographic evaluation was 10 (a full score). For the tibial AP view and lateral view, the average total score of the radiographic evaluation was 9.3.

#### Conclusions

HA-TKA showed good long-term clinical and radiological results. We believe that HA-TKA is useful in primary TKA.



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### Obliquity of the tibial cut predictive of tibial loosening in TKA: three-dimensional radiographic analysis

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**Introduction:** Unipolar aseptic loosening of cemented total knee arthroplasty (TKA) is a rare but early event suggesting a mechanical origin. It concerns mostly the tibial component generating up to 1.9% of TKA revisions. We sought to assess whether the actual inclination of the tibial component was a risk factor for unipolar tibial loosening.

**Material and method:** We managed a case-control study comparing 16 cases of unipolar tibial loosening to 33 TKA with a 10 years minimum follow up. We evaluated the actual inclination of tibial component (AIT) in relation to the mechanical axis of the tibia, calculated with tibial slope and tibial varus/valgus measured on two orthogonal radiographs. We also analyzed the knee deformity according to the conventional HKA angle post-operatively and at follow-up.

**Results:** The two study groups were homogeneous for age, body mass index, stage of arthritis, preoperative HKA and models of prosthesis. The AIT and post-operative HKA angle of loosened TKA ( $5.7^{\circ} \pm 3.0^{\circ}$  and  $177.2^{\circ} \pm 2.9^{\circ}$ ) were significantly higher than those of the control group ( $4.1^{\circ} \pm 2.0^{\circ}$  and  $179.2^{\circ} \pm 2.9^{\circ}$ ), while independent analysis of tibial slope or varus/valgus showed no difference. AIT was correlated with postoperative HKA angle.

**Conclusion:** An actual inclination of tibial component of more than  $5^{\circ}$  and a HKA angle of less than  $177^{\circ}$  were significant risk factors for tibial loosening.

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### Fixed-bearing and mobile-bearing total knee arthroplasties are equivalent after tibial osteotomy

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**Introduction:** The long-term results of total knee arthroplasty (TKA) with a fixed-bearing design have shown a high degree of clinical success with similar results than mobile-bearing arthroplasties in primary TKA. However the two designs may give different results in TKA following high tibial osteotomy (HTO). We compared the results of 57 fixed-bearing prostheses after HTO with the results of 41 matched rotating platforms after HTO. The manufacturer (Ceraver Osteal France) was the same for both devices.

**Methods:** The mean follow-up was 10 years (range, 9 to 12 years). The patients were assessed clinically, radiographically, and with CT scan for osteolysis. At the latest follow-up, all patients underwent a computed tomography (CT) scan (with a multislice scanner) to check the presence of osteolysis.

**Results:** The preoperative knee scores, intraoperative releases, blood loss, thromboembolic complications and infection rates had no statistically significant differences between the two groups. There was no significant difference between the groups (i.e., fixed-bearing and mobile-bearing knees) with regard to the mean postoperative knee motion (115 and 117, respectively;  $p=0.58$ ), the mean Knee Society knee clinical score (91 and 92 points, respectively;  $p=0.51$ ), or the Knee Society knee functional score (82 and 83 points, respectively;  $p=0.24$ ) at the latest follow-up. The Kaplan-Meier survivorship for revision at 10 years of follow-up was 98% (95% confidence interval, 89 to 100) for the fixed bearing prosthesis and 97% (95% confidence interval, 91 to 100) for the rotating platform mobile-bearing prosthesis. Radiographic and CT scans showed tibial osteolysis in one knee for each group. No knee in either group had femoral or patellar osteolysis.

**Conclusion:** Although we did manage to detect statistically significant differences mainly in clinical and radiographic results between the two groups, we found no significant difference. Surgeons who feel more comfortable with one device or another can use their preferred device to treat patients with TKA after HTO.



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## Results of metallic wedges and press fit stem for filling tibial osseous defects in TKA

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For filling tibial bone defect during total knee arthroplasty, various options are possible: screw with cement, allograft, autograft, tantalum or metallic wedge often associated with a cemented stem.

### Material and method

18 TKA posterostabilized cemented was realized for intra-articular deformation Hungerford 3 on tibial bone defect type 2 on the AORI score. The tibial bone loss were filled by metallic wedge completed by a stem. The stem was the biggest possible. Cement was only use under the metallic tibial plateau and the wedge.

### Results

14 cases (13 patients) were revised with an average of 67 (26-137) months. The average age of the patients at the time of the intervention was 73(57-89) years.

At 67 months FU, the average total score IKS was 147. The average score KOOS was 74%. The preoperative femoro-tibial mechanical angle was 168° and 179° at revision.

### Discussion

Metallic wedges gives better results than screw and cement (Brand). As Neumann and Parsley, this results confirms the good results of uncemented stem with press fit effect.

### Conclusion

Our study confirm the good results of the use of metallic wedge and large uncemented stem in the filling of tibial bone defect during total knee arthroplasty.

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## Utility of the pre-cut trial for a precise gap making system in total knee arthroplasty

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**INTRODUCTION:** We developed a “pre-cut trial component” to check the component gap before the final bone resection of the femur in TKA.

**METHODS:** The pre-cut trial is composed of an 8-mm-thick usual distal part and a 4-mm-thick posterior part, and lacks an anterior part of the femoral component. To begin, the extension gap is created with a standard femoral distal cut and tibial cut. Next, a 4 mm pre-cut from the posterior condylar line of the femoral posterior condyle is performed. After gap balancing is checked, the pre-cut trial is attached to the femur and the component gaps are estimated. As the final step of the surgery, the femur is completely resected according to the measurements of the component gaps with the pre-cut trial. In cases where the flexion gap is large relative to the extension gap, PCL is preserved. Bone gaps and component gaps with the pre-cut trial component were investigated in 222 knees.

**RESULTS:** Gap decrease after the pre-cut trial was set were  $1.5 \pm 1.0$  (0~5) mm in extension and  $0.2 \pm 0.4$  (0~2) mm in flexion. After the pre-cut trial component was set, the component gaps were  $9.4 \pm 2.8$  mm in extension and  $12.2 \pm 2.8$  mm in flexion. Although, the mean component gap difference between both gaps (flexion-extension) was small ( $2.8 \pm 2.6$  mm), its variation was too large to make equal gap (-3~11 mm).

**DISCUSSION:** The difference between the bone gap and component gap is very important for an adequate extension and flexion gaps in the TKA procedure. Yet with the conventional technique, the component gap is impossible to estimate before the final bone resection. If unacceptable results are discovered after the component gaps are estimated, the gaps are difficult to correct. With the technique we present here, the component gaps can be checked before final bone resection and truly precise gap control can be attained.



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The correlation between preoperative flexion contracture and intraoperative extension, flexion gap in total knee arthroplasty

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**PURPOSE:** To clarify whether the degree of preoperative flexion contracture of the knee may affect the resulting the extension gap (EG), and the flexion gap (FG) in total knee arthroplasty (TKA)

**METHODS:** We examined 214 knees and divided into five groups as follows,

- 62 knees possible full extension: Gr1,
- 30 knees less than 10 degrees in preoperative flexion contracture: Gr2,
- 69 knees less than 20 degrees: Gr3,
- 40 knees less than 30 degrees: Gr4,
- 13 knees over 30 degrees: Gr5.

Operation was performed with preserving PCL, EG was created by measured resection, FG was created temporarily small by cutting posterior femoral condyles 4 mm thickness. We measured EG and FG using a spacer that can be adjusted at 1 mm pitch. By adding 4 mm in FG, we adjusted FG as in a measured resection.

**RESULTS:** EG was significantly smaller in accordance with the degree of flexion contracture. (Gr1: 18.4±3.0 mm, Gr2: 17.9±2.6, Gr3: 16.7±2.6, Gr4: 16.2±3.3, Gr5: 14.0±2.1) On the other hand, FG had no significant difference between each group. FG-EG was the gap to be adjusted during the operation, it was significantly different between each group. (Gr1: 0.5±2.7mm, Gr2: 1.3±2.8, Gr3: 1.7±2.4, Gr4: 2.7±3.2, Gr5: 4.6±2.5) Regardless of the degree of preoperative flexion contracture, FG was always greater than EG. FG-EG was getting larger as the flexion contracture advanced.

**CONCLUSION:** FG-EG is greater in accordance with the degree of preoperative flexion contracture.

In advanced flexion contracture cases, there is a risk that FG-EG becomes too large, so we should address more attention to sacrificing PCL.



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## Surgical treatment of permanent dislocation of the patella a report of three cases

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**Purpose:** Permanent dislocation of the patella is not a common condition, especially in adults. We analyzed the short-term results after surgical treatment for permanent patellar dislocation.

**Material and Methods:** This study included 3 knees in 3 women treated between 2011 and 2012. Age of the patients at surgery was 14 (case 1), 27 (case 2) and 50 (case 3). They experienced the first-time dislocation at 6 years old (case 1) and 14 years old (case 2, 3). TT-TG (tibial tubercle – trochlear groove) distance was 25 mm (Case 1), 22 mm (Case 2) and 20 mm (Case 3). Surgical procedure: Realignment procedure consisted both proximal and distal realignment. Proximal realignment aiming the horizontalization of the patella was achieved by extensive lateral retinacular release into the fibers of vastus lateralis, division of tight lateral capsule, and reefing of the medial retinaculum. Distal realignment was done by medial transfer of the tibial tubercle to 10mm TT-TG distance. Finally we confirmed the normal patellar tracking in full range of motion. Mean follow-up after surgery was 17 months (range 13-20 months).

**Results:** There were no further dislocation and no subjective instability in two patients at final follow-up (case 2, 3). But in one patient (case 1) dislocation of the patella recurred 17 months after surgery and she remained in habitual dislocation of the patella.

**Conclusion:** This surgical procedure provided short-term satisfactory results in adults. However we will need to address additional surgery such as the medial patellofemoral ligament reconstruction or trochleoplasty for correcting patellar instability in adolescent case.

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## Three-dimensional Transfer of The Tibial Tuberosity for Patellar Instability with Patella Alta

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**Background** The objective of this study is to find out whether three-dimensional transfer of the tibial tuberosity elicits good knee functionality with improved patella alta.

**Methods** Twelve knees (10 patients) underwent surgery for patellar instability with patella alta. The surgery performed was a three-dimensional transfer for the anteromedial distalization of the tibial tuberosity. Predisposing anatomical factors for patellar instability were evaluated preoperatively; femorotibial angle (FTA), patella alta (PT ratio), trochlear dysplasia (sulcus angle) and tilting angle (lateral tilt). The function of the knee was assessed before and after surgery by Lysholm and Kujala score.

**Results** Before surgery, the PT ratio was  $1.34 \pm 0.13$ , lateral tilt was  $22.4 \pm 6.5$ , and the sulcus angle was  $151.7 \pm 8.3$ , indicating patella alta, laterality, and trochlear dysplasia. After surgery, the PT ratio and lateral tilt significantly improved to  $0.95 \pm 0.13$ , and  $10.6 \pm 3.4$ , respectively. FTA and sulcus angle were not altered. Lysholm and Kujala score improved from 63.8 to 94.7 and 67.0 to 94.1 points, respectively.

