

The Bulletin of German-Japanese Society for Orthopaedics and Trauma (GJSOT)



Vol. 1, 2018

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Greeting from Japanese president of German-Japanese Society for Orthopaedics and Trauma; GJSOT

Naoto Shiba, M.D., Ph.D.
Japanese president of GJSOT
Chief professor, Department of Orthopedics,
Kurume University School of Medicine

On behalf of GJSOT, I would like to give a greeting as the Japanese president of the society. The relationship between German and Japanese orthopedics has a special history, and it affects not only science but also humanity. The society was formed in 1977, and it has a 40 year history. The 1st president of the meeting was professor Amako from Kyushu University, and the meeting was held in Kyoto. Now 19 meetings have been conducted in the two countries.

In 2017, in order to spread awareness for the society and secure new members, the process of incorporation has been completed in Japan, and we believe the society will progress further as a result. The meeting has usually been held in turn in Germany and Japan every two years, however the meeting will be held every year according to the rules of incorporation starting this year. We expect the society will contribute to the academic cooperation of both Japanese and German orthopedic doctors and help to develop true friendship between the two countries moving forward.

The 20th GJSOT will be held on August 4, 2018 at Hirosaki city, Aomori, Japan hosted by professor Hiroyuki Ishibashi combined with the 31st Annual Meeting of the Japanese Association of External Fixation and Limb Lengthening. We hope many orthopedic doctors will attend the meeting.

I want to express my sincere appreciation to professor Scholz, professor Mittelmeier, professor Penigh, and all our German colleagues. I also want to say thank you very much to professor Masashi Yamazaki, president of the Japan Orthopedic Association, and all the Japanese colleagues for their contribution and cooperation.



Photos of 3rd GJSOT in Fukuoka Japan in 1982 by professor Amako

GREETINGS GJSOT 2018

Dear colleagues of the GJSOT,
Dear friends,

according to the long tradition of the contacts between our orthopaedic societies it is a great pleasure for me to participate and to send greetings to all members.

Experience is a very important basic in the medical profession. Especially in the operating filed of orthopaedic and trauma surgeons the exchange of knowlegde between different education schools, societies and countries are essential for a safe decision making and operative procedure.

Therefor the narrow and open discussion at this panel of specialists between our societies is an important value oft he GJSOT meeting since many years.

According to the history of the GJSOT including very important names of orthopaedic and trauma surgeons it is a great honor for me to represent the german part of our common GJSOT as chair since 10/2018. Many thanks to Prof. J. Scholz and Prof. U. Böhling.

As a sign for the hig value of our common activities fort he german society for orthopaedics and trauma the DGOU will name Prof. Naoto Shiba as a official „Corresponding member“ of the DGOU.

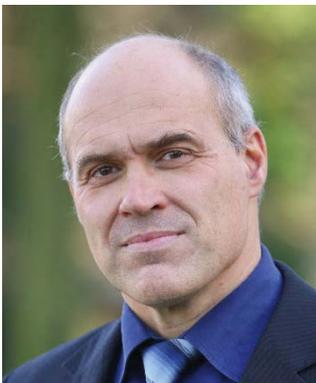
This decision is based on the proposal of myself and Prof. Dietmar Pennig. The title Corresponding member is associated with a special position in our society and additional invitations.

The respectful and friendly personal contacts via visits of our annual meetings are stabilizing our cooperation. Looking forward we will strengthen our common activities of the visiting fellowships betwenn Japan / Germany and promote research cooperations.

My father Heinz Mittelmeier (beeing the chair of the german group of the GJSOT during the 1980ies) addresses warm greetings to his Japanese friends by this way.

With many thanks for your kind invitation

Wolfram Mittelmeier
Orthop.Klinik, Universitätsmedizin Rostock, Germany



Greetings from the German President and Vice-President of the German Japanese Society for Orthopaedics and Trauma (GJSOT)

Prof. Dr. med. habil. Wolfram Mittelmeier

Prof. Dr. med. Dietmar Pennig

It is our great honor and privilege to send greetings to our Japanese colleagues on the occasion of the upcoming meeting in Hirosaki city in Aomori, Japan. Both of us have attended several meetings of the Society in Japan as well as in Germany. Over the years, many personal relationships have been established between surgeons in Japan and Germany.

In 2017 the ties between members of the Japanese as well as the German side have been formalized and the German Japanese Orthopaedic and Trauma Society now is part of the international collaboration roster of the Deutsche Gesellschaft für Orthopädie und Unfallchirurgie.

We very much look forward to attending the 20th meeting on August 4th, 2018 and exchanging experiences with surgeons specializing in external fixation and limb lengthening. It will be a great honor to discuss and communicate with our Japanese colleagues and friends.

Wolfram Mittelmeier

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Secretary General of the DGU

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To celebrate the publication of Journal of German-Japanese Society for Orthopaedics and Trauma (GJSOT) and welcome the 20th GJSOT meeting in Hirosaki

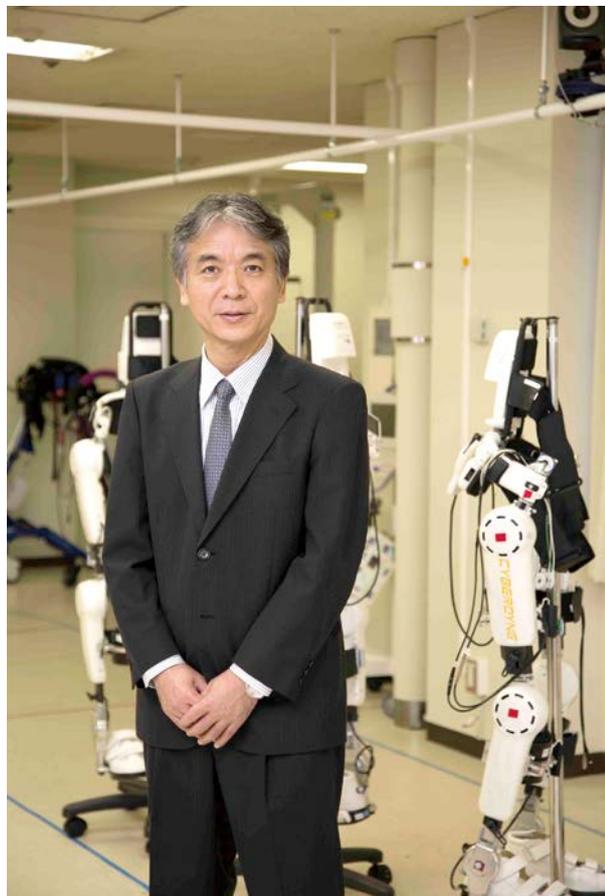
Masashi YAMAZAKI, MD, PhD
President
Japanese Orthopaedic Association (JOA)
Professor and Chairman
Department of Orthopaedic Surgery
Faculty of Medicine, University of Tsukuba

On behalf of Japanese Orthopaedic Association (JOA), I heartily congratulate the initial publication of Journal of German-Japanese Society for Orthopaedics and Trauma (GJSOT). I would express my sincere gratitude for Professor Naoto Shiba, the Japanese President of GJSOT, for his tremendous effort on this publication. I would also express my great thanks for Professor Scholz, Professor Mittelmeier, Professor Penigh and all German and Japanese members of GJSOT for their enthusiastic contribution to the development of this society.

In the medical field, Germany and Japan have had a long history of collaboration. Almost 140 years ago, an intensive exchange of knowledge already began between Japanese and German surgeons. Regarding Orthopaedic surgery, the GJSOT was founded in 1977. After that, the combined meeting of GJSOT has been held in Japan or in Germany almost every year.

On October 27, 2017, special combined symposium of GJSOT was held in Berlin, as one of the programs of German Congress for Orthopaedics and Traumasurgery. I would thank Professor Hoffman for providing us with the opportunity to have the combined symposium in Berlin.

This year, the 20th memorial meeting of GJSOT will be held in Hirosaki City, Japan on August 4, 2018. Professor Hiroyuki Ishibashi is the president of the meeting. Hirosaki is a famous castle town in the North-East region of Japan, and “Neputa”, which is one of the most famous summer festivals in Japan, is going to be held in Hirosaki at the meeting date. I would thank Professor Ishibashi for his kind arrangement to have the GJSOT meeting at this special day. I hope that many Japanese and German Orthopaedic surgeons will visit Hirosaki and



enjoy the meeting.

I convince that collaboration between German and Japanese Orthopaedic surgeons will produce a new-style fantastic feature world of Orthopaedic surgery. At the GJSOT meeting in Hirosaki, therefore, I would ask all of you to have a hot and fruitful discussion with many doctors for the progression of the diagnosis and treatment of musculoskeletal disorders. I convince that your active contribution and your corporation will lead this meeting to a great success.

We look forward to seeing you in Hirosaki in August 2018.

Sincerely yours,

**18^{te} Japanisch-Deutsche
Orthopädische und Unfallchirurgische Tagung**



**Department of Orthopaedic Surgery
Kurume University School of Medicine**

Kurume, Japan

June 16, 2017

18th German-Japanese Society for Orthopaedics and Trauma; GJSOT in Kurume on June 16th, 2017

Naoto Shiba, M.D., Ph.D.
President of 18th GJSOT
Chief professor, Department of Orthopedics
Kurume University School of Medicine

The 18th GJSOT was held in Kurume city, Fukuoka, Japan combined with the 133rd West Japanese Society of Orthopaedics and Traumatology on June 16th, 2017. 64 doctors participated the meeting, and 19 papers were presented. Fruitful discussion was carried out, and the meeting was a success. Professor Ulrich Bohling and Dr. Christian Brinkmann participated in this meeting from Germany.

The committee meeting of Japanese members was carried out on the same day, and fellowship members and participation for the 19th GJSOT were discussed.

The 19th GJSOT was held on October 27th, 2017 in Germany as one of the official sessions of the Deutscher Kongress für Orthopädie und Unfallchirurgie; DKOU in Berlin for the achievement of professor Scholz.



18th GJSOT was held at Kurume City Plaza in Kurume city, Fukuoka, Japan

German Japanese Society for Orthopaedics and Trauma (GJSOT) 18th Summit at Kurume University

Taking up the invitation of the current president of the society, Prof. Naoto Shiba from the Kurume University, it was an honour and a great pleasure to attend the summit. Dr. Christian Brinkmann from Sendenhorst and me from Berlin were representing the German branch of the society. Our summit took place June, 16th 2017 and was combined with the Summit of the West-Japanese Society of Orthopedic and Traumatology (WJSOT). Venue of the Summit was the Grand Hall of the Kurume City Plaza which provided excellent facilities.

After the inaugural address of Prof. Shiba I gave my welcoming speech to the audience. First I expressed the greetings from Prof. Jörg Scholz President of the German Side of the society. Regarding the long and fruitful history of the society I pronounced my appreciation about the efforts that have been done to organize this meeting in Kurume. The successful future of the society is relying on two columns: These are the periodical scientific meetings and the practical personal interchange by visiting our colleagues on a regular base. In this context I gave my thanks to the Aesculap Academy Japan supporting these activities. They enabled us to organise the first Travel Course in November 2016 in Germany with two hip and two spine surgeons from Japan. The participants spent one week in two different clinics and attended hip and spine surgery. These Travel Courses are very important not only to support young surgeons in their education but also to integrate new colleagues into the framework of the society.

The scientific program of the summit was structured into five sessions with the following topics: Knee; Hip; Shoulder; Spine and Traumatology. Nineteen presentations of excellent level were given, summit language was English. The contribution from the German side was a presentation of Dr. Christian Brinkmann about history and the current state of the art in spine fusion techniques. I gave a presentation about kinematic alignment, alignment evaluation on cases using Ortho Pilot and a presentation about German Japanese Orthopedic Society and their activities.