**Conclusion** Three-dimensional tibial tuberosity transfer was shown to correct the patella position and result in a good clinical outcome. This method is introduced as an alternative surgery for patellar instability with patella alta.



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## Extended Indications in Unicompartmental Arthroplasty

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It is well documented in the literature the very good results of unicompartmental knee arthroplasty (UKA) when the standard accepted indications are followed. In our experience, these indications can be extended to include: 1. Post-traumatic osteoarthritis (OA) with malunion secondary to tibial plateau fracture, 2. Mild patellofemoral OA associated with monocompartmental femoro-tibial OA, 3. Degenerative changes of the contralateral compartment after ipsilateral UKA in the same knee (BiUKA). We report our results concerning 35 UKAs in these particular situations. Our results in the short to medium term are excellent. They support that the selection criteria for UKA can be extended to include these indications. A longer follow up is required before they can be routinely included in the conventional selection criteria for UKA.

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## 90-Day Morbidity in Patients Undergoing Primary TKA with Discontinuation of Warfarin and Bridging with LMWH

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Performing a total knee arthroplasty (TKA) in patients on long-term oral anticoagulation will become more and more common with the population aging. We asked whether or not current guidelines regarding the perioperative management of patients under long-term warfarin therapy are associated with an increased rate of complication and re-operation when compared to a control group. We therefore retrospectively reviewed patients who underwent a primary TKA from 2004 to 2011. Among these patients, 38 were preoperatively on long-term warfarin therapy and had their warfarin withheld and resumed after surgery according to the current guidelines. They were matched paired to 76 patients that were not on long-term oral anticoagulation. We compared rates of complications, re-operations, blood loss, transfusions and length of hospital stay. Our results showed a significant increased rate of complications (42.1% vs. 6.9%,  $p < 0.001$ ) and re-operation (21.1% vs. 5.2%,  $p < 0.001$ ) in the warfarin group. Moreover, the warfarin group had a significantly higher rate of blood loss, transfusion and length of hospital stay. Our data suggest that current guidelines for preoperative warfarin management are associated with an unacceptable high rate of bleeding complications and reoperation following primary TKA.





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### Painful medial knee compartment syndrome in over-45 year-olds

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There is at present no consensus on the management of degenerative medial meniscus lesions in patients aged over 45 years without proven osteoarthritis, especially given that the causal relation between degenerative meniscal lesion and osteoarthritis remains controversial. A prospective multi-center non-randomized study was therefore performed. The principal objective was to assess surgeons' practice in the management of degenerative medial meniscus lesions. The secondary objectives were to identify predictive and prognostic factors and to compare medical versus surgical attitudes so as to draw up an adapted treatment strategy.

**Material and method.** 174 patients were included between September 2008 and February 2010, and distributed between a surgical (n=104) and a medical group (n=70). Minimum follow-up was 6 months. Patient satisfaction and health-related quality of life on the SF-36 questionnaire were assessed at 6 months.

**Results.** No difference emerged between the surgical and medical groups. However, predictive factors for poor results were identified: overweight (p=0.005), cartilage lesions (p=0.035) and meniscus extrusion (p=0.006).

**Discussion.** Results clarified the relation between degenerative meniscus lesions and osteoarthritis, in terms of meniscal incompetence. Meniscal extrusion should be seen as an arthrogenic degenerative meniscus lesion. We recommend a management strategy based on terrain and imaging data (X-ray and MRI), with the aim of providing patient relief while conserving cartilage.

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### How transforming a semi tendinous ACL graft into a BT transplant; original technique

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The author proposes to include a cylindrical bone graft harvested during tibial tunnel drilling in the tibial strands of a semi tendinosus graft. This never-described technique allows self-locking stabilization of the tibial part of the semitendinosus ACL graft.

In a prospective non-randomized study, 39 patients had classic hamstring ACL graft, (gracilis and semitendinosus: group A) with a classic tibial fixation (resorbable screw) versus 65 patients with a composite bone tendon (semitendinosus) ACL graft also fixed by the same screw (group B). Short suspended (20 mm) femoral fixation was done with TLS (FH orthopedics®). Unstable meniscal tears were removed and stable lesions were not sutured in this serie.

Differential laxity 6 months FU

KT 1000 Groupe A

Meniscal résection Groupe B

Meniscal Resection Groupe A

No Meniscal Resect Groupe B

No Meniscal Resect

68 N 1,6 1,1 1,1 0,8

90 N 2 1,4 1,4 1

130 N 3 1,8 2 1,5

This short term 6 months FU (clinical and Xray) study confirms the validity of an original technique of composite (BT) semitendinosus graft.

Global results are better in B group. Significantly stabler tibial fixation is constated in the B group (with meniscal resection) at 6 months (KT 1000).



Evaluation of an original technique of ACL composite (Bone Tendon) grafting using semitendinosus: A prospective Study versus classical Hamstring ACL grafting.  
6 months FU evaluation (Clinical and Rx)

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The author proposes to include a cylindric bone graft harvested during tibial tunnel drilling in the tibial strands of a semi tendinosus graft. This never-described technique allows self-locking stabilization of the tibial part of the semitendinosus ACL graft.

In a prospective non-randomized study, 39 patients had classic hamstring ACL graft, (gracilis and semitendinosus: group A) with a classic tibial fixation (resorbable screw) versus 65 patients with a composite bone tendon (semitendinosus) ACL graft also fixed by the same screw (group B).

Short suspended (20 mm) femoral fixation was performed with TLS (FH orthopedics®). Unstable meniscal tears were removed and stable lesions were not sutured in this serie.

Differential laxity 6 months FU

KT 1000 group A meniscal resection group B

meniscal resection group A

no meniscal resection group B

no meniscal resection

68 N 1.6 1.1 1.1 0,8

90 N 2 1.4 1.4 1

130 N 3 1.8 ! 2 1.5

This short term 6 months FU (clinical and Xray) study confirms the validity of an original technique of composite (BT) semitendinosus ACL graft.

Global results are closer in both groups. Paradoxically, Significantly better results are constated in the B subgroup with meniscal resection at 6 months.



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## Total Hip Arthroplasty Using Direct Anterior Approach for Displaced Femoral Neck Fracture

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**[Purpose]** Total hip arthroplasty (THA) has been recommended for the treatment of displaced femoral neck fractures, especially in active patients. In this study, we investigated surgical results and clinical results in THA for displaced femoral neck fracture.

**[Patients and methods]** Thirty patients (8 males, 22 females, mean age of 67.7 years) with femoral neck fracture who underwent THA were enrolled in this study. All THAs were performed using minimally invasive direct anterior approach (DAA). Surgical time, operative blood loss, blood requirements, JOA score, and complications were evaluated.

**[Results]** The mean operative time was 62 (range, 38 to 119) minutes, the mean operative blood loss was 395 (range, 75 to 820) ml, the mean hospital stay was 9.8 (range, 4 to 26) days. One patient (2.5%) required allogenic blood transfusion. The mean JOA score at final follow up was 93. One patient (2.5%) had dislocation on fifth post-operative day, and one patient (2.5%) suffered symptomatic pulmonary embolism.

**[Conclusion]** The advantages of DAA-THA include less invasiveness, early recovery, and early return to everyday activities. We concluded that DAA-THA is useful treatment for displaced femoral neck fracture.

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## Total Hip Arthroplasty Using Direct Anterior Approach for failed internal fixation of femoral neck fracture

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**[Introduction]** The purpose of this study was to evaluate the clinical outcome of Total Hip Arthroplasty (THA) using Direct Anterior Approach (DAA) for failed internal fixation of femoral neck fractures.

**[Methods]** Nine patients with failed internal fixation following femoral neck fracture who had undergone THA between 2008 and 2012 were enrolled in this study. All operations were performed using DAA in the supine position. The mean age was 73 years. The mean follow up period was 12.5 months. Seven fractures had been treated with hook-pin, and two fractures with cannulated cancellous hip screw. Using DAA all pins and screws were moved out easily and after that we were able to undergo THA. The next day after operation all patients started walking with full weight bearing. We estimated operating time, the volume of blood loss, the length of stay in hospital, walking ability at discharge, complications and X-ray.

**[Results]** The mean operating time was 60.5 minutes. The mean volume of blood loss was 342 g. We had one intra-operative complication, which was a proximal femoral neck fracture and underwent intraoperative circulatory wiring of the femoral shaft. The mean length of stay was 12.4 days. Seven patients were able to walking with T cane and the others with walking frame at discharge. We had no dislocation, infection or deep symptomatic vein thrombosis. A last follow up all X-ray showed no displacement of their stems and cups.

**[Discussion]** THA using DAA was an effective salvage procedure for failed internal fixation of femoral neck fracture.



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## Effectiveness of Direct Anterior Approach in Minimally Invasive Total Hip Arthroplasty

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**[Study]** MIS-THA has been spreading in joint replacement surgery. It enables patients to early ambulation and early return to daily activities. We examined clinical outcomes by comparing perioperative data of posterior approach and direct anterior approach (DAA) in MIS-THA.

**[Methods]** We studied on MIS-THA cases could be measured abductor muscle strength regularly. 28 cases of them were MIS-THA with Posterior approach group of 5 males and 23 females, and 68 cases were MIS-THA with DAA of 2 males and 66 females. We examined comparing with both groups on the operative time, the blood loss, the day of bed off, the day patient did SLR, the ambulation day, pre and postoperative JOA score and the abductor muscle strength at preoperative and first 4 postoperative week.

**[Results]** In posterior group, the mean preoperative and postoperative JOA score were 53.2 and 96.7 points. In DAA group, they were 52.8 and 96.6 points. The mean operative time was 81.6 min in posterior group and 70.5 min in DAA group. The mean blood loss was 844 g in posterior and 1052.9 g in DAA. The mean days patient did SLR were 4.5 days in posterior and 6.8 days in DAA. The mean days ambulation were 20.7 days in posterior and 18.5 days in DAA. The mean abductor muscle strength of operative side in both groups increased almost the same as not-operative side of them in 12 weeks after surgery.

**[Conclusion]** We examined clinical outcomes by comparing perioperative data of Posterior approach and DAA (direct anterior approach) in MIS-THA. Although the day of patients could SLR was significantly late in DAA, no significant difference between both approach in general results. There is the fact that the usage of posterior approach is ten times higher than that of DAA in dislocation late. Considering these things, DAA is first choice to indicate in patients with Crowe I, II dysplastic hip who need THA in my opinion now.

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## Advantages of orthopedic table to perform direct anterior approach in THR

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Pascal Vie

Clinique du Cedre

In France the most famous way to perform a direct anterior approach in THR is with the help of an orthopedic table as it was describe by Robert Judet, even though it is possible without it. For some colleagues the traction table is too bulky, make the hip testing difficult and is at high risk of limb length discrepancy and femoral fracture. For some others the orthopedic table is just a leg holder and as they become more friendly user this device is now irreplaceable. This technical note will review the advantage and the drawback of the orthopedic table to perform a THR through a direct anterior approach from the point of view of a surgeon who moved to this technique in his second part of his hip surgeon life after 1500 cases done from 2005 to 2012. In Japan the direct anterior approach is really famous, so the discussion will be very open.



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### Preoperative Evaluation of One or Two-Stage Revision Total Hip Arthroplasty

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**Introduction:** An assessment system for deeply infected hip prostheses was evaluated in patients who had undergone one- or two-stage revised THA. The aim of the present study is firstly to report on the scoring system for deeply infected hip prostheses, and secondly to decide a rational surgical treatment strategy.

**Methods:** This study included 56 revised THAs for which a minimum follow-up of two years was available. Six parameters were employed in the assessment system: 1) general condition, 2) duration of infection, 3) wound complications, 4) presence of microorganisms, 5) C-reactive protein, and 6) necessity for bone grafting. Each parameter ranged from 0 to 2 points, giving a full score of 12 points.

**Results:** In one-stage revised THA, the average scores in the successful (16/17) and failed (1/17) cases were  $9.5 \pm 1.3$  and 6 points, respectively. In two-stage revised THA, the average scores in successful (29/39), multiple debridement (5/39) and failed (5/39) cases were  $7.0 \pm 1.4$ ,  $5.6 \pm 0.5$  and  $3.6 \pm 0.5$  points, respectively. There were significant differences in the average score of successful cases between the groups.

**Conclusions:** One-stage revised THA is recommended in cases scoring above 9 points, while a palliative operation may be indicated for those scoring under 4 points.

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### Improved technique for subtrochanteric shortening osteotomy in total hip arthroplasty with severe hip dysplasia

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Subtrochanteric shortening osteotomy in total hip arthroplasty is sometimes necessary for severe hip dysplasia. We report the results of the improved technique. There are three points of improvement. First, transverse osteotomy with minimal soft tissue dissection. Second, a simple device which allows transverse cut perpendicular to the femoral shaft axis to obtain good bony contact and facilitate early union. Third, augmentation of the fixation against rotation with a small locking plate.

**Materials & Methods:** There were 19 cases with 21 hips. All were female with average age  $58.9 (44-73)$  years. According to the Crowe classification there were type II 5, type III 5 and type IV 11. Cementless S-ROM® (Depuy) stem was used for all cases. All cup were placed in the primary acetabulum, 7 were cemented and 14 were uncemented. The size of the shortening was  $22.4 \pm 8.2$  mm and the leg lengthening was  $24.6 \pm 8.2$  mm. Average follow-up was 4.5 (1-10) years.

**Results:** Japanese Orthopaedic Association hip score improved  $37.9 \pm 16.6$  preoperatively to  $75.8 \pm 9.5$  at final follow-up. All cases united within 4 months and average time to union was 11.2 weeks. There were no infection, no nerve palsy and no dislocation.

**Conclusion:** Simple transverse osteotomy with improved technique was advantageous for early and sound bony union in total hip arthroplasty for severe hip dysplasia.



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### Total Hip Arthroplasties for Highly Dislocated Hips – How Long Is The Safety Amount of Leg Lengthening –

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**[Background]** Total hip arthroplasty (THA) for highly dislocated hip is problematical. The incidence of nerve palsy after THAs for those cases is more common. Several reports have confirmed that an important factor is leg lengthening, especially in highly dislocated hips. The aim of this study was to examine the safety amount of leg lengthening.

**[Patients and Methods]** Between 1990 and 2011, THAs were performed on 19 patients with Crowe's group IV dislocated hips. The mean age of the patients at surgery was 60.9 years (42-76) and the mean follow-up period was 57 months (17-169). The patients were sub-divided into two groups. Group 1 consist of 13 patients, the operations was done using a modified Hardinge approach with femoral shortening osteotomy. The proper amount of shortening was calculated to avoid the limb's being brought down more than 5 cm. Group 2 consist of 6 patients was used transtrochanteric approach (4 THAs without shortening osteotomy, 2 THAs with minimum shortening osteotomy). In group 1, cementless cups and stems (S-ROM system) were implanted. In Group 2, cemented cups and stems (Charnley-Kerboull type) were implanted. Clinical and radiographical evaluation was performed in both groups.

**[Results]** Merle d'Aubigne hip score was improved from a mean of 10.8 points to 16.9 points at the latest follow-up in Group 1, from 9.8 points to 16.5 in Group 2. The leg lengthening was a mean 39.2 mm (20-50) in Group 1, and 46.7 mm (40-65) in Group 2. Temporary femoral numbness occurred in 2 cases in Group 1, 4 cases in Group 2.

**[Discussion]** Femoral shortening is sometimes necessary to achieve a reduction, and to prevent damage to the neurovascular structure. The exact amount of leg lengthening that may result in the occurrence of the nerve dysfunction is unknown.

**[Conclusion]** Our experience thus suggests that leg lengthening might be safe more than 50 mm.

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### Total hip arthroplasty with subtrochanteric shortening osteotomy for Crowe grade 4 using direct anterior approach

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Direct anterior approach (DAA) has been gaining popularity as minimally invasive approach in Total hip arthroplasty (THA). However, there have been no data regarding the results for THA for severely developmental dysplasia using DAA. The purpose of this study is to present the early clinical and radiographic results of 12 THAs with subtrochanteric shortening osteotomy for consecutive patients with Crowe grade 4 dysplasia using DAA. Between September 2006 and June 2011, THA with subtrochanteric shortening osteotomy was performed in 12 hips, being exposed with bluntly splitting the vastus intermedius from the anterior port. The mean follow-up period was 3.7 years. Full weight-bearing was allowed one week after surgery. Patients were allowed to discharge to home if they were able to walk with T-cane. The mean hospital stay was 22.3 days. The clinical portion of JOA hip score improved from a mean of 54.8 pre-operatively to 81.5 at the latest follow-up. No patient had a positive Trendelenburg or Duchenne sign at the latest follow-up. No cases of nonunion or nerve palsy were encountered. Our findings suggested that DAA provided satisfactory short-term outcomes for THA with subtrochanteric shortening osteotomy for Crowe grade 4.



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## Clinical Results of Arthroscopic Superior Capsule Reconstruction for Irreparable Rotator Cuff Tears

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**Purpose:** The objective of this study was to investigate the clinical outcome and radiographic findings after arthroscopic superior capsule reconstruction (ASCR) for symptomatic irreparable rotator cuff tears.

**Method:** From 2007 to 2009, 24 shoulders in 23 consecutive patients with irreparable rotator cuff tears (11 large, 13 massive) underwent ASCR using fascia lata. We used suture anchors to attach the graft medially to the glenoid superior tubercle and laterally to the greater tuberosity. Side-to-side sutures were added between graft and infraspinatus tendon and between graft and residual anterior supraspinatus/subscapularis tendon to improve force coupling. Physical examination, radiography, and MRI were performed before surgery, at 3, 6, 12 months after surgery, and yearly thereafter.

**Results:** Mean active elevation increased significantly from 84° to 148° ( $P < .001$ ) and external rotation from 26° to 40° ( $P < .01$ ). Acromiohumeral distance increased from 4.6±2.2 mm preoperatively to 8.7±2.6 mm postoperatively ( $P < .0001$ ). No patients had progression of osteoarthritis or rotator cuff muscle atrophy. Twenty patients (83.3%) had no graft tear or tendon re-tear during follow-up. The American Shoulder and Elbow Surgeons score improved from 23.5 to 92.9 points ( $P < .0001$ ).

**Conclusions:** Arthroscopic superior capsule reconstruction restored superior glenohumeral stability and function of the shoulder joint with irreparable rotator cuff tears. Our results suggest that this reconstruction technique is a reliable and useful alternative treatment for irreparable rotator cuff tears.

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## Partial thickness lateral bursal side subscapularis tendon tears affect LHB lesions

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**(Purpose)** We investigated SSC and SGHL footprint from bursal side by dislocating LHB with releasing transverse ligament and rotator interval in rotator cuff surgeries.

**(Materials)** We performed 87 rotator cuff surgeries for recent one year arthroscopically, the average age at operation was 62.9 (35~79) years old, 60 males, 27 females, 48 rights, 39 lefts. SSC footprints were inspected as mentioned above and these were classified into five groups (intact, joint side, intratendinous, lateral bursal side, and full-thickness tears). Mid-substance LHB tears were inspected and classified into four groups (intact, mild, severe, and completely torn), and LHB subluxation were observed. We examined the relationship between the status of SSC footprints and LHB lesions.

**(Results)** In SSC joint side tear the SGHL footprint were intact, but in lateral bursal side tear and full thickness tear the lateral one-third or two-thirds of the SGHL footprints was torn with SSC. Fifty one SSC tears (58.3%) were observed, 11 joint side, 5 intratendinous, 16 lateral bursal side, 19 full thickness. Intact, mild, severe, and completely torn LHB tears were observed 6, 1, 4, 0 shoulders in joint side tears, 5, 0, 0, 0 in intratendinous, 3, 5, 8, 0 in bursal side, 1, 1, 10, 7 in full thickness respectively.

**(Conclusion)** Partial thickness lateral bursal side and full thickness subscapularis tendon tears frequently have lateral SGHL tears, and these changes affect the LHB mid-substance tears and subluxations.



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## High risk of subsequent fractures but little treatment of osteoporosis in elderly patients after proximal humeral fracture

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**Background:** Proximal humeral fracture in aged individuals occurs as a complication of osteoporosis. If the osteoporosis is not properly managed, there is a concern of high frequency of subsequent osteoporotic fractures.

**Objective:** To investigate the risk of subsequent fractures and the rate of osteoporosis treatment in elderly patients after proximal humeral fracture.

**Methods:** The enrollment criteria were; patient aged over 65 years, diagnosed as proximal humeral fracture, and followed up for more than 12 months. The data was extracted from medical record to evaluate the 10-year fracture risk using FRAX. A questionnaire was sent to the patients to identify the rate of subsequent fractures as well as the osteoporosis treatment.

**Results:** 42 patients satisfied the criteria. The risk of subsequent osteoporotic fracture in this group was 26% on average. 22 patients replied the questionnaire and among them three patients (14%) suffered subsequent fractures. Only five patients underwent osteoporosis treatment.

**Conclusion:** This study cautioned that there was a high risk of subsequent fractures but little treatment of osteoporosis were carried out in elderly patients after proximal humeral fracture.





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## Resolution of posttraumatic symptomatic stage I osteonecrosis following implantation of autologous bone marrow after femoral neck fracture

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**Introduction:** The purpose of this study is to report total resolution of posttraumatic symptomatic stage I osteonecrosis the femoral head after percutaneous implantation of autologous bone marrow and to investigate the reparative process with MRI.