More than sixty colleagues were participating in the Summit. In my closing remarks I invited the participants to the 19th Summit of the Society that will be held October, 27th 2017 in Berlin. I explained, that the coincidence of two meetings in the same year are necessary to notify the presidential future of the German side and to enforce the ambition to be an official part of the German Congress of Orthopedics and Traumatology. So we are officially integrated in the International Program of the Congress. I expressed special thanks to Prof. Christoph Josten from Leipzig who is in charge of the international contacts of the German Society for Orthopedics and Traumatology.

After the summit Prof. Shiba invited us to a meeting of the Japanese members of the board from the society. There were 13 participants including Prof. Masahshi Yamazaki / University of Tzukuba (current president of the JOA). Important organizational topics have been discussed. Next meeting of the board will be held August, 04th 2018 in combination with the Summit of the Northern Japanese Orthopedic Society. Chairman will be Prof. Yasuyuki Ishibashi / Hirosaki University.

The summit was rounded up with a delightful reception dinner in traditional and warm atmosphere. With participation of many members and friends of the German Japanese Society from all generations and enriched by an extraordinary cuisine there was place for formal speeches and personal contacts. I returned with the overall impression of a very vital and active work of the society enforcing future projects.

Prof. Dr. Ulrich Böhling

Berlin





1. Predicting Factor for the Discrepancy between Preoperative Planning and Lower Limb Alignment After Opening Wedge High Tibial Osteotomy

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Nobuhiro Okuno, Hitoshi Wakama, Masashi Neo

Facility: Department of Orthopedic Surgery, Osaka Medical College, Japan

Opening wedge high tibial osteotomy (OWHTO) is widely performed for medial osteoarthritis of the knee. Preoperative planning is essential for evaluating the degree of correcting angle for HTO, however, postoperative lower limb alignment is sometimes differed from preoperative planning. The purpose of study was to investigate the affecting factors for the discrepancy between preoperative planning and postoperative alignment with HTO.

Materials & Methods:

Twenty-six knees (10 male and 16 female) undergoing OWHTO were enrolled in this study. The average age was 65 years old, the height was 161 cm, and the weight was 66 kg. Varus and valgus JLCA were measured with manual stress test under fluoroscopy. The preoperative planning for HTO was assessed by using the software of Advanced Caseplan[®]. Pre- and post-operative hip knee ankle angle (HKA angle) and medial proximal tibial angle (MPTA) were also measured, and the difference were defined as Δ HKA angle and Δ MPTA, respectively. Δ HKA angle was compared to age, gene, height, weight, preoperative JLCA, Varus JLCA, and Valgus JLCA.

Results:

HKA angle and MPTA were altered from varus 5.9° and 84.1° to valgus 3.3° and 92.7° with HTO, respectively. Preoperative planning of HKA angle was valgus 2.5°, which was significantly lower than postoperative HKA angle ($p = 0.04$). On the other hand, preoperative planning of MPTA was 92.7°, which was not significantly different from postoperative MPTA ($p = 0.92$). Δ HKA angle showed a moderate correlation with preoperative JLCA (rs, 0.46, $p = 0.02$) and Varus JLCA (rs, 0.46, $p = 0.02$). Moreover, Δ HKA angle over 65 years old was significantly lower than that of under 65 ($p = 0.02$).

Discussion:

Large preoperative JLCA and Varus JLCA, and under 65 years of age at surgery were considered the risk factors for occurring the discrepancy between preoperative planning and postoperative alignment.

2. Effect of injury prevention training program on kinematics of drop jump tasks: Evaluation with Landing Error Scoring System and three-dimensional kinematic analysis

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Facility1): Department of Orthopaedic Surgery Hyogo College of Medicine, Hyogo, Japan,

Facility2): Department of Clinical Biomechanics Keio University

Introduction:

The Landing Error Scoring System (LESS) has been shown to be a reliable clinical screening tool that was developed to identify individuals at increased risk for noncontact anterior cruciate ligament (ACL) injury through evaluation of landing biomechanics during the drop vertical jump (DVJ) test. In the present study, we developed an ACL injury prevention training program and applied the program to the subjects. Kinematic characteristics during DVJ were assessed by LESS scoring and three dimensional motion analysis system before and after the training intervention. The purpose of this study was to examine whether the training intervention can correct the kinematics of jump-landing task using the two evaluation systems.

Methods:

Study subjects

Ten female healthy volunteers participated in the study (average age; 20.6 years). The injury prevention training program consisted of turn jump, plyometric exercise, and strengthening training (approximately 20 minutes for one set of exercise) was conducted 3 days a week for a period of 6 weeks. Kinematic analysis using LESS and motion analysis system was performed before and after completion of the whole training program.

Jump-landing task according to the LESS protocol

All subjects performed 3 test DVJ trials according to the LESS protocol described by Padua et al.

Analysis of video images for LESS scoring

Frontal and sagittal view video data were acquired using standard HD video camcorders (HDR-CX560, Sony, Tokyo, Japan) that were positioned according to the LESS protocol.

Three-dimensional motion analysis using Point Cluster Technique

Simultaneously, three-dimensional kinematics data were collected using an 8-camera motion analysis system (Vicon motion system, Oxford, UK) with ground reaction forces recorded using a force plate. In order to accurately analyze the sequential change in tibio-femoral spatial relationship at the knee, the Point Cluster Technique (PCT) was utilized. Testing procedure included attachment of multiple reflective markers and use of the special program to analyze the three-dimensional motion for extension/flexion, varus/valgus rotation, internal/external rotation of the tibia with respect to the femur.

Results:

LESS score at the post-training trial (4.8) was significantly smaller than that for the Pre-training trial (6.2) ($P < 0.05$) (figure1). Regarding the motion analysis results, the peak knee valgus angle at

the post-training trial (5.0°) was significantly smaller than that at the pre-training trial (8.2°) ($P < 0.05$).

Conclusions:

The results of the present study showed that The ACL injury prevention program successfully decreased knee valgus angle and LESS score. Therefore, the potential effectiveness of the training intervention was confirmed.

3. Clinical and Radiological Results of Double Level Osteotomy for Varus Knee Osteoarthritis.

Nakayama H, M.D., Kanto R, M.D., Yoshiya S, M.D.

Facility: Hyogo College of Medicine. Dept. of Orthopaedic Surgery

Purpose:

In Japan, we frequently encounter osteoarthritic young active patients with severe varus knee deformity requiring surgical treatment. Conventional osteotomy is such that correction of the deformity is only made in the proximal tibia. However, we encounter a problem of excessive joint line obliquity. To avoid that, we have indicated and performed double level osteotomy (DLO) in such situation. The concept of DLO was to obtain anatomical knee joint-line by bi-plane cut closed wedge distal femur osteotomy (DFO) and bi-plane cut open wedge high tibial osteotomy (HTO) with the use of LCP. The purpose of the study was to examine clinical and radiological outcomes of this procedure in our practice.

Methods:

Thirty-nine knees with severe varus knee deformity who underwent DLO and could be followed up for clinical and radiological assessments were included in the study. DLO was indicated for medial compartment osteoarthritic knees with severe varus malalignment. Surgical goal of DLO is to reconstruct the anatomical knee joint line while correcting the varus malalignment. Whole leg weight-bearing radiographs at the preoperative period and 1-year after surgery were available for 18 knees in 18 patients. Radiological parameters measured for analysis were as follows: hip-knee-ankle (HKA) angle, mechanical lateral distal femoral angle (mLDFA), medial proximal tibia angle (MPTA), and joint-line convergence angle (JLCA). In addition, pre- ad postoperative clinical outcomes were evaluated using the KOOS.

Results:

Each of the radiological parameters improved after surgery. The postoperative changes in measured values for HKA angle, MPTA, mLDFA, and JLCA from the preoperative to the 1-year evaluation were -13.5° varus to 0.8° valgus, 82.3° to 90.1 , 91.1° to 85.6° and 5.8° to 3.9° respectively. KOOS improved after surgery from 201 to 380.

Conclusions:

This study showed that DLO for patients with severe varus malalignment and medial compartment osteoarthritis could accomplish satisfactory clinical outcomes by normalizing coronal alignment while avoiding joint line obliquity.

4. Large Knee Laxity in ACL Injured Knee Had a Higher Risk of Postoperative Positive Pivot Shift

Yuji Yamamoto, Eiichi Tsuda, Shugo Maeda, Yuka Kimura, Shizuka Sasaki,
Daisuke Chiba, Yasuyuki Ishibashi

Facility: Department of Orthopaedic Surgery, Hirosaki University Graduate School of Medicine, Hirosaki, Aomori, JAPAN

Purpose:

Residual pivot shift has been shown to correlate with poorer clinical outcomes following anterior cruciate ligament (ACL) reconstruction. The navigation system was one of the tools for quantitative assessment of laxity in ACL-deficient knee. To investigate the relationship between preoperative knee laxity measured by a navigation system and postoperative positive pivot shift result in ACL reconstruction.

Methods:

One hundred patients who had undergone primary ACL reconstruction using a navigation system were included in this study. Posterior tibial reduction (PTR) during pivot shift test and anterior tibial translation (ATT) during Lachman test were quantitatively measured by a navigation system before surgery. Based on pivot shift results at 2 years after ACL reconstruction, patients were divided into two groups which were then compared. Cuff-off value of PTR or ATT were determined using ROC analysis.

Results:

Preoperative PTR and ATT in the positive pivot shift group was significantly larger than that in the negative pivot shift group. Using ROC analysis, PTR provided an AUC of 0.871 for the prediction of postoperative positive pivot shift. ATT (AUC of 0.825) showed smaller AUC compared to PTR. Based on the ROC curve, optimal cut-off value of PTR was 7mm with sensitivity of 88.9% and specificity of 71.4% for postoperative pivot shift. Univariate and multivariate logistic regression analysis showed odd ratios of PTR \geq 7mm were 20.0 (95%CI 2.4-168.0, $p < 0.006$) and 19.7 (95%CI 2.1-187.9, $p = 0.009$), respectively .

Conclusions:

ACL injuries with large PTR had a higher risk of positive pivot shift. In cases with large knee laxity, a strategy to prevent the pivot shift phenomenon may be needed.

5. Comparison between Suture Bridge Technique with or without Medial Tying in Rotator Cuff tears.

HONDA H, Gotoh M, Mitsui Y, Shiba N

Background:

Significance of medial tying in suture bridge (SB) technique in arthroscopic rotator cuff repair (ARCR) still remains unknown.

Aim:

The aim of this study was to compare clinical and structural outcome between suture bridge (SB) techniques with or without medial tying.

Methods:

Between 2011 and 2013, 124 patients with rotator cuff tears underwent ARCR in our institute. Of these, 53 patients were subjects for this study: 29 shoulders (11 small / medium and 18 large / massive tears) treated by SB technique with medial tying (WMT group) and 24 shoulders (9 small / medium and 15 large / massive tears) without medial tying (WOMT group). Clinical outcome consisted of Japanese Orthopedic Association (JOA) and University of California, Los Angeles (UCLA) scoring systems. Structural outcome was evaluated by magnetic resonance images using Sugaya's classification. These were assessed before, 3, 12, and 24 months after surgery.

Results:

There were no significant differences on preoperative demographic data between both groups. There were significant improvements between preoperative and postoperative UCLA / JOA scores in both groups. Postoperative re-tear rate (Sugaya Types 4 & 5) was not significant between the groups (WMT group: 7 / 29 cases and WOMT group: 6 / 24 cases); however, incomplete healing (Sugaya Types 2 & 3) was significantly higher in WMT group at final follow-up ($P > 0.05$).

Conclusions:

No significant difference between both group was noted in clinical outcome and in re-tear rate. However, incomplete healing was significantly higher in WMT group than WOMT group, suggesting the negative effect of medial tying on the repaired site.

6. Shoulder function after total resection of the deltoid muscle during a surgery for malignant soft tissue tumor.

**Michiro Yanagisawa¹⁾, Shusa Oshika¹⁾, Yuka Kimura¹⁾, Toru Asari¹⁾, Kazutomo Miura²⁾,
Eiichi Tsuda²⁾, Yasuyuki Ishibashi¹⁾**

Facility1): Department of Orthopedic Surgery, Hirosaki University Graduate School of Medicine

Facility2): Department of Rehabilitation Medicine, Hirosaki University Graduate School of Medicine

We considered the biomechanics of the shoulder joint by evaluation of the shoulder joint function of a patient whose deltoid muscle was resected during surgery of the soft tissue sarcoma.

Case:

A 68 year-old woman underwent surgery for a well-differentiated liposarcoma, located in the left deltoid muscle. Almost all deltoid muscles and the deltoid branch of the axillary nerve were resected. No macroscopic findings revealed damages or tears on the rotator cuffs. Although a part of the posterior fiber of the deltoid muscle was left un-resected, the rest underwent fatty degeneration during the postoperative course.

Postoperative shoulder function:

The patient acquired the full range of motion of the shoulder joint and recovered muscle strength by scoring at least a 4 on manual muscle evaluation in each direction by 8 weeks postoperatively. On observing the shoulder's automatic movement under fluoroscopy, the humeral head was located at the center of the glenohumeral joint, both in the resting position and in each direction during active motion. The motion of the scapula during shoulder movement was almost the same bilaterally. Although there was no ADL disorder, the patient experienced fatigue when keeping the upper limb elevated. The ISOLS functional score was 29/30.

Discussion and Conclusion:

In this case, the rotator cuff function was normal and only the deltoid muscles did not work during the shoulder motion. It is in a rare circumstance that can hardly occur in a usual clinical situation. Although there are a few studies on the postoperative shoulder function after deltoid muscle resection with a malignant tumor, they reported that the function were good as a whole. In general, the deltoid muscles are interpreted as the main driving muscles of the shoulder joint movement. However, because the humeral head of a patient with a rotator cuff injury tends to be displaced upwards, the shoulder motion often can not be performed well even if the deltoid muscles are firing. Our case showed that the rotator cuff plays an extremely important role, not only for keeping the humeral head afferent, but also for shoulder joint movement it self. The main driving muscles of the shoulder joint are the muscles constituting the rotator cuff, such as the supraspinatus, the subscapularis, the infraspinatus and the teres minor, and the deltoid muscle is a so-called booster which supports the cuff's motion.

7. Mid-term results of concentrated autologous bone marrow transplantation for steroid-associated femoral head osteonecrosis in systemic lupus erythematosus

Hisashi Sugaya^{1,2)}, Tomokazu Yoshioka^{1,2)}, Yohei Tomaru¹⁾, Naoyuki Ochiai¹⁾,
Masashi Yamazaki¹⁾, Hajime Mishima¹⁾

Facility1): Department of Orthopaedic Surgery, Faculty of Medicine, University of Tsukuba, Tsukuba, Japan

Facility2): Division of Regenerative Medicine for Musculoskeletal System, Faculty of Medicine, University of Tsukuba, Tsukuba, Japan

Background:

Patients with osteonecrosis of the femoral head are commonly treated with total hip arthroplasty. Disadvantages of this approach include the need for revision arthroplasty in young patients. We developed autologous concentrated bone marrow grafting as a joint-preserving procedure in 2003.

Objectives:

This study aimed to evaluate the mid-term results of autologous concentrated bone marrow grafting for steroid-associated femoral head osteonecrosis in systemic lupus erythematosus.

Study Design & Methods:

We retrospectively reviewed 55 systemic lupus erythematosus patients (97 hips) treated with autologous concentrated bone marrow grafting for steroid-associated femoral head osteonecrosis between April 2003 and June 2014. Ten patients (19 hips) were male and 45 (78 hips) were female, with an average age at the time of bone marrow grafting of 35.3 years (range 16–77 years). Mean follow-up period was 6.2 years. Based on the 2001 Japanese Orthopaedic Association staging system for osteonecrosis of the femoral head, 25, 29, 30, 11, and two hips were respectively classified as stage 1, 2, 3A, 3B, and 4; furthermore, three, five, 43, and 46 hips were classified as types A, B, C1, and C2, respectively.

[Procedure] Bone marrow was aspirated from the iliac crest and concentrated using a conventional manual blood bag centrifugation technique to extract the buffy coat. Multidirectional holes were made by drilling with a Kirschner wire to perforate the interface between the areas of osteonecrosis of the femoral head. Aspirate was then injected into the osteonecrotic area of the femoral head.

[Evaluation] The endpoint was set as the time-point at which the patient required additional surgery (total hip arthroplasty), which was dependent on hip pain, radiographic change, and social background. In the early stages of osteonecrosis of the femoral head, the endpoint of evaluation was also set as the time-point at the onset of collapse. The following factors were investigated: age, sex, body mass index, unilateral or bilateral disease, etiological factors, preoperative classification and staging, and history of steroid pulse therapy. The 97 hips were divided into a total hip arthroplasty conversion group and a non-total hip arthroplasty conversion group. Multivariate logistic regression analysis was performed.

Results:

Of the 97 hips, 28 hips (29%) were converted to total hip arthroplasty. There were 14 hips (26%) converted to total hip arthroplasty in the early stages (stages 1 and 2), and 14 hips (33%) converted to total hip arthroplasty in the late stages (stages 3 and 4). Multivariate logistic regression analysis revealed that conversion to total hip arthroplasty was significantly correlated with body mass index and disease type (osteonecrosis of the femoral head classification). Of the 54 hips in the early stages, 34 hips (63%) experienced collapse. Of these 34 collapsed hips, 10 hips were stage 3A but only with the crescent sign.

Conclusions:

The strong predictors of total hip arthroplasty conversion after bone marrow grafting are body mass index and disease type. Cases with high body mass index or wide necrosis area may need additional osteogenic therapy such as parathyroid hormone or low-intensity pulsed ultrasound. This combination of bone marrow grafting plus osteogenic therapy may be more suitable for joint preservation in steroid-associated femoral head osteonecrosis in systemic lupus erythematosus.

8. Assessment of early biological fixation between cementless taper wedge stem and femur using digital tomosynthesis

Ryo Inoue, Yuji Yamamoto, Yasuyuki Ishibashi

Facility: Department of Orthopaedic Surgery, Hirosaki University Graduate School of Medicine, Hirosaki, Japan

Objectives:

Total hip arthroplasty (THA) is now one of the most popular treatment procedures for end-stage osteoarthritis (OA) and osteonecrosis (ON) of the hip, and it has been reported that biological fixation is an essential factor for favorable outcome after THA procedure. However, there are few studies regarding evaluation of biological fixation in the early postoperative period within the first several months. The objectives of this study were to assess early biological fixation between the cementless short tapered wedge stem and the femur using radiography and digital tomosynthesis.

Materials and Methods:

From June 2015 to July 2016, 34 patients (8 males and 26 females, 36 hips) were treated using a cementless short tapered wedge stem; Accolade II (Stryker), and could be followed for at least six months. The mean ages at the time of surgery of patients were 60.5 ± 13.8 years old, and 23 OA hips and 13 ON hips (22 right sides and 14 left sides) were included in this study. Anterior-posterior radiographs of both hips and digital tomosynthesis (Sonialvision Safire 17, Shimazhu, Kyoto, Japan) of postoperative hip were performed at preoperative, postoperative 6 weeks, 3 and 6 months. Regarding biological fixation between stem and femur, the presence of spot welds (SW) were evaluated on both radiograph and digital tomosynthesis at each postoperative point.

Results:

There were no SW at postoperative 6 weeks in neither radiograph nor digital tomosynthesis, nor postoperative 3 months in radiograph out of all 36 hips. On the other hand, there were 9 SW in 7 patients (21%) at postoperative 6 months in radiograph, and there were 16 SW in 11 patients (32%) at postoperative 3 months and 31 SW in 19 patients (56%) at postoperative 6 months in digital tomosynthesis.

Discussion:

Digital tomosynthesis has been introduced in clinical practices and there have been several studies in recent years. This method can remove overlapping structures in radiography and reduce metal artifacts in CT, and provide depth information by images of high quality. This study suggested that digital tomosynthesis can detect the findings of biological fixation such as the SW between the stem and femur earlier than the radiograph images, and biological fixation has the potential to appear within the postoperative first 3 months.

9. Risk factors associated with poor prognosis after percutaneous suction aspiration and drainage for pyogenic spondylitis

Tsunemasa Matsubara¹⁾, Kei Yamada¹⁾, Kimiaki Sato¹⁾, Hidetake Inoue¹⁾,
Kimiaki Yokosuka¹⁾, Shoji Iwahashi¹⁾, Kensei Nagata¹⁾, Naoto Shiba¹⁾, Noriyuki Ando²⁾

Facility1): Department of Orthopedic Surgery, Kurume University, Fukuoka, Japan

Facility2): Department of Orthopedic Surgery, General Hospital, Fukuoka, Japan

Background:

The incidence of pyogenic spondylitis is increasing steadily, particularly in immunocompromised elderly populations. However, open surgical treatment under general anesthesia is difficult in such patients. Here, we describe the approach to minimally invasive surgical treatment adopted at our institution, which involves percutaneous suction aspiration and drainage (PSAD) under local anesthesia. We previously reported the achievement of good results with PSAD for pyogenic spondylitis, but the increased risk of treatment failure has not been fully assessed.

Methods:

We retrospectively reviewed patients with pyogenic spondylitis who underwent PSAD surgery between 1997 and 2014 at our institution and evaluated the clinical outcomes according to the modified Nagata criteria. Patients with excellent, good, outcomes were classified into the “satisfactory results” group and those with fair and poor outcomes comprised the “unsatisfactory results” group. We statistically compared several clinical parameters between the 2 groups and investigated the increased risk of treatment failure.

Results:

The subjects included 77 patients (43 male and 34 female, average age 68.7 years). Sixty patients had severe comorbidities, 27 of which had diabetes. Causative organisms were detected in 53 patients, including 29 with drug-resistant bacteria by blood culture in 15 patients and/or tissue culture in 48 patients. According to the modified Nagata criteria, 22, 25, 20, and 10 patients had excellent, good, fair, and poor outcomes, respectively. In a multivariate analysis, drug-resistant bacterial infection ($p<0.001$, odds ratio: 10.7, 95% Confidential Interval (C.I.): 2.96-46.2) and the presence of epidural abscess and/or paravertebral abscess on preoperative MRI ($p=0.014$, odds ratio: 8.88, 95% C.I.: 1.87-69.7) were associated with increased risk of treatment failure.

Conclusions:

PSAD is advantageous because it allows treatment of the relevant condition and identification of causative organisms by tissue culture, which yielded a higher detection rate than blood culture. Factors associated with poor prognosis after PSAD included drug-resistant bacterial infection and the presence of epidural abscess and/or paravertebral abscess on preoperative MRI.

10. Percutaneous ultrasonographic observation of the spinal cord after cervical laminoplasty at the postoperative early periods

**Yoshiharu Nakaya, Atsushi Nakano, Kenta Fujiwara, Ichiro Baba,
Takashi Fujishiro, Sachio Hayama, Toma Yano, Masashi Neo**

Facility: Department of Orthopedic Surgery, Osaka Medical College /Japan

Introduction:

Some reports have been published about intraoperative ultrasonography of the spinal cord in cervical laminoplasty. However, there is no study that has investigated the postoperative changes over time. Double-door cervical laminoplasty with suture anchors keeps the split laminae widely open, and this method does not install any structures at the posterior part of the cervical spine. Therefore, we can observe the spinal cord by percutaneous ultrasonography(PUS). The objectives of this study are to confirm whether the spinal cord can be visualized clearly by PUS at the postoperative early periods after cervical laminoplasty, and to evaluate the changes over time.

Materials and Methods:

Twenty-five patients who underwent cervical laminoplasty were evaluated by postoperative (1week, 2weeks, and 3months) PUS. Additionally, if unusual events such as acute paralysis were encountered postoperatively, emergency ultrasonography was performed. In order to evaluate the decompression status of the spinal cord, we observed the ventral subarachnoid space, and classified into 3grades (Noncontact, Contact and apart, Contact). And in order to evaluate the pattern of the spinal cord pulsation, we classified the spinal cord dynamics into 6 categories (Pulsating, Forward and Backward, Upward and Downward, Seesaw, Wave, No pulsation). Ultrasonography was performed using Noblus (Hitachi Aloka Medical, Ltd. Tokyo, Japan) with a 1-5 MHz sector transducer (EUP-C715).