**Methods:** Thirty patients with femoral neck fractures (8 Garden I, 1 Garden II, 14 Garden III, 7 Garden III) had osteosynthesis, bone union, and osteonecrosis between 1993 and 2001. Symptomatic Stage I osteonecrosis was diagnosed average 1 year (6 months to 24 months) after the fracture on MRI. These 30 symptomatic stage I hips with a femoral head involvement of average 30 per cent (range 10 to 40 per cent) of the volume of the femoral head were treated with percutaneous bone marrow grafting (BMG Group), and compared with 30 other Stage-I posttraumatic symptomatic osteonecroses without bone marrow transplantation (control Group). These 30 hips (30 patients) were followed during average 15 years (range 10-20). The repair volume was the decrease in abnormal signal between the preoperative MRI and the MRI obtained at the most recent follow up.

**Results:** Bone marrow injection delayed collapse and decreased the number of collapses. Twenty-three (77%) hips (23/30) of the control group had collapse within 4 years after the fracture. Four (13%) of the 30 hips with Bone Marrow Graft had collapse after 5 years. The other 26 hips with bone marrow injection remained asymptomatic until the most recent follow-up. In the BMG Group the bone marrow graft contained on average 2 579 progenitors per cubic centimeter. Each osteonecrosis lesion received a mean number of thirty cubic centimeters of bone marrow graft. The average number of progenitors injected in each lesion was 51 000 cells (range 1 200 to 122 000). The mean volume repair was 16 cubic centimeters. These 26 hips of the BMG Group demonstrated total (14 hips) or subtotal (12 hips) resolution on MRI at the most recent follow-up (15 years).

**Conclusion:** Bone marrow graft delayed the need for total hip replacement, 12 among 30 hips in the control group, versus 2 among 30 hips in the BMG Group at the most recent followup.

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## Subchondral insufficiency fracture of femoral head – classification by clinical and radiological features –

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Twenty two cases of subchondral insufficiency fracture (SIF) of the femoral head experienced in our institution were classified in 4 types by clinical and radiological features. All the cases showed a sudden onset of hip pain, low-signal band parallel to the joint surface on MRI, no history of steroid use and alcoholism, and no apparent destruction of acetabulum. Four types are follows. 1. Spontaneous remission type; MRI shows a small low density band at the lateral end of the femoral head. 2. Cartilage wearing type; a small dent at the lateral end of the femoral head and a low density band expanding to the weighed area. The cartilage wearing and hip pain advances gradually, resembling to primary osteoarthritis. 3. Cartilage detachment type; radiograph shows a slight narrowing of the articular space and no compression of the femoral head. However, the patients could not walk owing to severe hip pain. Expansive cartilage detachment was certified in the operation. 4. Collapse type; the femoral head is flat by collapse without no abnormality of acetabulum.

If the low destiny band is small and located out of weight bearing area, spontaneous remission is expected. However, the band extended to weight bearing area suggests wearing or detachment of the cartilage. The mechanism differentiating wearing from detachment is unclear. High energy injuries like falling or excessive obesity may cause the advanced collapse of the femoral head.



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## Osteoarthritis change after Salter pelvic osteotomy for DDH – Long term results of Salter pelvic osteotomy over 30 years –

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**Purpose:** We evaluated the osteoarthritis (OA) change after Salter pelvic osteotomy for the treatment of developmental dysplasia of the hip (DDH). From the results, the course of early OA involvement after Salter operation was investigated.

**Material and methods:** The materials were as follows, 14 cases (man; 1, female; 13), 18 hips. For all cases, Salter pelvic osteotomy was done for the purpose of acetabular coverage improvement. The age at operation was on average 4.7 (2-7) years old. Follow-up term was on average 34 (30-40) years. The age at final follow-up time was 38 (34-46) years old. We evaluated 18 hips on X-P as follows, Severin's classification at skeletally mature age, OA change at final follow-up time. The correlation between Severin's classification at skeletally mature age and early OA change appearance was estimated.

**Results:** According to Severin's classification at skeletally mature age, Group 1a was 4 hips, Group 2a; 5 hips, Group 2b; 5 hips, Group 3; 4 hips. OA change was found on 4 hips (1 hip from Group 2a, 2 hips from Group 2b, 1 hip from Group 3). All these 4 cases had hip joint pain clinically, from slightly to severe. OA change on X-P had started at the time of their twenties. And advanced one case came to THA.

**Conclusion:** After Salter pelvic osteotomy for DDH, there exists the possibility that early OA change may occur at relative younger age. Even from Severin's 2a groupe, early OA change appeared and advanced. Long terms follow-up over skeletally mature age is need. And true course of early OA involvement must be estimate from many DDH cases.

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## MULTIMODAL management of complex acetabular fractures

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In a previous paper on 83 cases, we demonstrated that results of total hip replacement for acetabular fractures were better if the patient was initially treated conservatively than after ORIF. Moreover long term results with all ceramic material provide acceptable results without any activity limitation.

We developed a special algorithm called: multimodal management of acetabular fracture. This includes: clinical examination, X rays, tomo scan, sometimes angio scans, traction under anesthesia, sometimes arthroscopy. ORIF are indicated for anterior column fracture or instable posterior wall. For very complex fractures, ie bi-column or comminuted, we prefer to apply a traction for 3 weeks at least. After rehabilitation and weight bearing, THR is indicated if pain and disability do persist. We found in the first patients treated this way that total hip indication was exceptional. We are not in favor of primary total hip except in very old persons who need to become vertical early.



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### Dual SC Screw; a novel device of internal fixation for femoral neck fractures

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Dual SC Screw (DSCS) is a implant for femoral neck fractures developed in Japan, which comprised with a screw and barrel allowing sliding and compression. Two types of barrel are available; thread barrel which is a threaded cylinder and plate barrel which prevents as one-holed side plate preventing displacement of the screw. From November 2005 one-hundred patients with femoral neck fractures treated with DSCS in our hospital were included in this study. There were seventy-eight females and twenty-two males and average age was 73.4 years. All fractures are operated with a plated barrel and a thread barrel simultaneously. Seventy seven were non-displaced fracture (Garden Stage 1, 2) and twenty two were displaced fracture (Garden Stage 3, 4). An average operation time was 42 minutes. Complication was found in 14 patients and 11 were required reoperation. No backout pain of the screw end and displacement of plate barrel were found. We conclude that DSCS is reliable fixation device providing stable fixation and minimizing complication.

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### A New Analysis with 3-D CT for the Trochanteric Femoral Fracture

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**Purpose:** To clarify a significance of 3D-CT analysis in trochanteric femoral fracture.

**Patients:** We evaluated 76 trochanteric femoral fractures (14 male and 62 female, average age 83 y/o, average follow-up 10 months) with pre-operative 3D-CT. All fractures were treated with Japanese PFNA (proximal femoral nail anti-rotation, Synthes).

**Method:** Trochanteric fractures were classified by 3-D CT classification (Nakano, 2006) into 2-part, 3-part, 4-part, and subtrochanteric like fracture. TAD (Tip apex distance) and quantity of post-operative telescoping were measured in each fracture types. The bone union of a main fracture line between femoral head fragment and femoral shaft fragment was decided with the plain radiographs. We selected 31 fractures that have the third fragment at the back side of the greater trochanter and have more than 10 months follow-up terms. These fractures were evaluated about bone unions not only the main fracture line but also the trochanteric fragments.

**Result:** We judged 99% (75/76) fractures as healed or normal healing process about the main fracture line. There was no statistical correlation between TAD and 3D-CT classification. But post-operative telescoping had statistical difference between 2-part fractures and the others ( $P=0.037$ ). In 6 fractures of selected 31 fractures, the third fragments at the backside of the greater trochanter were suspected of non-union (6/31, 19%).

**Discussion:** Many 3 or 4-part fractures have misjudged as 2-part fractures in plain radiographs. Because a lot of fragments behind greater trochanter can not be recognized with A-P and lateral radiographs. The 3D-CT can clearly visualize the third or fourth fragment behind the greater trochanter. In our study, the 3D-CT classification have no correlation with TAD, but there was a statistical correlation with post-operative telescoping.

**Conclusion:** 3D-CT analysis can predict the post-operative telescoping by visualizing fragments behind the greater trochanter.



## Poster

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### Less-Invasive Cement Spacer for Infected Uncemented Total Hip Replacement: report of three cases

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The treatment of an infected total hip prosthesis is difficult because of the presence of foreign bodies in the lesion. Treatment aims to remove all foreign bodies initially in order to reduce the cause of infection and then to reimplant a new prosthesis. The procedure is invasive not only to the hip joint due to bone removal but also is invasive to general condition due to intramedullary bleeding after removal of the implant. Moreover increased number of uncemented implant, which bond to bone directly, removal of the uncemented implant is generally more invasive to the bone.

The risk to infection generally increases with the more invasive treatment. In the present study we explored the use of a partial cement spacer for infected hip implant, in three cases. The patients were a 73-year-old female, a 69-year-old male, and an 85-year-old female. The infected acetabular component and the femoral head were removed in the first case and second case, while the stem and acetabular liner were removed in the third case but not the acetabular uncemented shell. After reimplantation of a new prosthesis using cement spacer, the infections in all three cases disappeared.

We conclude that a partial cement spacer to reduce the invasiveness of treatment may be effective in selected old-aged patients.

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### Treatment for Periprosthetic Femoral Shaft Fractures after Femoral Revision Using Long Stem

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Periprosthetic femoral fractures are becoming increasingly common and are a major complication of total hip arthroplasty (THA). We report a retrospective review of the outcome of treatment of 9 periprosthetic fractures around THA and bipolar hemiarthroplasty (BHA) after femoral revision using long stem. Nine female patients with a mean age of 75.9 years (70 to 87 years) were treated for a Vancouver type B1 fracture between 1997 and 2011. The average time to fractures after femoral revision using long stem was 75.4 months (3 to 120 months). The average follow-up was 47 months (8 to 157 months). In this study, the type B1 fractures with good bone quality were treated with the fixation of fractures in 6 hips. Among them 4 cases were reinforced with bone graft. The type B1 fractures with poor bone quality were treated with stem revision and augmentation with a bone graft in 3 hips. One type B1 fracture with poor bone quality was treated with augmentation with a plate. All cases achieved primary union. The mean Japanese Orthopaedic Association (JOA) score was 77 in final follow up. These results suggest that the customized treatment, with considering the quality of host bone and the configuration of the fracture, showed favorable overall results.



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**Femoral Reconstruction using Impaction Bone Grafting**

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Loss of bone stock due to aseptic loosening of femoral component or osteolysis is a main problem in femoral revision. The purpose of the present study was to evaluate the mid-term clinical and radiological outcomes of femoral revision with impaction bone grafting technique combined with a highly-polished, double-tapered cemented stem (CMK Original concept stem). Femoral revision with an impacted allograft was performed on 41 patients (41 hips). The average age was 67.1 years (44 to 82 years) and the average follow-up period was 4.3 years (2 to 8 years). The preoperative bone loss was graded according to the Endo-klinik classification. There were 3 patients with grade I, 23 patients with grade II, 10 patients with grade III, and 5 patients with grade IV bone loss. The mean Japanese Orthopaedic Association (JOA) hip score improved from 60.8 to 80.8 at the final follow-up. There were two intra-operative fractures which were successfully treated by cerclage wires. Reoperation of the femur was undertaken in one patient due to postoperative femoral fracture. None of the 41 stems showed extensive subsidence (>2 mm). Four patients needed a closed reduction for dislocation. We concluded that impaction bone grafting technique with the CMK stem in femoral revision has excellent 2 to 8 year results.