Results:

In all cases, the surroundings of the spinal cord could be observed clearly. The decompression status were tended to improve postoperative over time. The pulsation patterns were various in each evaluation periods. However, spinal pulsation itself was observed at all periods in all cases. Exceptionally in only one case, the pulsation of the spinal cord disappeared at the time when the postoperative paralysis occurred by the epidural hematoma. Percutaneous ultrasonography demonstrated not only spinal cord compression due to hematoma, but also “no pulsation” pattern of the spinal cord.

Conclusion:

We could observe the status of the spinal cord by PUS at the postoperative early periods after cervical laminoplasty. PUS was a very useful method to evaluate the postoperative status of the spinal cord, especially in the diagnosis of the postoperative epidural hematoma.

11. Expression of alpha-2-delta-1 subunit at the lumbar spinal cord in spinal cord injury rats

Kazuki Kusuyama^{1,2)}, Toshiya Tachibana²⁾, Hiroki Yamanaka¹⁾, Shinichi Yoshiya²⁾,
Koichi Noguchi¹⁾

Facility1): Department of Anatomy and Neurosci, Hyogo College of Medicine

Facility2): Department of Orthopaedic surgery, Hyogo College of Medicine

Spinal cord injury (SCI) commonly results not only in motor paralysis but also in the emergence of neuropathic pain, both of which can impair the quality of life for SCI patients. In the clinical field, it is well known that Pregabalin, which binds to the voltage-gated calcium channel alpha-2-delta-1 subunit (Cava2d-1) has therapeutic effect on neuropathic pain after SCI. Previous study has demonstrated that SCI increase Cava2d-1 in L4–6 dorsal spinal cord of SCI rats by Western blot and that the increase of Cava2d-1 correlated with tactile allodynia of the hind paw. However, the mechanisms of Pregabalin for SCI induced neuropathic pain are poorly understood. In this study we examined cellular distribution of Cava2d-1 expression in L4–6 spinal cord of SCI rats using immunohistochemistry.

Methods:

Spinal cord contusion injury was produced in male Sprague–Dawley rats (180–200 g). Rats were anesthetized by intraperitoneal pentobarbital administration. The lamina of the T10 vertebrate was then removed. A contusion injury was generated using the IH impactor device that emulates a 100-kilodyne weight-drop onto the dura mater from a distance of 3–4 mm (N=5). Sham control rats received laminectomy without the contusion injury (N=5). During pentobarbital anesthesia, perfusion fixation was performed using 1-4% paraformaldehyde and 0.1 M phosphate buffer solution (at pH 7.4), the spinal cord (L4-6) was removed. The transverse sections were cut and processed for immunohistochemistry. Quantitative analysis was performed by NIH image software. Locomotor function recovery post SCI was monitored using the Basso, Beattie, and Bresnahan locomotor rating scale (BBB scale) .

Results:

Following SCI, the BBB scale was 2.4 ± 0.6 at day 1, and increased to 12.4 ± 0.6 four weeks after SCI, indicating improvement . In the naïve rats we detected expression of Cava2d-1 immunoreactivity mainly in lamina I and II in the dorsal horn. SCI significantly increased Cava2d-1 immunoreactivity in lamina I and II in the dorsal horn at four weeks after SCI significantly.

Conclusion:

These findings suggested that increase of Cava2d-1 in the L4/5 of dorsal horn after thoracic SCI was involved in the development of neuropathic pain in hindlimb.

The increase of Cava2d-1 in superficial dorsal horn after SCI may be related to the Pregabalin's effect on central neuropathic pain.

12. Surgical outcome of postural instability in patients with cervical myelopathy: A preliminary report

Toma Yano, Takashi Fujishiro, Ichiro Baba, Kenta Fujiwara, Atsushi Nakano,
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Facility: Department of Orthopedic Surgery, Osaka Medical College, Osaka, Japan

Introduction/Aim:

It is well known that cervical myelopathy patients present with upper extremity numbness, hand clumsiness or gait disturbance. However, in clinical settings, cervical myelopathy patients often complain of unsteadiness in standing aside from these symptoms. However, balance disorder in patients with cervical myelopathy is not well understood, and moreover there have been no studies investigating its surgical outcome. The purpose of the present study is to investigate the surgical outcomes of postural instability in patients with cervical myelopathy subjectively and objectively.

Materials and methods:

Sixty patients without the history of pathology presenting neither dizziness nor vertigo, who underwent an operation for cervical myelopathy in our institution were included in the present study. To evaluate subjective postural instability (SPI), patients were asked to answer the questionnaire, and severity of unsteadiness was graded into 4 types. To assess objective postural instability (OPI), stabilometric analysis was conducted, and 2 parameters were assessed: sway area (SA: measuring degree of sway of the gravity center, /cm²) and sway density (SD: = sway path per sway area, measuring fine control of standing posture by proprioceptive reflex, /cm). Neurological status was also noted using JOA score. All the evaluations were performed preoperatively and postoperatively (3 to 6 months after the operation)

Results:

Included in the present study were 37 males and 23 females with an average age of 64.5 years at time of operation. JOA scores improved significantly after the operation (from 11.6 ± 2.4 to 13.5 ± 1.8 , $p < 0.001$). The improvement of SPI was identified in approximately 40% of patients, although the 2 stabilometric parameters improved significantly (SA: from 9.6 ± 8.6 to 7.1 ± 9.7 , $p = 0.007$; SD: from 14.9 ± 7.7 to 19.1 ± 9.2 , $p = 0.010$). Even in patients without the improvement of SPI, the stabilometric parameters were improved significantly (SA: from 10.6 ± 9.2 to 7.9 ± 13.1 , $p = 0.047$; SD: from 14.3 ± 7.1 to 19.4 ± 9.2 , $p = 0.011$).

Discussion:

The present study demonstrated that OPI in patients with cervical myelopathy through evaluation with stabilometry was significantly improved at early postoperative periods. However, the improvement of SPI was found in less than half of the patients. The present study suggested that the postoperative improvement of OPI did not always lead to that of improved SPI in patients with cervical myelopathy. Further investigation will be necessary to clarify this pathology.

13. Surgical Treatment for the fragility fractures of the pelvis

Yuka Sugiura, Masahiro Shirahama, Kenjiro Nakama, Shiro Yoshida, Shinji Okazaki

Facility: Department of Orthopaedic Surgery, Kurume University School of Medicine, Japan

Introduction:

Fragility fractures of the pelvis (FFP) are increasing frequency and some cases are requiring an operating treatment. But now there were not correct methods for fragility fractures of the pelvis. We used classification by Rommens, and treated by operative four cases of fragility fractures of the pelvis. We used spinal system.

Methods:

Between January 2014, and April 2016, five patients with FFP were treated with iliac screw and connected rod. The mean age of the patients was 84.0(range of 81 to 86). Fractures pattern were three cases of FFPs IV a, and two of III a. The patient is placed in the prone position with only small bilateral longitudinal skin incisions to the pelvis. The iliac screws of spinal system were inserted from the posterior superior iliac spine to the anterior inferior iliac spine. Each two iliac screw were connected two rod parallels. All of cases were used teriparatide after operation.

Results:

Surgery was performed 5 to 22 days after injury. Surgical time was averaged 85 minutes, and blood loss averaged 135.6 ml. All patents were started sitting immediately after operation. They were able to walk by worker without pain after two or three weeks after operation. Fractures healed within 12weeks. Two cases were delayed surgical wound, but there were not major complications.

Conclusion:

Fragility fractures of the pelvis were difficult to treatment. Our method for FFP was minimally invasive and able to fix. Patients were able to decreasing pain and walk quickly after operation.

14. Relationship between bone morphology and location of fractures in patients with atypical femoral fractures

Tomofumi Nishino, Kojiro Hyodo, Hajime Mishima, Masashi Yamazaki

Facility: Department of Orthopaedic Surgery, Faculty of Medicine, University of Tsukuba

Purpose:

Atypical femoral fractures (AFFs) is considered as unfavorable cause resulted from long-term use of bisphosphonate (BP) for treatment of osteoporosis. However, it cannot be concluded that BP is the only cause of AFFs, because there are some reports of BP-unrelated AFFs. The purpose of this study was to determine fracture location and the characteristics of patients with AFFs.

Methods:

We studied 38 AFFs in 34 patients admitted to our institution between November 2007 and July 2013. The diagnostic criteria for the AFFs were based on 2014 American Society of Bone and Mineral Research guidelines. We classified the fracture location as proximal, middle, or distal to trisect the femoral diaphysis from just distal to the lesser trochanter to just proximal to the supracondylar flare. Bowing was defined as a line through the inside of the tip of the great trochanter and a condylar center that was outside the medullary cavity. We investigated the fracture's location, existence of coronal bowing, BPs, glucocorticoids (GCs), and proton pump inhibitors (PPIs) therapy and body height and weight.

Results:

We analyzed associations between fracture location and demographic and clinical factors. Twelve fractures were proximal, 25 were middle, and one was distal. Nineteen limbs showed femoral bowing. Thirty-one patients received BP treatment. Fourteen patients received a GC, and 16 received a PPI. There was a significant association between coronal bowing and middle fracture locations, GC therapy and proximal fracture locations, and older age and middle fracture locations. Tall height and heavy weight had an association with proximal fracture location, and short height and light weight had an association with middle fracture location.

Conclusion:

In conclusion, we provide evidence supporting a causal relationship between BP-related severely suppressed bone turnover and AFFs. We also provide evidence supporting additional influences from altered distribution of mechanical stress with femoral bowing and various factors, such as GC therapy, age, body weight, and height, which might negatively affect bone intensity and quality and result in fracture.

15. Voluntary elbow flexion is possible in patients with complete quadriplegia due to C4 cervical cord injury using Hybrid Assistive Limb (HAL[®]) technology

Yukiyo Shimizu^{1),2)}, Hideki Kadone³⁾, Shigeki Kubota²⁾, Tetsuya Abe²⁾, Toru Funayama²⁾,
Aiki Marushima²⁾, Tomoyuki Ueno¹⁾, Yasushi Hada¹⁾, Masashi Yamazaki²⁾,

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Facility2): Department of Orthopaedic Surgery, Faculty of Medicine, University of Tsukuba

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Introduction:

Patients with complete quadriplegia after high cervical spinal cord injury (SCI) are fully dependent on others in activities of daily living (ADL)^[1]. Neurological recovery is rare^[2]. The rehabilitation plan should include environmental control systems to compensate for loss of independence in performing ADL. Therefore, the use of assistive technology can improve their quality of life.

The single-joint hybrid assistive limb (HAL[®]-SJ; Cyberdyne Inc., Japan) was developed for elbow or knee joint motion support. The small power unit on the lateral side of the joint consists of angular sensors and actuators. The primary control system is based on the motion intention and uses the bioelectric signals generated by the patient's muscle activities.

We hypothesized that the HAL-SJ for SCI patients with complete quadriplegia could restore active elbow movement.

Methods:

Participants

Two male patients were enrolled in this study. First was 19 years old and at 3 years 8 months post injury. Second was 75 years old and at 1 month post injury. Clinical evaluation before intervention revealed that both cases were grade A on the American Spinal Injury Association impairment scale (AIS) and the International Standards for Neurological and Functional Classification of Spinal Cord Injury (ISNCSCI) motor scores of 0 points.

HAL-SJ intervention

The intervention on each side included 10 sessions. Each session with the HAL-SJ lasted 50 min, including rest, attachment, detachment of the device, and evaluation before and after intervention. The intervention targeted both sides in Case 1, whereas only the left side was targeted in Case 2.