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**Short-Time Results of Metal-on-Metal Total Hip Arthroplasty**

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**The aim of the study:**

Early failures of Metal-on-metal total hip arthroplasty (MOM THA) are reported in several years. We reviewed 37 patients who underwent MOM THA from January 2007 to December 2010 in our hospital. There were 2 men and 35 women with a mean age at surgery of 63.5 (39 to 79). The original disease is 28 osteoarthritis, 5 osteonecrosis, 3 rheumatoid arthritis and 1 rapidly destructive hip coxarthropaty.

**Methods:**

We investigated their systems, size (cup, femoral head and stem) and cup position (anteversion and inclination). And we checked them for aseptic loosening, metal hypersensitivity reactions and pseudotumor in X-ray and computed tomography (or magnetic resonance imaging)

**Results:**

4 patients experienced significant localized soft tissue reactions and we performed revision. There were 3 patients with PINNACLE (Depuy) (3/14=21.4%) and 1 patient with M2A Taper (BIOMET) (1/23=4.3%). They are all women and their original disease was osteoarthritis.

**Conclusions:**

MOM THA with PINNACLE (Depuy) has higher incidence of revision so it is better to check CT and MR periodically.



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## Emerging idea Treatment of precollapse osteonecrosis of the hip with a single local injection of recombinant human FGF-2 microspheres. Can local FGF-2 administration enhance bone regeneration in osteonecrosis of the femoral head

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**Background:** Untreated symptomatic osteonecrosis of the femoral head (ONFH) often leads to femoral head collapse and secondary OA. We developed and evaluated a new animal model of ONFH using rabbits and investigated the therapeutic effects of recombinant human rhFGF-2 in the repair of ONFH.

**Methods:** ONFH was induced by high-dose corticosteroid administration with vascular occlusion. Thirty-five rabbits with ONFH were divided into control and treatment groups including PBS and rhFGF-2 groups, in which 100- $\mu$ g rhFGF-2 or PBS in 100- $\mu$ l gelatin hydrogel were directly injected into the femoral head 8 weeks after the ONFH procedure. Controls were sacrificed at 0, 4, 8, 12, and 24 weeks, and the treatment groups at 24 weeks after ONFH. Gross morphologic and histologic examinations as well as radiographic assessment by micro-CT scans and MRI were performed.

**Results:** Controls demonstrated a band-like pattern in T1-weighted MR images at 4 weeks and developed ONFH with time. New bone formation without collapse was detected in the rhFGF-2 group. OA histological score in the rhFGF-2 group was significantly less than that in the PBS group and control group.

**Conclusion:** Our animal model demonstrates the essential histopathologic and radiological features of human ONFH. A single local injection of rhFGF-2 microspheres induces bone regeneration and suppresses femoral head collapse and OA progression. We propose the early treatment of precollapse ONFH with a single local injection of rhFGF-2 gelatin hydrogel microspheres

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## Return to Sports Activities Following Minimally Invasive Total Hip Arthroplasty

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Mitsugi Kukimoto, Matsuko Ogata, Kazuhiro Oinuma, Hideaki Shiratsuchi, Tatsuya Tamaki,  
Yoko Miura  
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**Objective:** The purpose of this study was to assess the sports activities of patients undergoing THA using minimally invasive direct anterior approach.

**Patients and methods:** Self-administered questionnaires were mailed for 378 patients who had undergone THA in 2011. The questionnaire contained items related to sports activities before and after surgery.

**Results:** The response rate to the questionnaire was 70.3% (266 patients). At the time of surgery, 44.7% of patients engaged sports activities. Sports activities include swimming, walking, gymnastic exercises, golf, and so on. At the time of investigation, 90.8% of patients returned to sports. The mean time to return to sports activities was 4.9 months.

**Conclusions:** Nearly half of patients had engaged sports activities prior to surgery, and about 90% of them returned. Minimally invasive direct anterior approach provides rapid recovery and return to sports activities after THA.



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## Intra-operative Blood Loss in Each Surgical Procedure in Total Hip Arthroplasty

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**Introduction:** It is important to recognize accurate operative blood loss during total hip arthroplasty (THA), because THA has been reported to associated with large amount of blood loss. We divided surgical procedures in THA into three stages and investigated the intra-operative blood loss and operating time in each stage.

**Methods:** One hundred and six patients (106 hips) who had undergone THA were enrolled in this study. All THAs were performed using direct anterior approach (DAA). Surgical procedures in THA were divided into three stages: approach to the hip (procedure A), acetabular procedure (procedure B), and femoral procedure (procedure C). Intra-operative blood loss and operating time were investigated in each procedure.

**Results:** The mean total operating time was  $47 \pm 14$  minutes. The mean total operative blood loss was  $424 \pm 186$  g. The mean operating time in procedure A, procedure B, and procedure C was  $16 \pm 6$  minutes,  $11 \pm 5$  minutes, and  $15 \pm 7$  minutes, respectively. The mean operative blood loss in procedure A, procedure B, and procedure C was  $85 \pm 70$  g,  $168 \pm 110$  g, and  $171 \pm 127$  g, respectively. When blood loss was greater than 200 g in procedure A, total blood loss was greater than 500 g in 88%.

**Conclusions:** Acetabular procedure was associated with large amount of blood loss per minutes. Total blood loss can be predicted from blood loss during approach to the hip joint.

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## Good clinical and radiographic outcomes of a cementless total hip prosthesis with alkaline and heat treatments

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**Background** Cementless total hip arthroplasty (THA) implants using alkaline and heat treatments were developed to enhance bone bonding. Although bone-bonding ability of the alkali- and heat-treated titanium surface has been demonstrated in animal studies, it is unclear they enhance bone bonding in humans.

**Questions/purposes** We therefore (1) determined survivorship, function, and radiographic signs of fixation alkali- and heat-treated THA implants; and (2) to examine their bone-bonding ability histologically.

**Methods** We retrospectively reviewed 58 patients who underwent 70 primary THAs, of whom 67 were available for minimum follow-up of 8 years (average, 10 years; range: 8-12 years). Survival rate was calculated. Hip function was evaluated using the Japan Orthopaedic Association (JOA) hip scores, and radiographic signs of fixation were determined from anteroposterior radiographs. Two retrieved implants were investigated histologically.

**Results** Using revision for any reason as the end point, the overall survival rate was 98% (95% confidence interval, 96%-100%) at 10 years. The patients' average JOA hip scores improved from 47 points preoperatively to 91 points at the time of the last followup. No implant had radiographic signs of loosening. Histologically we observed bone in the pores 2 weeks after implantation in one specimen and apparently direct bonding between bone and the titanium surface in its deep pores 8 years after implantation.

**Conclusions** Cementless THA implants with alkaline and heat treatments showed a high survival rate. Further study is required to determine whether the treatment enhances direct bone bonding.



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## Return to Work Following Minimally Invasive Total Hip Arthroplasty

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**Objective:** The purpose of this study was to assess the employment status of patients undergoing THA using minimally invasive direct anterior approach.

**Patients and methods:** Self-administered questionnaires were mailed for 378 patients who had undergone THA in 2011. The questionnaire contained items related to employment status before and after surgery, job categories, and satisfaction level with surgery.

**Results:** The response rate to the questionnaire was 70.3% (266 patients). At the time of surgery, 46.6% of patients were employed. Of those working prior to their surgery, 90.3% return to work at the time of investigation. Within the first one month 50.6% of patients returned to work, and after that 39.7% returned. One hundred and six (94.6%) patients were satisfied or somewhat satisfied with surgery.

**Conclusions:** About 90% of patients working prior to surgery returned to employment following surgery. About half of them returned to work within the first one month. Minimally invasive direct anterior approach provides rapid recovery and return to work after THA.

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## Relationship between the Ischial Axis and the Anterior Pelvic Plane in Patients Undergoing Total Hip Arthroplasty

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**Introduction:** Accurate positioning of the acetabular component is critical to achieve successful total hip arthroplasty (THA). The lateral radiographs are useful in evaluation of the acetabular cup anteversion. However, this method was affected by variations in pelvic position and radiographic technique. In this study, we employed the ischial axis as an anatomical landmark on the lateral radiographs. A relationship between the ischial axis and the anterior pelvic plane was investigated using three dimensional computed tomography (3D-CT).

**Materials and method:** Preoperative 3D-CT images were obtained in 65 patients (65 hips) who underwent total hip arthroplasty. The mean age of the patients was 64.8 years. The diagnosis was osteoarthritis in all patients. The angle between the ischial axis (the long axis of the ischial tubercle) and anterior pelvic plane (defined by the bilateral anterosuperior iliac spine and the symphysis) was measured on 3D-CT.

**Results:** The angle between the ischial axis and anterior pelvic plane was  $18.8 \pm 3.0^\circ$ .

**Conclusions:** The ischial axis can be used as an anatomical landmark on the lateral radiographs. The findings in this study considered to be useful for evaluating the acetabular cup anteversion in THA.





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## Clinical results of the cemented THA using double-tapered titanium stem – Comparison with the results of the previous type stem

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**[Introduction]** We have compared the clinical results of the K-MAX HS-3 tapered stem with those of the previous type having cylindrical tip.

**[Materials and Methods]** In K-MAX HS-3 THA (Kyocera Medical, Japan), cemented titanium alloy stem and all polyethylene cemented socket are used. This stem has the double tapered symmetrical stem design, allowing the rotational stability and uniform stress distribution (Type T). The features of this stem are; 1. Vanadium-free high-strength titanium alloy, 2. Double-tapered design, 3. Smooth surface. In contrast, previous type stem has the design with cylindrical stem tip (Type C).

All surgery was performed at Kitano Hospital between September 2003 and September 2005. 58 THA were performed (Type T; 38 hips, Type C; 20 hips). The average follow-up period was 7.9 and 8.2 years for the Type T and C, respectively.

**[Results]** Japanese orthopaedic association (JOA) score improved from 40/37 to 88/80 points (Type T/C). Socket loosening was not observed radiographically. Stem loosening was observed in one hip in Type C, demonstrating osteolysis at the distal end of the stem. In this case revision THA was performed 3.5 years postoperatively. Bone resorption was more frequently observed in Type C than Type T. Cortical hypertrophy was observed in 7.3% in Type T and 25% in Type C.

**[Discussion]** From the X-ray finding, it was suggested that Type T had more uniform stress distribution to the femoral bone than Type C. Moreover, the problems associated with titanium alloy usage were not observed. From the present investigation, the better long term results of the tapered titanium stem (Type T) was expected.

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## Failure of Conventional Metal-on-Polyethylene Total Hip Arthroplasty Mimicking Hip Infection A Case Report

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In 2006, a 77-year-old woman with the diagnosis of osteoarthritis of the right hip joint underwent a metal-on-polyethylene total hip arthroplasty with metal wiring around the great trochanter elsewhere. In November 2012, her operation wound revealed marked swelling with local heat. Laboratory studies showed the erythrocyte sedimentation rate 90 mm/hr (0-15 mm/hr), the C-reactive protein level 6.0 mg/dL ( $\leq 0.3$ ), and blood leukocyte count 11100 (3500-9000/ml), however, the culture of aspirated fluid was negative for bacterial growth. Though she was prescribed oral antibiotics, the clinical symptom was getting worse, in November 2012, she was presented to the authors' institution. Plain radiographs demonstrated evidences of severe bone resorption at proximal part of the femur and the broken metal wire. We thought that the wound became filled with purulent fluid, however, magnetic resonance imaging revealed well-defined solid lesions, which were located in the subcutaneous tissue or the gluteus muscle. Surgical exploration revealed no obvious sign of infection and the masses were excised. The acetabular shell and femoral components were solidly fixed, and therefore, only a removal of the metal wire was undertaken. This failure seems to be associated with adverse reaction to metal debris caused by friction between the metal wire and the femoral component.



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### Less-Invasive Cement Spacer for Replacement of Infected Uncemented Total Hip Replacement: report of three cases

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The treatment of an infected total hip prosthesis is difficult because of the presence of foreign bodies in the lesion. Treatment aims to remove all foreign bodies initially in order to reduce the cause of infection and then to reimplant a new prosthesis. The procedure is invasive not only to the hip joint due to bone removal but also is invasive to general condition due to intramedullary bleeding after removal of the implant. Moreover increased number of uncemented implant, which bond to bone directly, removal of the uncemented implant is generally more invasive to the bone.

The risk to infection generally increases with the more invasive treatment. In the present study we explored the use of a partial cement spacer for infected hip implant, in three cases. The patients were a 73-year-old female, a 69-year-old male, and an 85-year-old female. The infected acetabular component and the femoral head were removed in the first case and second case, while the stem and acetabular liner were removed in the third case but not the acetabular uncemented shell. After reimplantation of a new prosthesis using cement spacer, the infections in all three cases disappeared.

We conclude that a partial cement spacer to reduce the invasiveness of treatment may be effective in selected old-aged patients.

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### Assessment of Walking Ability following Total Hip Arthroplasty Relationships between the 2-Steps Test and 10-Meters Walk Test

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**Purpose:** 2-steps test (2ST) has been reported to be useful test for assessing physical activities in daily living and fall risk in elderly people. The purpose of this study was to assess the walking ability using 2ST (the maximum length of two step) in the patients with total hip arthroplasty (THA) for osteoarthritis.

**Patients and Methods:** 2ST values (the maximum length of two steps/height) and 10-meters walk test (10MWT: the time taken to walk 10 meters) were evaluated in 55 patients (6 males and 49 females, mean age 61.9 years) undergoing THA. All THAs were performed using direct anterior approach. The evaluation was performed before surgery, 3 weeks, 6 weeks, and 12 weeks after surgery.

**Results:** The performance data for 2ST values before surgery, 3 weeks, 6 weeks, and 12 weeks after surgery were 0.85, 0.87, 0.97, and 1.04, respectively. For corresponding time point, 10MWT were 8.75 seconds, 9.03 seconds, 7.88 seconds, and 7.21 seconds, respectively. Statistically significant negative relationships were observed between 2ST and 10MWT in each time point ( $r=-0.72$ ,  $-0.73$ ,  $-0.70$ ,  $-0.75$ ).

**Conclusion:** 2ST was considered to be useful for assessing walking ability in the patients undergoing THA.



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## Evaluation of the accuracy in socket setting on THA with CT-based navigation system – Comparison between two different matching systems –

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**Introduction:** We have used CT-based navigation system from 2003, to set the acetabular socket on THA in optimal position. At first, we had used CT-based land-mark matching system (LM). From 2006, we started to use CT-based fluoroscopy-matching navigation system (CT-FM) (BrainLAB Company). We evaluated the accuracy and discussed the usefulness of these two different matching systems.

**Material:** Series 1 (234 THA cases) from 2003 to 2008 and Series 2 (88 THA cases) from 2009 to 2011. Series 1 composed 152 cases with LM and 82 cases with CT-FM, and Series 2 composed 51 cases with LM and 37 cases with CT-FM. For Series 1, absolute discrepancy between verification angle in navigation procedure and post-operative CT measurement angle was calculated and compared. For Series 2, the absolute discrepancy in socket angle between navigation procedure and post-operative measurement (CT and X-P) was calculated and compared in these two different matching systems.

**Results:** Series 1; LM: The absolute difference in 152 cases between final verification angle and post-operative CT measurement angle was 4.2 degree (on average)  $\pm$  3.2 degree in inclination angle, and 4.4 degree (on average),  $\pm$  3.7 degree in anteversion angle. CT-FM: The absolute difference in 89 cases between final verification angle and post-operative CT measurement angle was 2.9 degree (on average)  $\pm$  2.5 degree in inclination angle, and 2.8 degree (on average)  $\pm$  2.6 degree in anteversion angle.

Series 2; LM: The absolute difference in 51 cases between final verification angle and post-operative X-P measurement angle was 3.6 degree (on average)  $\pm$  3.1 degree in inclination angle, and 3.1 degree (on average),  $\pm$  2.6 degree in anteversion angle. CT-FM: The absolute difference in 37 cases was 2.7 degree (on average)  $\pm$  1.6 degree in inclination angle, and 2.9 degree (on average)  $\pm$  2.4 degree in anteversion angle.

**Discussion and conclusion:** The accuracy of socket setting angle in 322 THA with CT-based navigation was evaluated. The absolute differences between navigation verification and post-operative CT and X-P measurement were within 5 degree on average. CT-FM is new technology and its accuracy is always high. Thinking about the advantage of both systems, we should use divide these CT-based navigation systems.

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## Perioperative issues of artificial joint replacement of the lower limbs for hemophilic arthropathy

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**Purpose:** Hemophilia is a hemorrhagic disease, and perioperative management for hemorrhage is very important. In this study, we investigated prognosis in the patients receiving artificial joint replacement.

**Subjects:** Subjects were 10 joints in 7 patients with hemophilic arthropathy who received total hip arthroplasty for 6 joints and total knee arthroplasty for 4 joints. All the patients had hemophilia A, 6 patients were positive for HCV, and 3 patients for HIV. In these patients, the changes of clotting factor activity levels on postoperative clotting factor replacement therapy, postoperative rehabilitation, and complications were investigated.

**Results:** The patients left the bed 3.4 days after operation on average, and ambulation was started 6.9 days after operation on average. As perioperative complications, infection was observed in 1 patient, and intra-articular hematoma in 1 patient. Regarding clotting factor activity levels, the trough level of factor VIII activity was below the reference range of the perioperative guideline in 1 patient.

**Discussion:** It has been reported that hemostasis management by replacing clotting factor is cumbersome and complicated after artificial joint replacement for hemophilic arthropathy, and postoperative hematoma and infection are often observed. In our study, hematoma and infection due to poor control of hemostasis were also observed in one each. We should strictly control hemostasis by monitoring the clotting factor activity levels, and perform rehabilitation tailored to each patient's hemostasis management.



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## An investigation of the internal rotation angles after primary THA with Direct Anterior Approach

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### Introduction

The direct anterior approach (DAA) is used for the primary total hip arthroplasty (THA) in our institute, mainly. Posterior capsule is released to elevate the proximal femur. Then, short rotator muscles should be preserved to achieve the stability of the hip joint postoperatively, especially excessive internal rotation (IR) angles is thought to have a close relationship to recurrent posterior dislocation. However, there is a possibility to injure a part of short rotator muscles during operations.

The purpose of this study is to investigate whether surgical procedure to elevate the femur has an influence the postoperative stability of the hip joint or not.

### Materials and Methods

We retrospectively reviewed 80 primary THAs. The average age at surgery was 66.5 yrs. 6 hips were in 5 men and 74 hips were in 73 women. All THAs were performed with DAA in supine position without traction table under general anesthesia.

We defined 44 THAs with repaired the released soft tissue after implantation as group A, and 36 THAs with kept release as group B. Maximum IR angle was measured at hip flexion angle 0, 45 and 90 degrees at the time of before THA, after implantation during THA, at 3 weeks, 3 months, 6 months and 1 year after THA.

### Results

Group A has a tendency of smaller IR angles than group B during THAs at flexion 0, 45 and 90 degrees position. After 3 weeks postoperatively, both groups had similar angles. No statistical significant between both groups.

### Discussions and conclusions

DAA is an intermuscular approach, therefore we can perform THAs without releasing muscle. However, here is a possibility to injure a part of short rotator muscles. Our study shows the maximum IR angles are stable after three weeks postoperatively. So, soft tissues might be spontaneously repaired and the hip joint might become stable about three weeks after THA.

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## Relationship between Bone Cement Thickness and Cement Creep A Biomechanical Study Using Collarless Polished Tapered Stem

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**[Aims of this study]** The optimal thickness of cement in cemented femoral components is still a controversial issue. The good outcome in femoral components with a thin cement mantle is called "The French paradox".

We researched cement creep direction and quantity for different thicknesses of the cement mantle, using a collarless polished tapered femoral stem.

**[Subjects and methods]** We used three sizes of collarless polished tapered stem, two stems for each size. Same size composite femurs were reamed with a No. 3 rasp. The stems were fixed with bone cement, using various thicknesses of cement mantle. We then injected tantalum marker balls (balls) into the proximal portion of the bone cement, and applied a 1-Hz dynamic load to the stems for half a-million cycles. We used micro-CT before and after loading to measure the 3-D movement of the tantalum balls. And we analyzed occupation ratio of stem in the femoral canal by reconstructed 3-D model of bone cement and stem.

**[Results]** We were able to detect a total of 13 balls in the cement for the 6 stems. The range of cement thickness in the CT slice on balls was 1.52 to 5.32 mm. In the horizontal plane, 8 of these 13 balls moved in an outside direction and five moved in an inside direction. The horizontal/perpendicular ratio for the tantalum balls showed a significant negative correlation to the thickness of the cement mantle. The ratio of stem subsidence to ball subsistence showed a significant negative correlation to the stem occupation ratio.

**[Conclusions]** We found that stem subsistence was more commonly associated with the thicker cement mantles and with a low stem occupation rate. Effective horizontal cement creep was seen in thin cement mantles.



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## Changes in number of total hip arthroplasty and patient backgrounds in cases of rheumatoid arthritis in Japan

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**Objectives:** Joint destruction caused by rheumatoid arthritis (RA) can be limited by administration of a biological drug, thus it is considered that the number of surgeries for affected patients will decrease in the future, with some recent reports noting that the number of total hip arthroplasty (THA) procedures for RA patients is decreasing. The purpose of this study was to examine whether the number of RA cases in Japan has shown a decreasing trend.

**Methods:** We investigated the records of all patients who underwent THA at our institution during the most recent 12-year period (2000-2011) including preoperative X-rays to determine any difference in tendency for hip joint destruction. In addition, 2 investigators independently evaluated pre-operative X-ray findings using the Larsen classification to determine whether the number of severe cases (Larsen grade 5) of hip joint destruction decreased during the study period.