Clinical Assessment

Clinical assessments were conducted before and after the intervention. A Trigno Lab wireless electromyography (EMG) movement sensor system (Delsys, USA) was used to evaluate the muscle activities of the trapezius, biceps brachii, infraspinatus, and triceps brachii muscles before and during the HAL-SJ sessions. The activity of each muscle was evaluated using EMG, which was collected at 2000 Hz and filtered with a 30- to 400-Hz band-pass filter. An activation envelope was computed using a 200-ms moving window average, using scripts on MATLAB 8.2 (Mathworks, USA).

Results:

Case 1

Surface EMG before the intervention revealed no voluntary contraction in the bilateral upper arms, but revealed voluntary contraction in the bilateral trapezius. The electrodes for flexion and extension were placed on the right and left trapezius, respectively. Initially, voluntary right elbow flexion with a HAL was performed with motion intention from the right trapezius in accordance with shoulder elevation. Over time, isometric contraction of the trapezius was performed; therefore, only elbow flexion was performed without shoulder elevation.

After the sixth session, EMG of the biceps revealed voluntary contraction. Following which, voluntary right elbow flexion with the HAL-SJ could be performed using the right biceps activities. After the tenth intervention, the patient could contract the right biceps voluntarily; therefore, the intervention on the left side was implemented as well. After intervention, he could drive a standard wheelchair 10 meters by himself using elbow flexion during the clinical evaluation.

Case 2

As in Case 1, EMG showed no voluntary contraction in the bilateral upper arms, trapezius activities were also used for elbow flexion at first. After the first session for the left side, voluntary contraction of the left biceps was observed. After the third session on the left side, contraction on both sides of the biceps was detected. From the sixth session, left biceps contraction was used for the flexion of the left elbow.

Discussion and Conclusions:

In this study, the HAL-SJ was used to produce active elbow flexion in patients with complete quadriplegia, based on the voluntary motion intention detected from the trapezius. In both cases ISNCSCI motor scores became from 0 points to 2 points.

Both patients could contract the bilateral biceps voluntarily after the HAL-SJ intervention. Voluntary elbow flexion using HAL-SJ might provide systematic feedback, including motor learning effects.

References:

1. Memberg WD, et al., Arch Phys Med Rehabil. 95(6):1201-1211.e1, 2014.
2. Lim PA, Tow AM. Ann Acad Med Singapore. 36(1):49-57, 2007.

16. History and trends of German spine surgery

Christian Brinkmann

Facility: Hospital St.Josef-Stift in Sendenhorst,Germany Centre for Spine Surgery

The history of treatment of spine deformity and fractures started with the Harrington System in 1962. F. Magerl introduced the Fixateur externe in 1977. The Fixateur interne (W. Dick, F. Magerl, Ing. R. Mathy) was first implanted in 1982 (Dick, Basel). The technical solutions are well developed since 1982, but the rationale behind the Fixateur interne is worldwide still the same after decades.

Surgical treatment of low back pain today is usually indicated after an adequate trial of conservative treatment. Classical fusion techniques are arthrodesis (PLIF, TLIF, XLIF, OLIF). Non fusion techniques like: TDR, Dynamic Fixation and spacers are also used. PLIF was first described by Cloward et al in 1953 with a cure rate of 85%. TLIF was described by Harms and Rollinger in 1982.

The effect of interspinous devices is the distraction of the motion segment of the lumbar spine and indirect decompression of neural structures. The first implant was the Wallis implant 1988 with further development of other devices. These devices are supposed to unload the facet joints as well as the posterior part of the disc but it creates a slight segmental kyphosis and may increase unfavourable sagittal balance. Semirigid pedicle fixation Graf ligaments (Graf et al 1992) increased lordosis, while Dynesis (Dubois 1994) reduces the lumbar lordosis.

Total disc replacement was developed by Büttner Janz in 1984.

The importance of the sagittal alignment in spine surgery became well known in the last decade. A high pelvic incidence with diminished lumbar lordosis predisposes to adjacent segment disease after lumbar spine fusion. The risk is two-ten times higher for undergoing revision surgery. Correction of sagittal imbalance often requires Smith Peterson osteotomies, Ponte OT as well as Pedicle subtraction osteotomy (PSO), sometimes in rare cases column resection (VCRs).

The role of minimally invasive surgery in sagittal balance correction and indirect decompression in spinal deformity is not yet entirely clear.

To achieve the most accurate position of pedicle screws even in complex anatomy the industry developed navigation systems and intraoperative 3D scan.

The German spine society (DWG) was founded in 2006 and is now the biggest spine community in Europe.

17. Kinematic alignment, alignment evaluation on cases using OrthoPilot

Ulrich Böhling

Facility: Schlosspark-Klinik Berlin / Department of Orthopedic Surgery Academic Hospital of the Humboldt University

Navigation systems in computer assisted surgery like the OrthoPilot have been developed in order to improve clinical outcome and longevity of total knee arthroplasty. To achieve these goals, kinematic alignment and soft tissue balancing are focused on the continuous development of the OrthoPilot system.

In literature it is documented that from a certain degree of malalignment asymmetric loosening of the implant is increasing significantly and becomes a reason of failure. Biomechanically asymmetric force transmission creates increased polyethylene wear leading to osteolysis and loosening.

Soft tissue balancing of flexion and extension gap throughout the full range of motion is a precondition for a stable functional result free of pain. The OrthoPilot system offers a continuous feedback of every surgical step visualising the impact of planning and the accuracy of every surgical procedure. After more than 20 years of application of navigation in computer assisted surgery several studies are proving the benefits in total knee arthroplasty.

18. History of the German-Japanese Orthopedic Society

Ulrich Böhling

Facility: Schlosspark-Klinik Berlin / Department of Orthopedic Surgery Academic Hospital of the Humboldt University

Due to the long relationship in medicine between Germany and Japan a German–Japanese Orthopedic Society was founded in 1977. The membership to this Society is free for every member of the Japanese Orthopedic Association (JOA) and the German Society of Orthopedic and Traumatology (DGOU). It is the purpose of this society to patronize an intensive exchange in scientific and social life.

Following this intention every two years the society is holding a summit alternating in Japan or Germany.

Within a fellowship program in the last 20 years more than 20 orthopedic surgeons completed a surgical training from one month up to two years.

In the present concept the fellowship program is designed as an orthopedic travel course for a period of two weeks in different clinics specialized in hip and knee arthroplasty and spine surgery. So the first group of four surgeons passed this course in November 2016.

The Congress of the West-Japanese Society of Orthopedic & Traumatology in Kurume is an excellent panel to promote our activities and you are cordially invited to attend the meeting of the society during the German Congress for Orthopedic and Traumatology in Berlin in October this year.

19. Effect of the Hybrid Training Method on the Disuse Atrophy of the Musculoskeletal System of the Astronauts Staying in the International Space Station for a Long Term

Naoto Shiba

Facility: Department of Orthopedics, Kurume University School of Medicine

Back ground

Musculoskeletal atrophy is one of the major problems of extended periods of exposure to weightlessness such as on the International Space Station (ISS). We developed the Hybrid Training System: HTS to maintain an astronaut's musculoskeletal system using an electrically stimulated antagonist to resist the volitional contraction of the agonist instead of gravity. The present study assessed the system's orbital operation capability and utility, as well as its preventative effect on an astronaut's musculoskeletal atrophy.

Methods:

HTS was attached to the non-dominant arm of an astronaut staying on the ISS, and his dominant arm without HTS was established as the control (CTR). 10 sets of 10 reciprocal elbow curls were one training session, and 12 total sessions of training (3 times per week for 4 weeks) were performed. Pre and post flight ground based evaluations were performed by Biodex (muscle performance), MRI (muscle volume), and DXA (BMD, lean (muscle) mass, fat mass). Pre and post training inflight evaluations were performed by hand held dynamometer (muscle force) and measuring tape (upper arm circumference).

Results:

The experiment was completed on schedule, and HTS functioned well without a problem. Elbow extension muscle average power (Watts) according to Biodex changed +22.1% using HTS. Triceps muscle volume according to MRI changed +11.7% and that of biceps was +2.1% using HTS, however -0.1% and -0.4% respectively for CTR. BMD changed +4.6% in HTS arm and -1.2% for CTR. Lean (muscle) mass of the arm changed +10.6% only in HTS. Fat mass changed -12.6% in HTS and -6.4% in CTR.

Conclusions:

These results showed the orbital operation capability and utility, and the preventive effect of HTS for an astronaut's musculoskeletal atrophy. The initial flight data together with the ground data obtained so far will be utilized in the future planning of human space exploration.



German-Japanese Society: Symposium

Kaiserin Friedrich Haus
Robert-Koch Platz 7 10115 Berlin Germany

**DKOU – Deutscher Kongress für
Orthopaedie und Unfallchirurgie**

Berlin October 27th, 2017

endorsed by



The Japanisch-Deutsche Gesellschaft für Orthopädie und Unfallchirurgie

Knowledge is increased by sharing it. Therefore an intensive exchange of knowledge between Japanese and Germany surgeons already began in the 19th century. Pursuing the target of a scientific exchange between the Japanese Orthopaedic Association (JOA) and the Deutsche Gesellschaft für Orthopädie und Orthopädische Chirurgie (DGOOC), the Japanisch-Deutsche Gesellschaft für Orthopädie und Unfallchirurgie was founded in 1977. Especially young surgeons shall be given the opportunity to meet experienced colleagues in order to discuss specialist topics and findings. By holding events like the Scientific Symposium a platform for this knowledge transfer is created. In addition to that research works and professional training programs for aspiring surgeons are supported, so that the present knowledge can be more increased. Thus the traditional relationships between Japanese and German surgeons will be continuously fostered.

Preface

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SHARING EXPERTISE

Program

Friday 27.10.2017

Speakers have been allotted 12 minutes to present their talks and 3 minutes to answer questions.

9:00 Opening Ceremony

Congress President: Jörg Scholz

DGOU President: Reinhard Hoffmann

JOA President: Masashi Yamazaki

9:15 Session I Knee and Hip

Moderators: Naoto Shiba, Christoph Josten

1. Ceramic surface in Total Knee Arthroplasty – quo vadis?
Wolfram Mittelmeier
2. Accuracy of tibial tunnel placement during double bundle anterior cruciate ligament reconstruction using the PL Divergence Guide
Shugo Maeda
3. Navigation TKA Revision using the OrthoPilot®
Oliver Hauschild
4. Treatment of slipped capital femoral epiphysis, two osteotomy cases
Yukinao Ishibashi
5. Current status of Short Stem Arthroplasty
Henning Windhagen
6. Survival Analysis of Hard on Hard THAs for Dysplastic Oas
Atsushi Kusaba

10:45 Coffee brake

11:00 Session II Spine and Rehabilitation

Moderators: Masashi Neo, Ulrich Böhling

7. Experiences with a Plasmapore® XP coated PEEK cage using the lumbar ventral approach
Stefan Kroppenstedt
8. Percutaneous ultrasonography of the spinal cord in different cervical positions after cervical laminoplasty
Sachio Hayama
9. Requirements for a new pedicle screw system
Michael Rauschmann
10. Efficacy of gait training using HAL after surgery for severe myelopathy due to thoracic ossification of the posterior longitudinal ligament
Tetsuya Abe
11. High impact sports activity after total hip arthroplasty
Akihiko Maeda
12. Gait analysis pre- and post-THA with a new device (Akira)
Ryoichi Izumida

12:30 Closing Remarks

President GJOS Japan/GJOS Germany:

Naoto Shiba, Ulrich Böhling

Information

Chairmen



Prof. Jörg Scholz, MD
Medical Director of MEOCLINIC
Berlin / Germany



Prof. Naoto Shiba
Kurume University School of Medicine
Kurume / Japan

Venue

**DKOU – Deutscher Kongress für
Orthopaedie und Unfallchirurgie**
October 24 – 27, 2017

Messe Berlin, Entrance Sued
Jafféstraße, 14055 Berlin, Germany
<http://dkou.org/>



Dinner of DKOU:

Thursday, 26.10.2017 | at 20:30 pm
KaDeWe, Tauentzienstraße 21–24, 10789 Berlin
6th floor | Price: 80 EUR p.p.