**Results:** The total number of primary THA procedures was 561, while RA was diagnosed in 54 patients (9.6%). That latter value showed a decreasing tendency, as 31 of the 54 cases occurred from 2000 to 2005 and 23 from 2006 to 2011, a decrease of approximately 30%. Cases classified as Larsen grade 5 by X-ray evaluation decreased to only a single case in the final half from 7 cases in the first half.

**Conclusion:** The number of patients who underwent THA for RA was decreased and patient backgrounds were also changed. Preoperative X-ray evaluations showed that cases of severe joint destruction in particular were remarkably decreased.

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## Arthroscopic treatment for femoroacetabular impingement after healed femoral neck fractures

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**Objective:** To describe femoroacetabular impingement (FAI) as a cause of persistent painful loss of motion and progressive joint-destruction in patients with a healed femoral neck fracture, and to evaluate results after its arthroscopic treatment.

**Methods:** Four patients with groin pain caused by motion and exertion following a healed femoral neck fracture were diagnosed by a physical exam, by conventional radiographs and radial MR-arthrograms, and their average follow-up period was one year (range, 3-24 months). We performed an osteochondroplasty on all four patients to their femoral head-neck junctions arthroscopically. We also performed a labral debridement for three patients and a labral suture for one patient.

**Results:** All patients presented a flat contour of the anterior head-neck junction causing a cam-type impingement with subsequent damage to the anterior-superior acetabular cartilage adjacent to the rim. These chondral changes result from the repetitive compression and shear forces between the flattened head-neck junction and the acetabular cartilage in flexion and internal rotation. All four patients have seen a marked decrease in the amount of pain caused by motion due to FAI and have improved the range of motion compared to their preoperative condition.

**Conclusions:** When there is chronic pain after a healed femoral neck fracture of the femoral head that is not caused by necrosis, the possibility of a cam impingement caused by retrotorsion of the proximal fragment should be taken into consideration. If conservative therapy failed, we believe it is a useful treatment to correct the femoroacetabular impingement arthroscopically.



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In Vivo Implant Fixation of Carbon Fiber–Reinforced PEEK Hip Stems in an Ovine Model

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Carbon fiber-reinforced polyetheretherketone (CFR/PEEK) is theoretically suitable as a material for use in hip prostheses over metal materials, however, optimum in vivo fixation manner has not yet been confirmed for CFR/PEEK hip prostheses, either with cementless or cemented fixation. The purpose of this study was to radiographically and histologically investigate in vivo implant fixation of cementless and cemented CFR/PEEK hip stems up to 52 weeks after implantation in an ovine model.

CFR/PEEK stems with rough textured surface plus hydroxyapatite coating for cementless fixation and CFR/PEEK stems without rough textured surface and hydroxyapatite coating for cement fixation were manufactured based on ovine CT data. A cementless or cemented CFR/PEEK stem was unilaterally implanted by a commonly used cementless or cemented technique, respectively. Five cementless stems and 6 cemented stems were harvested between 12 and 52 weeks postoperatively. Fixation to the surrounding bone was evaluated radiographically (X-ray and  $\mu$ CT) and histologically.

All five cementless and all 6 cemented stems were well-fixed on manual examination. Radiographs and histology revealed direct contact of neocortex on the stem surface and confirmed achievement of bone ongrowth fixation for all cementless stems. They also confirmed stable fixation without any gaps at both the bone-cement and cement-stem interfaces for all cemented stems.

Bone ongrowth fixation could be achieved without any failure even under the weight bearing condition. Stable bone-cement and cement-stem interface was created in all the cemented stems suggesting that cemented fixation could be successful for CFR/PEEK stem. We conclude that either cementless or cemented CFR/PEEK stem works well for in vivo fixation.

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Radial MR imaging for detection of degeneration of acetabular labrum in developmental dysplasia of the hip

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**Purpose:**

To document the reliability of Abe's classification and to clarify the prognostic factors for acetabular labral lesions in osteoarthritis of the hip with radial magnetic resonance (MR) imaging.

**Materials and Methods:**

This retrospective study was approved by our institutional review board. In the reliability trial, six orthopedic surgeons twice classified 20 radial MR images in a blinded fashion at an interval of 4–5 weeks. Radial MR images of 275 hips in 263 patients were analyzed to determine the relationship between acetabular labral lesions, their distribution, age, and the acetabular coverage.

**Results:**

Interobserver reliability was 0.647 for the grade and 0.728 for the shape category. Intraobserver reliability was 0.799 for the grade and 0.865 for the shape category.

Multiple regression analysis revealed:

$$[\text{Grade score}] = 4.193 + 0.033 \times [\text{age}] - 0.118 \times [\text{portion of the acetabular labrum}] - 0.052 \times [\text{acetabular head index (AHI)}] - 0.015 \times [\text{center edge angle (CEA)}] \quad (R^2=0.289, p<0.0001).$$

$$[\text{Shape score}] = 2.414 + 0.024 \times [\text{age}] - 0.076 \times [\text{portion of the acetabular labrum}] - 0.010 \times [\text{AHI}] - 0.011 \times [\text{CEA}] \quad (R^2=0.171, p<0.0001).$$

**Conclusion:**

Abe's classification of labral lesions was reliable for both the grade and shape categories. Age, acetabular coverage, and the anterosuperior portion are prognostic factors for degeneration of the acetabular labrum using radial MR imaging.

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### Hydroxyapatite block for reconstruction of tibial bone defects in non-cemented total knee arthroplasty in patients with rheumatoid arthritis A case report of three cases

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Three knees in two patients (one female; 81 years old, the other male, 61 years old) with bone defects of the tibial plateau were treated with hydroxyapatite block during primary non-cemented total knee arthroplasty in patients with rheumatoid arthritis. All patients were followed clinically and radiographically, and had minimum of 1-year follow-up. Good clinical outcome were achieved in all cases and osteointegration were achieved in two knees in three knees.

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### Questionnaire survey of satisfaction after total knee arthroplasty

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**Purpose**

We investigated patients' satisfaction after total knee arthroplasty (TKA) by questionnaire.

**Methods**

We sent questionnaire forms to 143 patients performed TKA operations from January 2010 to June 2011. We asked about the purpose and expectation for TKA preoperatively, and satisfaction in range of motion, pain, daily activity, gait ability and quality of life (QOL) postoperatively. We also investigated Japan Orthopaedic Association score (JOA score) and range of motion (ROM).

**Results**

We received 106 questionnaire forms and the response rate was 74.1% and an average follow-up period was 14.8 months (6~23 month). The satisfaction rate was 68.8% in ROM, 63.2% in pain relief, 65.1% in gait ability, and 60.3% in QOL postoperatively. But 5.7% in ROM and 11.3% in pain relief, 11.3% in gait ability and 12.3% in QOL did not satisfied postoperatively. JOA scores was 53.6 preoperatively and 88.7 postoperatively. An average flexion angle was 124.6° postoperatively and 92.3% of patients got more than 110° in flexion. A correlation between knee flexion and satisfaction was not statistically significant.

**Conclusion**

Over 60% patients were satisfied postoperatively. But over 10% patients were not satisfied in ROM, pain relief, gait ability, and QOL. We need to improve explanation and rehabilitation preoperatively and postoperatively.



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### Gap-balancing Technique with Patient Specific Instrument in Total Knee Arthroplasty

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**Background:** The advantages of patient specific instruments (PSI) in total knee arthroplasty (TKA) include shorter operative time, less invasiveness, accurate osteotomy, and so on. In PSI-TKA, the bony landmarks were used to determine femoral component rotation. However, superior stability and femoral component rotational alignment has been reported when gap-balancing technique was used. We propose modified gap-balancing technique using PSI.

**Patients and Methods:** PSI-TKAs were performed in 27 patients (36 knees). Standard tibial cut, femoral distal cut, and the femoral posterior pre-cut was performed using PSI. Then, the gap-balancing procedure was performed, and the femoral posterior condyle was finally resected parallel to the resected proximal tibia. Surgical results were investigated and prosthetic alignment in relation to the femur and tibia was measured using postoperative radiographs.

**Results:** Mean operative time was  $48.7 \pm 6.7$  minutes. The mean alpha angle was  $96.1 \pm 2.0^\circ$ , and the mean beta angle was  $89.3 \pm 0.8^\circ$ . There were no major complications.

**Conclusions:** Gap-balancing technique using PSI provides accurate osteotomy and satisfactory flexion gap stability.

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### Return to sports after Acutrak screw fixation for proximal fifth metatarsal stress fracture in Japanese football players

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**Purpose:** Internal fixation is adequate option for treatment of proximal fifth metatarsal stress fracture in athletes to return to sports earlier. However optimal implant selection for surgical treatment has not been determined. The aim of this study is to evaluate clinical results of Acutrak screw fixation for proximal metatarsal stress fracture in Japanese football players.

**Methods:** Fourteen competitive football players were treated with Acutrak screw for fifth metatarsal stress fracture. Twelve patients were classified into Torg classification type II, and 2 patients into type III. We evaluated radiologic and clinical results including return to sports time retrospectively.

**Results:** All 14 patients were able to return to sports in mean 11.7 weeks after surgery. Two patients experienced recurrent fracture after return to sports at 24 weeks and 28 weeks after surgery, though they returned to sports again with conservative treatment. All players could get back to the same sports level before injury finally, and all fractured were well healed with radiographic evaluation.

**Conclusion:** Elite football players treated using Acutrak screw for fifth metatarsal stress fracture returned to sports in short periods after surgery. Acutrak screw fixation was good option for treatment of fifth metatarsal stress fracture in competitive athletes.





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### Case study of 5<sup>th</sup> metatarsal bone fracture in two ballet dancers

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Hiromi Ashida

Arima Clinic and Kyoto ballet academy

In recent years, the number of those who enjoy classical ballet which originated in France is increasing in Japan. Not only the young who aims at professional dancer but also the middle age who enjoy dance as pleasure take lessons in anyplace in Japan.

5<sup>th</sup> metatarsal bone fracture has a specific feature in classical ballet dance. Because ballet dancers need point technique and deifferent care from other kind of dancers.

I would like to report two cases of 5<sup>th</sup> metatarsal bone fracture caused in those ballet dancers.

Moreover, I would like to consider the difference in athletic ability, races, and lifestyle, which cause such injury.

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### Patients Satisfaction of a Clinical Pathway for Arthroscopic Rotator Cuff Repair

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Masako Sasamori, Mirai Saito, Hiroyuki Sugaya, Norimasa Takahashi, Nobuaki Kawai, Morihito Tokai, Motoki Tanaka

Funabashi Orthopedic Hospital

**INTRODUCTION:** Since April 2012, we have shortened the hospital stay using the clinical pathway (CP) for arthroscopic rotator cuff repair. The implementation of the CP was 90% and the average of hospital stay was 4.0 days. The purpose of this study was to assess the patients' status and satisfaction at the time of discharge.