Dinner of German-Japanese Society

Friday, 27.10.2017 | at 19:00 pm
Restaurant Kaefer im Reichstag

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Gait analysis pre- and post- THA with a new device (AKIRA)

Ryoichi Izumida MD / Keiyu Joint Reconstruction Center, Tokyo

In Japan, daily locomotory activities of a total amount of 23 METs/week, performed at an intensity of 3 METs or higher, are recommended to increase the healthy life expectancy. However, patients with coxarthrosis present with gait disturbances due to various causes, in addition to pain. Even if total hip arthroplasty (THA) resolves pain, it may be difficult to obtain normal gait this goal, due to other factors remaining after surgery.

We performed gait analysis using <Akira>, a marker-less motion analyser based on the game system Kinect developed by Microsoft.

We observed the step length and gait velocity in 31 patients (9 males and 22 females), who had initially undergone unilateral THA, immediately before and 3 months after surgery. In male patients, the mean step lengths before and 3 months after surgery were 47 and 56 cm, respectively. With a 9 cm extension in step length, the mean gait velocity increased from 51.7 to 57.1 m/minute. In female patients, the mean step length extended from 42 to 50 cm after surgery, consequently improving their mean gait velocity from 43.4 to 52.4 m/minute.

However, when compared to the national mean, the step lengths and /-gait velocities were markedly shorter/lower at 3 months after surgery.

In a previous study using an activity meter, the number of steps at 6 months after surgery tended to be insufficient to maintain health. To date, the main objective of THA for patients with coxarthrosis has been to improve impairment due to coxarthrosis.

The results of the present study indicate the necessity of providing gait education after surgery, and setting further goals, such as lengthening the healthy life expectancy. <Akira> may be useful for these approaches.

It was my regret that I could not attend the banquet after the congress because of poor physical condition.

The memory of GJSOT 2017

Masashi Tsuchida

Zama General Hospital

Artificial Joint Replacement and Rheumatoid Arthritis Center

That was my pleasure to participate in such a great congress, GJSOT in October 2017.

The historical meeting has been held in both Kurume and Berlin this year and I joined both of them as a participant.

Especially that in Berlin, Every moment was more memorable for me.

The evening I arrived at Berlin, two days before the congress, I and my senior doctor, Dr.Maeda, had a drink at the Japanese style restaurant in Charlottenburg named Kushinoya that serves wonderful fried vegetables and meat on skewer. Dr.Maeda used there often when he was in Berlin about 10 years ago and I visited once several years ago when I travelled. I personally like to go Japanese style restaurant same as trying to taste local food whenever I go outside of Japan. And I like to feel how much the taste and the appearance of the meal are customized from the original.

About Kushinoya, the owner is Japanese, the taste was superb, definitely better than any other same style restaurants in Japan that I have ever been to. For that reason, I will strongly recommend there to German people.

Of course we had a good time with real Japanese cuisine in Berlin.

One day before the congress, I and my senior doctors, Dr.Kusaba and Dr.Maeda, visited Robert-Koch-Krankenhaus Apolda to see the total hip replacement.

Apolda is a small town in central Thuringia and known as “town of bells”. The population is only twenty thousands and it took more than 3 hours from our accommodation in Berlin. Of course that was my first time to get Apolda.

We attended the operation and saw the operative technique directly.

Surprisingly, Our party was the first Japanese visitor to Apolda for that reason we were so welcomed officially and the local newspaper had already announced prior to our visiting.

Furthermore, the day we went to the hospital, the local journalist followed us and wrote an article of our ward round at the hospital (Please visit <http://www.thueringer-allgemeine.de> and search “prof Kusaba”, then you can read the detail).

I was so glad to have such kind of official reading script in German. So I should learn German as soon as possible to understand what is written on the website.

Return to Berlin with a huge gift from the hospital in Apolda, we joined a welcome party held at a famous traditional German restaurant.

Most of us might have been so astonished that the size of traditional German meal so huge even all of their taste was delicious.

Amazingly, some of German doctors finished them perfectly as if they were still starving. Unfortunately, I could only eat part of them but I enjoyed the taste and the time.

As all participants knew, the congress had lots of presentations for not only latest trend of surgical

treatment but also future-gazing technologies in orthopaedic scene. These topics and discussions must have been a good experience for both Japanese and German orthopaedic surgeons.

I was so proud that both of my senior doctors made German audience attract and laugh during their well-organized presentations.

After the congress, the dinner party was held at the German diet building named “Reichstag”.

I was not expected that the restaurant, Käfer, was placed at the top of Reichstag because normally it is difficult to find such kind of stylish restaurant in official government facilities in Japan.

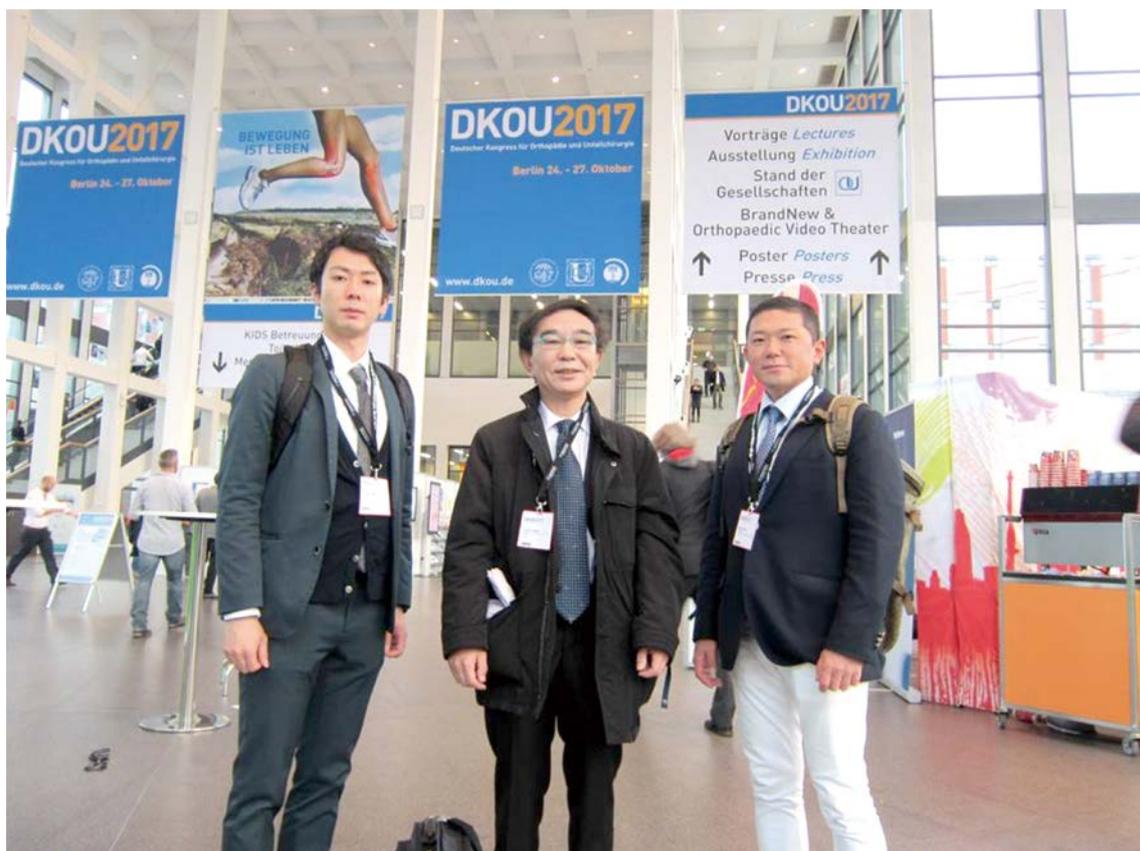
Everything was so gorgeous during the dinner party and we had a good moment with nice German people and Japanese doctors from other hospitals.

After finishing the congress, I give a great appreciation to German doctors for organizing both the congress and related activities.

Although it was very tough itinerary to attend the congress in Berlin from Japan, I am very satisfied the congress gave me a great opportunity to know the latest knowledge and also I felt the kindness and hospitality of German doctors through the communication.

I am looking forward to attending the next congress as a speaker with a topic that will attract both Japanese and German surgeons.

Thank you.



In front of DKOU entrance with my senior doctors (From left, me, Dr. Kusaba and Dr. Maeda).



Visiting Robert-Koch-Krankenhaus Apolda (Center, Dr. Dirk Seifert).



The picture from the article on Thueringer-Allgemeine website.

(<http://www.thueringer-allgemeine.de/web/zgt/suche/detail/-/specific/Zur-Hueft-Operation-aus-Japan-angereist-1445440705>)





GJSOT Fellowship Program

From October 30 to November 17, 2017



German-Japanese Society for Orthopaedics and Trauma fellowship program 2017

Toru Funayama

Department of Orthopaedic Surgery (Spine Group), University of Tsukuba

The German-Japanese Society for Orthopaedics and Trauma fellowship program this year consisted of spending three weeks from the end of October 2017 to undergo surgical training (observation) at three medical institutions in Germany.

Four Japanese orthopedic surgeons of the same generation—Dr. Shugo Maeda (specializing in arthroscopy and sports), Dr. Yukinao Ishibashi (hip joint), Dr. Sachio Hayama (spine) and me (spine)—were divided into two groups for surgery, i.e., joints and spine, and underwent training.

Our first training facility was Rostock University Hospital. Here, Professor Mittermeier, a famous surgeon of artificial joints (especially the hip joint) gave us a hearty welcome. Beginning with a welcome dinner on the first day, he arranged a city sightseeing tour for us the following day. He also took us to a resort area facing the Baltic Sea, and even invited us to his home. Spine surgery was mainly being carried out by the trauma team and neurosurgeons. We watched a percutaneous pedicle screw fixation for a burst fracture of the L1, performed by Dr. Rotter of the trauma team. The patient was a German male weighing 165 kg. Making him in a prone position, and driving a screw into his body, were difficult procedures usually not seen with Japanese patients. It was a new and a refreshing experience for me. We also watched anterior lumbar interbody fusion (ALIF) of the L5/S performed by Dr. Mann, a neurosurgeon. I got the impression that it was quite different from other surgeries that I had observed overseas. Historically, trauma surgery has flourished in Germany, so the trauma team was in charge of handling spinal trauma. Another thing was that neurosurgeons was handling an extremely large number of spinal surgeries. These were situations that differed significantly from Japan.

Our second training facility was St. Josef-Stift, a hospital located in Sendenhorst specializing in orthopedic surgery, spine surgery, and rheumatoid arthritis surgery. Sendenhorst is a small local town in the northwestern part of Germany with a population of only about 10,000 people. The town's only large buildings are a church and a hospital. Still, patients from all over Germany reportedly come here to receive surgery. An extremely large number of surgeries of the spine, joints and rheumatoid arthritis hands were being performed simultaneously. Here, we were welcomed by Dr. Bause (a specialist of joints), Dr. Platte (rheumatoid arthritis surgery), and Dr. Brinkmann (spine). In Germany, rheumatoid arthritis surgery has become independent as the sub-specialty of orthopedic surgery. This, and the fact that rheumatoid arthritis surgeons were in charge of performing surgery on the limb joints and hands of patients with rheumatoid arthritis-related diseases, were points that greatly differed from Japan. Regarding spine surgery, we observed modified Love's method being performed under the microscope for lumbar disc herniation; partial laminectomy; and anterior cervical discectomy and fusion (ACDF), etc. We also observed several posterior lumbar interbody fusion (PLIF). German patients, who are of a large build, have especially large lumbar spinous processes, and perhaps because of this, it appeared that their paraspinal muscles have developed significantly as well. There were scenes that we found somewhat questionable, such as surgeons handling the soft tissues rather roughly, and performing almost no interbody bone grafts. Still, we

were relieved to see no major differences in terms of basic indications and surgical techniques, etc.

Our third training facility was Katholisches Klinikum, a hospital located in Koblenz, focusing on orthopedic surgery and spine surgery. The city of Koblenz is called the “horn of Germany” where the Rhine River meets with the Mosel River, and is famous as the producer of one of German’s finest wines. In this hospital also, an extremely large number of surgeries were being performed. Here, we were welcomed by Dr. Hauschild (joints) and Dr. Kilian (spine). Regarding spine surgery, we observed PLIF, posterior vertebral column resection (VCR), and post-PLIF revision cases. Of the three training facilities we visited this time, this hospital showed us the toughest cases. We were able to hold discussions during surgery about indications and surgical techniques which were very meaningful. It so happened, moreover, that Dr. Junichi Murakami was currently being dispatched from Kyoto to study at this hospital as the clinical fellow of the spine. I spend with Dr. Murakami last summer when we took the one-week surgical training course in the US. Having had no prior information this time, we were both extremely surprised with this chance reunion. At the same time, we shared meals with other accompanying members and spent an enjoyable time together, although this was only for a brief period.

Lastly, we were allowed to tour the head office of Aesculap, Inc. which is based in Tuttlingen. Despite being a small rural town, Tuttlingen is home to several hundred medical-related companies. As the “head temple,” Aesculap’s huge building stands in front of the central station. Here, we observed a factory that manufactures surgical machinery, and a plant that manufactures orthopedic implants. Each of the so-called “hard accessories,” in particular, such as forceps, scissors for microsurgical use, was being made extremely meticulously by hand by the several hundred or so specialized artisans inside a large factory. We were extremely moved to learn this. We have known all along that Aesculap’s hard accessories cost more than other products, but we understood very well why this was so.

We enjoyed the weekends, seeing various places as tourists during our move to the next training facility. On our first weekend, we watched a Bundesliga soccer match in Hamburg (Hamburg versus Stuttgart). Currently, three Japanese play in the two teams combined. We were extremely lucky to see all three play the full game. Along with feverish German supporters, I was touched by seeing Japanese athletes playing their best as members of an overseas team. On our second weekend, we decided to travel to Brussels. This turned out to be an extremely fun tour, and we enjoyed the Belgian kingdom’s glamorous and fashionable atmosphere that was completely different from Germany. However, close to two weeks after leaving Japan, we could not help missing Japanese food. Something I remember the most from this training program may have been the “drinking party” we had at the resident home we stayed at in Sendenhorst, savoring the *udon* noodles that Dr. Ishibashi brought over to us, and the boil-in-a-bag curry and cooked rice that Dr. Hayama had brought.

I would like to thank Professor Masashi Yamazaki for giving me such a valuable opportunity to undergo training overseas, as well as members of the German-Japanese Society for Orthopaedics and Trauma secretariat, the people at Aesculap who have helped us at the local site in all sorts of ways, the staff at the spine group who had taken care of my postsurgical patients while I was away, the senior residents, physicians at hospitals where I work on outside duty, and, last but not the least, my wife who always takes such wonderful care of my household, along with my three young daughters. I strongly hope to make use of the things I’ve learned in Germany on my daily clinical practice.



Photo 1: In front of the Rostock University Hospital



Photo 2: At Sendenhorst; a dinner party with Dr. Bause, Dr. Platte, and Dr. Gunes (spinal fellow)

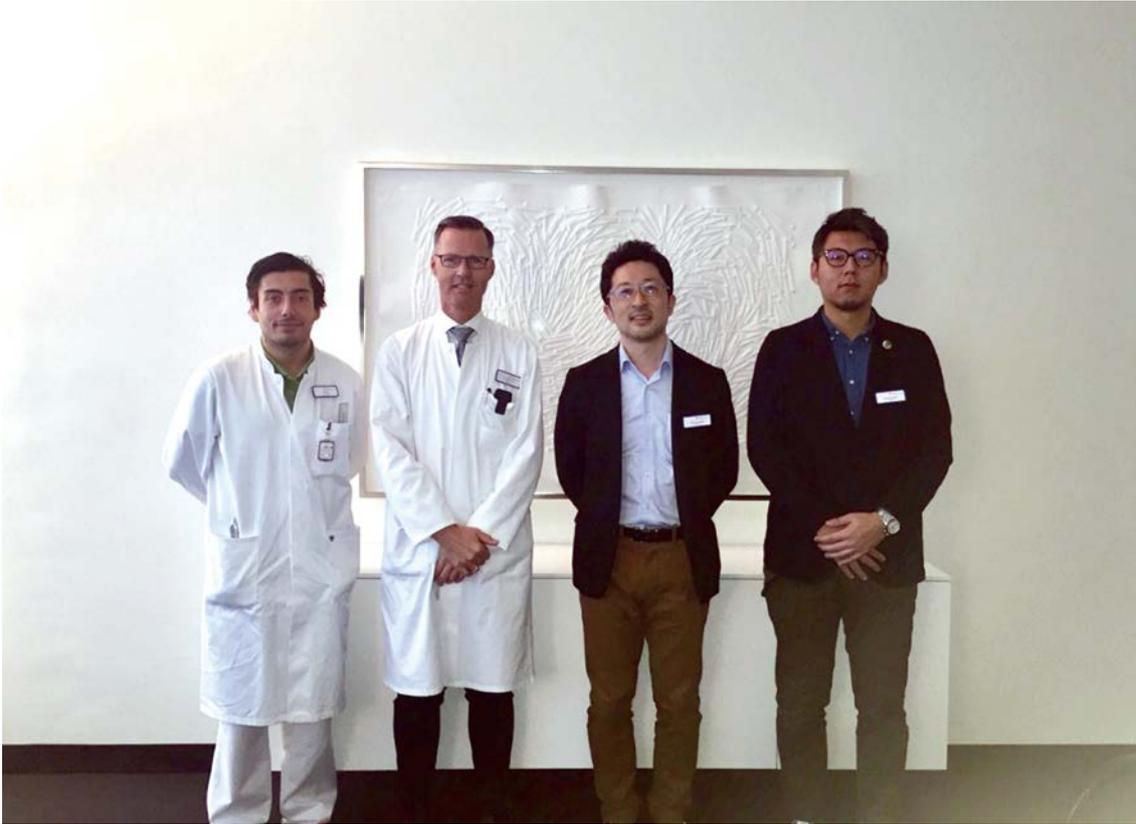


Photo 3: With Dr. Brinkmann (second from the left), at St. Josef-Stift in Sendenhorst



Photo 4: With Dr. Kilian (second from the right) and Dr. Junichi Murakami who is currently studying in Germany (far left) at Katholisches Klinikum in Koblenz

German-Japanese Society for Orthopaedics and Trauma Traveling Fellowship 2017 report

Shugo Maeda, Aomori Rosai Hospital

[Introduction]

This is a report based on the study tour I participated in, as a German-Japanese Society for Orthopaedics and Trauma traveling fellow, to visit hospitals in Germany between October 25 and November 19, 2017. The German-Japanese Society has a long-standing history and is celebrating its 40th anniversary this year. The fellowship program started in 1997, and since then, a total of 21 young doctors have visited different institutions in Germany in 10 years since 2009. While the program was unfortunately suspended temporarily, it was resumed in 2016. This year, four doctors including myself visited three institutions in Germany. The spine group and orthopedic group consisted of two people each. Dr. Toru Funayama from the University of Tsukuba and Dr. Hiroshi Hayama from Osaka Medical College were assigned to the spine group, while Dr. Yukinao Ishibashi (hip surgeon) from Kurume University Medical Center and I were assigned to the orthopedic group. In the fellowship program, we visited the same institutions in two separate groups.

[The 19th German-Japanese Society for Orthopaedics and Trauma Conference]

We departed from Haneda on October 25, and arrived, via Munich, in Berlin where the conference was to be held. Berlin is the largest and most well-known city in Germany (population 3.52 million). It was divided into the east and west by the Berlin Wall in 1961. In 1989, the Berlin Wall collapsed resulting in the unification of East and West Germany in 1990. Berlin, then, became the capital of Germany. Berlin is an attractive city with a range of tourist sites such as the Brandenburg Gate, the Reichstag building, and museums and churches. A total of 13 doctors including traveling fellows from nine institutions participated in this conference. Japanese and German doctors joined the welcome dinner held a day before the conference at a restaurant serving German cuisine. On October 27, the 19th German-Japanese Orthopedic Society Conference was held at Messe Berlin. On the last day of the conference, a discussion was held in a small room at the venue. A knee & hip session and spine & rehabilitation session were held for a frank exchange of opinions on 12 topics. I made a presentation titled “Accuracy of tibial tunnel placement during double-bundle anterior cruciate ligament reconstruction using the PL divergence guide” on the accuracy evaluation of the PL divergence guide ® (Arthrex, Inc.) used for creating posterolateral bundles and tibial tunnels in ACL reconstruction. An official dinner was held in the evening at a restaurant in the Reichstag building and we enjoyed the historical building, wine, and food. Hospital visits were scheduled for the following week, and the weekend was used as free time for sightseeing. Germany is known for the Bundesliga, to which many Japanese soccer players belong. There was a match between Hertha Berlin, of which Genki Haraguchi is a member, and Hamburger SV, of which Gotoku Sakai and Tatsuya Ito are members. I took this opportunity to watch my first soccer match with the other fellows and doctors who attended the conference and I enjoyed it.

【A visit to the University of Rostock】

The first institution we visited was the University of Rostock. Rostock is a harbor city located approximately 230 km north of Berlin with a population of 200,000. We had originally planned to take the train. However, fallen trees due to poor weather conditions over the weekend had blocked the

railroad tracks and the trains were completely non-functional. We negotiated with a taxi driver and took a taxi to University of Rostock at €100 per person as we could not delay the hospital visit. We got caught in a traffic jam but managed to reach the university. We observed operations performed by Professor Mittelmeier (prosthetic joints), Professor Tischer (sports orthopedics, arthroscopy), and Associate Professor Ellenrieder (artificial joint) at the university. We joined the staff meetings at 7:20 in the morning, at 7:30, we checked the images of the patients that were scheduled for surgery on that day, and entered the operation room by 8:00. Although our time at the University of Rostock was short, we were given the opportunity to observe many surgical procedures, mostly TKA and THA. Hip arthroscopy for FAI, a procedure I had never actually seen in Japan, was a very interesting procedure. In Germany, there is a room separate from the operating room where the patient is anesthetized. The patient is already under anesthesia by the time he/she enters the operating room. This makes the transition to the next operation smooth, as instructions for anesthesia induction for the next operation would have been given before the ongoing operation would have ended. We were also given the opportunity to observe Professor Tischer's outpatient practice. The patients would enter three separate rooms where a professor would later come in for consultation to determine the treatment course after a young doctor had conducted a medical interview and consultation. A visit to the laboratory was organized on the final day. Various studies including experiments on the implant surface and biological and biomechanics research were being conducted there. We received generous hospitality from Professor Mittelmeier who not only organized a visit to the hospital and laboratory but also arranged for a city tour and walks to scenic sites. We were most pleasantly surprised that he showed us around the scenic sites (churches and the beach) together with his wife and treated us to his wife's apple cake and coffee at his house at the end of the tour.