**METHDS:** 194 patients underwent an arthroscopic rotator cuff repair for recent 10 months. Among them, 115 patients were eligible for this study with implementation of the CP and the valid answer of the questionnaire. There included 67 males and 48 females with an average age of 61.6 years old. At the day before discharge, the patients answered the self-assessment questionnaire which included 1. Visual analogue scale (VAS) of daily and night pain, 2. Ability of activity of daily living with shoulder brace, 3. Sleeping status, 4. Satisfaction of hospitalization.

**RESULTS:** Average VAS was 2.1 at rest and 3.2 at night. 76-83% of the patients were able to do daily activities with shoulder brace. Only 46% of the patients were slept well. More than 90% of the patients were satisfied with the hospital stay included the nursing care and physical therapy. 9.6% of the patients were unsatisfactory with the length of stay and residual pain.

**CONCLUSION:** More than 90% of the patients were satisfied with our clinical pathway after arthroscopic rotator cuff repair. However, half of the patients complained about insomnia.



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Interphalangeal Dislocation of the Thumb – a report of two cases –

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Kenta Saito, Sanae Irimura, Yoshinari Fujita, Masanori Kato, Takashi Hashimoto, Kenshi Daimon, and Masaaki Takahashi

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Dorsal interphalangeal joint (IP joint) dislocation of the thumb is a rare injury, and can usually be reduced by traction. We experienced two cases of closed IP joint dislocation of the thumb that needed open methods of reduction.

Case 1, 18 y/o male. He had sustained injury while playing handball and was initially treated at another hospital. Because of pain and immobility of his thumb IP joint, he visited our hospital four weeks after the first reduction. X-ray films showed subluxation of the IP joint. During the operation we found that the volar plate of the IP joint was interposed into the IP joint. We released the volar plate and performed temporary fixation of the IP joint, enabling full range of its motion.

Case 2, 73 y/o male. He was introduced to our hospital four weeks after he first had treatment for thumb IP dislocation. The joint showed severe radial instability. During the operation we found the ulnar collateral ligament to be lacerated at its insertion at the proximal phalanx and interposed into the IP joint. We released the ligament from the joint space and reattached it to its proper site at the proximal phalanx, resulting in stability of the IP joint.

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Anterior Cervical Reconstruction with Pedicle Screws after a Four-Level Corpectomy

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**Aims of the study.** To describe a new method of anterior cervical reconstruction with pedicle screws.

**Technique.** However, pedicle screws for posterior cervical reconstruction show remarkable stability. We describe a new technique of anterior cervical reconstruction with pedicle screws and fibular strut grafting.

**Methods.** Seven patients suffering multilevel cervical myelopathy were treated with this new reconstruction technique after a four-level corpectomy. We describe this new technique and review the patients' clinical history, results of radiographic imaging and outcomes. Clinical outcomes were assessed preoperatively and at 3 months postoperatively. Postoperative radiographs were assessed 3 months and 6 months postoperatively.

**Results.** The mean operative time was 182 min and the mean blood loss was 271 ml. The average Japanese Orthopedic Association score for cervical myelopathy improved from 11.5 points preoperatively to 14.5 points 3 months postoperatively. No patients experienced major complications such as neurological deterioration, infection or massive blood loss. There was no case of reconstruction failure, graft dislodgement, migration or screw displacement.

**Conclusions.** To our knowledge, this is the first description of an anterior cervical reconstruction approach using pedicle screws and fibular strut grafting after a four-level corpectomy. It is likely that this technique will result in better clinical outcomes with fewer complications in the treatment of patients with multilevel cervical myelopathy.



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## Two cases of thoracolumbar fractures with hemothorax with rib fractures by multiple sclerosis

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**[Objective]** Examination of the time to undergo the posterior spinal fusion for spinal burst fracture with multiple rib fractures and hemothorax.

**[Case 1]** A 30-year-old man fell from the high place and sustained T9 burst fracture with bilateral hemothorax and rib fractures (right: 3-4, left: 7-10). He had bilateral lower extremity paralysis. He underwent posterior spinal fusion (T6-T12) under the bilateral chest drainage two days after hospitalization.

**[Case 2]** A 35-year-old woman fell from the high place and sustained L1 and L4 burst fractures with bilateral hemothorax, left tibia fracture and rib fractures (right: 4, left: 5-8). She had bilateral lower extremity paralysis. She underwent posterior spinal fusion (T12-L5) and open reduction and internal fixation for left tibia fracture under the bilateral chest drainage three days after hospitalization.

**[Discussion]** Generally, early spinal surgery is desirable to prevent several complications. On the other hand, in the case of poor general condition with hemothorax and multiple rib fractures, the posterior spinal surgery under the prone position may deteriorate general condition. In our two, we underwent the early posterior spinal fixation for the change of position. Consequently, in both cases, the general conditions have been improved at an early stage.

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## The effect of teriparatide for fresh vertebral fracture with severe pain in elderly patients

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**Background:** Spinal fractures due to osteoporosis are common among elderly persons. These patients must often experience hospitalization for several weeks, which leads to escalation of medical care cost. Today, a wide variety of new drugs has been developed for the prevention of osteoporotic fractures. It has been suggested that among these teriparatide (rhPTH) reduces fracture pain. We have therefore made an evaluation of analgesic effects of teriparatide for fresh vertebra fractures.

**Materials and methods:** We retrospectively reviewed 40 patients composed of 12 men and 28 women who were hospitalized in our hospital in 2012. The mean age was 80.9 years (59-93) and 16 of the 40 patients were treated with teriparatide at dose of 20 mcg/day.

**Results:** There were no significant differences in the duration of hospitalization and the administration of NSAIDs. However, there was a tendency for the duration of bed rest treated with teriparatide to be shorter. They began to walk at day 16 on the average, while the other patients began to walk at day 22.

**Conclusion:** Treatment with teriparatide for fresh vertebral fractures has a potential effect of shortening the period of hospitalization.



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### En bloc laminoplasty for elderly patients with cervical myelopathy

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#### Purpose:

Operative treatment of cervical myelopathy in elderly patients is controversial because they may have a variety of medical and social problems. The aims of this study was to compare clinical results between elderly patients (over 75 years) and non-elderly patients (less than 75 years), who underwent en bloc laminoplasty for cervical spondylotic myelopathy (CSM).

#### Methods:

Sixty-two CSM patients who were treated by en bloc laminoplasty were enrolled. The patients were divided into two groups: The elderly group, made up of 10 males and 12 females aged 75 years old or older (range 75-92 years), and the non-elderly group, consisting of 24 males and 16 females younger than 75 years old (range 44-74 years). Between these two groups, we evaluated (1) magnitude of surgery (operation time and blood loss), (2) Japanese Orthopedic Association (JOA) scores and (3) recovery rate according to Hirabayashi's method, and (4) postoperative complications.

#### Conclusion

In elderly patients, both the preoperative and postoperative JOA scores were inferior, but the JOA recovery rate was statistically equivalent between two groups. This indicates that elderly patients received similar benefits from en bloc laminoplasty as non-elderly patients. Thus, en bloc laminoplasty should be performed even in elderly patients.

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### Gait analysis and evaluation of residual muscle activity of patients with soft tissue sarcoma of anterior thigh

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Patients with soft tissue sarcoma in the lower extremity often experience gait disorders due to wide resection involving adjacent muscles. Although these patients usually regain the ability to walk in several weeks or months after surgery, they might be forced to employ movement strategies different from those which healthy people do. We report on 2 patients after anterior thigh muscle resection for soft tissue sarcoma by using motion capture and electromyographic (EMG) analysis. Patient 1 was a 48-year-old woman diagnosed with myxofibrosarcoma whose vastus medialis and sartorius were resected. Patient 2 was a 58-year-old woman diagnosed with hemangiopericytoma whose rectus femoris was resected. Five repetitions of level walking at a self-selected speed were collected using three-dimensional motion analysis system with 2 force plates. EMG signals of the lower limb muscles were also recorded. We qualitatively compared the gait kinematics, kinetics and muscle activity of the ipsilateral (operated) sides with those of the contralateral sides. During stance, both of the patients could walk with almost equal load on both limbs while the sum of the lower limb joint extension moment were generally lower on the ipsilateral sides than on the contralateral sides. Additionally, they strongly activated the ipsilateral planter flexors (soleus and medial gastrocnemius) compared with the contralateral soleus during early stance. Ipsilateral planter flexors might compensate for loss of knee extensors by increasing body support after initial contact in these patients.

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**Forequarter amputation of dominant limb for leiomyosarcoma reportage of a historical Japanese painter's case from the new point of view**

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Nowadays narrative approaches are used increasingly in the field of health science. A story of a case of forequarter amputation associated malignant bone tumour of the clavicle is described here. The patient, a 34-year-old Japanese-style painter, lost her right hand, which held her paintbrushes. Following the intra-arterial chemotherapy, she underwent amputation and intra-operative radiotherapy in March 1973. Voluntarily she started handedness exchange rehabilitation, not wishing to put on cosmetic prosthesis; then she wrote the greeting card by her left hand at three months after operation. She took up her brushes again by her left hand and began to paint more vigorously than ever. She and her family had positive thinking and attitude, as her husband encouraged her, 'You and I actually have three hands even though you lose your right hand.' At nine months postoperatively, metastasis to the lung was revealed by chest X-ray, which was found to be disseminated and unresectable on operation. She continued painting for a picture book, which was perhaps planned to give her son and daughter in hospital, but died of metastatic lung tumour in February 1975. The orthopaedic surgeon at that time writes, 'She was truly rehabilitated with the notice that she had no choice but to express her own limited life solely by her painting.' I intend not only to overview the forty years' progress in medical technology but also to clarify unchanging and everlasting history of an artist who overcame the impairment like Auguste Renoir or Raoul Dufy.

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**Humeral Component Insertion Method for Cases of Distal Humeral Large Bone Defects in Total Elbow Arthroplasty**

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Total elbow arthroplasty is a good reconstruction method for elbow joint dysfunction such as traumatic arthritis, tumor resections and distal humeral nonunions. The semi-constrained implant, which provides increased joint stability, has been introduced for unstable elbow joints with large bone defects or poor ligamentous tissue function. When large distal humeral bone defects are present, however, it is difficult to insert the humeral component into the humeral shaft with the correct alignment due to loss of the medial and lateral humeral condyles. We present a technique for humeral component insertion in total elbow arthroplasty in cases of distal humeral bone defects.

In the anterior-posterior direction, the stem and flange help to determine the correct position easily. Because the transverse section of the humeral shaft is triangular in shape, the rotational position of the humeral component can be determined from the muscular septum of the biceps and triceps and the anterior tip of the triangular transverse section. To determine the depth of the component, we reposition the joint and triceps muscle during the trial insertion before cementing, gently pull the elbow joint to 90° flexion, and then fully extend the joint, all while evaluating the tension in the soft tissue.

Semi-constrained total elbow arthroplasty is a powerful tool for the treatment of unstable elbow joints. In cases with large bone defects of the distal humerus, the technique described here enables the humeral component to be inserted in the correct position.



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