[A visit to St. Josef-Stift Hospital (Sendenhorst)]

The second institution we visited was St. Josef-Stift Hospital in Sendenhorst. Sendenhorst is a small town, which is not listed in the "Globe-Trotter Travel Guide Book," an essential guidebook for overseas travel, with a population of approximately 13 thousand. It is located in the northwest of Germany. We arrived in Sendenhorst via Hamburg and Münster. St. Josef Stift Hospital is one of the few rheumatism centers in Germany where patients with rheumatic diseases visit from all over the country. The orthopedic group observed operations performed by Dr. Bause, who is the head of the rheumatoid orthopedic surgery department, and Dr. Platte, who specialized in lower limb joint surgery. In the hospital, there was a room where prostheses were made, a pediatric ward, a rehabilitation ward, and a park, in addition to the outpatient department, rehabilitation room, and hospital wards that we see in Japan. We saw hospitalized children moving around the hospital on bicycles in order to reduce the load on the joints. It left an impression on me when I visited the hospital. As we had expected, the majority of the operations were for RA, and THA with patient-matched implants (acetabular cups) modeled on preoperative CT images that were being performed on RA cases with severe pelvic deficiency. In a TKA for severe cases of genu valgum with femoral deficiency, a normal TKA was prepared for some reason, but they switched to the hinge type during the operation to deal with the considerable lateral instability. The nurses were well-trained and were able to flexibly respond to sudden changes in the instruments. They assisted in the smooth running of the surgery. In the hospitals that I have worked in so far, a representative of the manufacturer would be present in most instances to instruct the nurses about the order of the instruments. However, we never saw representatives of manufacturers in any of the hospitals in

Germany. A range of implants made by different manufacturers used in TKA and THA were stored in a separate room, and a circulating nurse would come to this room to collect the instrument once the model and size were decided. We stayed in the resident home on the hospital premises, which was sufficiently equipped with beds, refrigerators (most German hotels do not have refrigerators), dishes, electric stoves, and so on. There were shared washing machines and dryers that could be used with purchased tokens. Sendenhorst is a small town with very few places to eat, and we would go to the supermarket to buy food, beer, and wine for a drinking party in Dr. Ishibashi's (Kurume University) room. I believe the alcohol consumption was the highest during this period.

[A visit to Katholisches Klinikum Brüderkrankenhaus Hospital (Koblenz)]

The last institution that we visited was Katholisches Klinikum Brüderkrankenhaus Hospital in Koblenz. Koblenz, an important area in European water transport where the Rhine and Moselle meet, has a population of approximately 110 thousand. It has been an important area from a military point of view since early times, and a fortress was built around the city. It is a city where a large number of tourists visit in the summer. Deutsches Eck, where the two rivers meet, and the Ehrenbreitstein Fortress can be seen from here. It is located approximately 250 km south of Sendenhorst. The operations in this hospital were smoothly performed under the guidance of Dr. Kilian who specializes in spines, Dr. Haunschild who specializes in prostheses, and Dr. Holsten who specializes in sports orthopedics. Images were shown in the morning (7:15 onwards on the day we joined), which is also the case in Japan, and images of the operations performed on the previous days and of patients that visited the outpatient department were streamed quickly. The conversation was of course in German but I was able to tell from the photos that a variety of cases ranging from distal radius fractures, proximal femur fractures, post-THA/TKA, post-TKA, postoperative infection after TKA, loosening of THA to large bone loss in the proximal femur due to infection in the proximal femur (?) were being discussed. Similar to other institutions, surgery started at 8 am. In this hospital, there were three operating tables in one operating room, and we saw three orthopedic operations being performed simultaneously in one room. The rooms were equipped with all the instruments and supplies necessary for surgery. Similar to the hospitals we visited prior to this one, the patient was brought into the room after he/she had undergone anesthesia induction, position change, preliminary disinfection, and so on, making the switching smooth. The orthopedic group observed operations performed by Dr. Haunschild. Like other hospitals, tourniquets were not used during TKA in this hospital. It appears that most doctors in Germany keep the use of tourniquets to a minimum to avoid the pain. Tourniquets are only used during implant installation in this institution. Continuous intraarticular injection of anesthesia was performed as a countermeasure against post-TKA pain. We were told that the patients thus feel little pain and are able to stand upright by the evening of the day of the operation, and are discharged within a few days.

At the end of the traveling fellowship program, a review meeting was held at the headquarters of Aesculap, the sponsoring company for this year's program. The four doctors that participated in this program discussed details about the traveling fellowship program for the following years including training at each institution with the person in charge of the traveling fellowship program at Aesculap. In this year's program, we were able to join operations at all three hospitals and have a discussion with the doctors (we scrubbed in on more than 10 operations at three hospitals). Also, we had the opportunity to speak with not only the top-ranking doctors of each institution but also young doctors at dinner. Through hospital visits, surgery observations, and dinners I was able to

objectively understand the difference between Japanese and German medical care, and where Japan stands today. I have learned a great deal. I would like to express my sincere gratitude to Professor Shiba, Professor Scholz and the doctors in charge at the German-Japanese Orthopedic Society, those at the management office, and Aesculap, the sponsoring company, for giving me this opportunity. Professor Ishibashi and Dr. Aburagawa at Aomori Rosai Hospital for allowing me to participate in the program, and doctors of the laboratory for covering for me while I was away. I am determined to put in extra effort to apply this unique experience to great use for future medical practice and research. Finally, I sincerely hope that young doctors (the maximum age limit for the program is 43) who are members of the German-Japanese Society for Orthopaedics and Trauma, apply and join this program, so that they may gain something more than what I experienced.



After the 19th German-Japanese Society for Orthopaedics and Trauma Conference



Discussion with Professor Mittelmeier in between operations (Rostock)



Dinner with Dr. Haunschild (Koblenz)

2017 German-Japanese Society for Orthopaedics and Trauma (GJSOT) – Fellowship diary

**Department of Orthopedic Surgery, Kurume University Medical Center
Yukinao Ishibashi**

10/25: We traveled from Fukuoka to Haneda, then to Munich and to Berlin. As I looked out on the countryside lit by the evening sun from the plane window over Munich, I felt intense excitement. The sight was somewhat familiar, since I was fortunate enough to come to Berlin for a Japan-Germany conference in my graduate school years. I introduced myself to the doctors, professors, and surgeons taking part in the conference during dinner in a restaurant next to my hotel with the other fellows. All of them seemed nice; I was relieved.

10/26: Tonight was the conference's reception, where I met a lively and cheerful German professor for the first time. He came over to our seats after a little while and initiated a conversation in a loud voice. That was how I met Professor Mittelmeier of the University of Rostock.

10/27: The German-Japanese Society for Orthopaedics and Trauma (GJSOT) conference was held as a part of the General Meeting of the German Society for Orthopedics and Orthopedic Surgery. The venue was huge. The session began with a greeting from Professor Yamazaki of Tsukuba University, the Chairman of the Japanese Orthopedic Association. Eventually, it was my turn to present our study entitled "Experiment of two cases of corrective osteotomy for slipped capital femoral epiphysis." My English was poor, but I was happy to receive a few questions from the attendees.

10/29: Today, we moved from Berlin to Rostock. The train was not running owing to a technical problem. In the end, we had to take a large taxi, crammed with luggage and passengers, for the 200-km trip. This port city is so atmospheric; now, I really feel like I'm overseas! After dinner, I went to bed, simultaneously hopeful and anxious about the fellowship starting tomorrow.

10/30: We arrived at the University of Rostock at 7:15 AM. The hospital departments seemed to be in different buildings. The orthopedic surgery was split, too, so fellows in the joint group and spine and trauma groups went to different departments and buildings. Both departments are managed by Doctors Mittelmeier. Despite having the same surname spelling, they were completely different people (apparently, the names are pronounced slightly differently). In the morning, We took part in the conference. Afterwards, I followed Dr. Mittelmeier, while Dr. Maeda followed a knee specialist. First, we went to his office, where he talked about the historical images decorating the room. His office was beautiful, like something out of a foreign drama. The first surgery of the day was on a patient who complained of pain following a THR. An angioma-like mass was removed from the surgical site. The second was a TKA. The third was a nerve resection in the lower leg (?) to relieve pain lateral to the patella positive for Tinel's sign, which appeared after TKA. The fourth was on a 60-year-old man with femoral head necrosis and FAI. Under hip arthroscopy, debris was removed from osseous bumps in the region, and cancellous bone was then harvested from the ilium and grafted on the femoral head (i.e., the OATS procedure). It was my first time seeing a surgery with

hip arthroscopy. I learned a lot, thanks to Dr. Mittelmeier's patience and kindness.

We had lunch between the second and third surgeries. Dr. Mittelmeier treated us to pizza. He cut the pizza himself, portioned it on our plate, and got us some coffee, too. I keenly felt that the professor took care of everyone and that his team was a good one.

The next day (10/31) was a public holiday; in the afternoon, Dr. Mittelmeier and his wife took us by car to a famous church and beach. Afterwards, he even invited us into his home and treated us to some coffee, his wife's homemade cake, and even a glass of alcohol. He even gave me a traditional Alpine hat when we left, which now decorates my home.

11/1: Today, I have observed four cases: talipes equinovarus in a child, THR, knee PVNS, and another THR. The two THR cases experienced ION and primary OA, respectively, and were treated using a modified Jones-Watson approach. Both patients were big, relatively young males, characteristics which I thought would complicate the operation, but Dr. Mittelmeier skillfully retracted the muscles using a sharp, curved hook. The cup size was about 60 mm, a size you never really see in Japan. Apparently, he uses ceramic-on-ceramic bearings in THRs as a general rule, which could have been related to the fact that his father, the senior Dr. Mittelmeier, had pioneered their development. When I asked at lunchtime, he said he tends to choose a polyethylene implant when the cup size is 60 mm or bigger to accommodate the active lifestyle of Germans. He said the first choice should be a ball head of 36 mm. He inserted the implant after checking the size and position of the femoral head on X-ray images.

At our hospital, we primarily do THRs through the posterior approach. I was fortunate to see a Jones-Watson approach once before at a surgery observation in Osaka; but this time seemed fresh and new, since it was performed when the patient was completely in the supine position.

11/2: Today, I have observed two THAs and a popliteal cyst excision. Afterwards, a doctor around my age and the trauma department chief took me by car to a famous spot on the beach, and we had dinner together. They spoke in English slowly and patiently translated the German menu. We had a lively conversation, energized by the similarities in our work and family situations. I truly hope they can come to a Japan-Germany conference in Japan someday.

11/3: Today was my final day at the University of Rostock. The plan was to observe a THR, a hip arthroscopy for FAI, a TKA, and then another THR.

I was allowed to wash my hands and take part in the TKA and THR. The femoral head that came out after the osteotomy was huge! Dr. Mittelmeier again told me about the surgical approach and points to watch out for. Finally, we said goodbye, hoping to see each other again next year in Hirosaki. This ended my training at the University of Rostock. I will never forget Dr. Mittelmeier.

11/6: Today, we moved to the town of Sendenhorst. I learned that around 2000 surgeries are performed at St. Joseph-Stift Sendenhorst every year. The hospital included a rheumatoid arthritis center, which also deals with juvenile RA, so there were a lot of children who appeared to be patients. It has a close relationship with Japanese centers for rheumatoid arthritis and apparently runs a similar fellowship to our own here with Japanese trainees. Tonight, we had dinner with Professor Bauze, Dr. Platte (the training director), and a few spinal specialists. Professor Bauze is a kind man with a superb smile. Dr. Platte apparently has been to Japan several times previously for

arthritis-related conferences; he had done sightseeing in Fukuoka, Hiroshima, Kyoto, and Tokyo.

11/7: The surgery center included a preoperative anesthesia room, an equipment sanitation room, and an operating room. Staff moved in and around the rooms fluidly. I observed two THR surgeries with Professor Bauze: one with femoral head necrosis and the other with anteroposterior wall damage to the acetabulum. I was allowed to wash my hands and take part in both surgeries. I washed my hands with soap, wiped them dry with paper, and disinfected them with alcohol three times, the same as that at the University of Rostock. Upon entering the operating room, I noticed the sun's rays shining brilliantly into the room through a window that took up about half the wall. Professor Bauze called this "operating room sunshine." He used the direct lateral approach in both cases. The first patient had avascular necrosis of the femoral head. He needed a big implant because of his weight (110 kg). I'm starting to get used to seeing them. The second case had acetabular wall damage due to RA. The doctors created a 3D model of the hip joint before the operation and prepared a bone graft based on it (BIOMET Inc.). A blood salvaging/transfusion system was also set up. The entire defect was coated with giant osteophytes, like the lid of a pot. We scraped all of them off, treated the soft tissue underneath, and inserted the augmentation graft. The bone tissue obtained from the hospital's bone bank system was then transplanted around the implant, and the whole augmentation was fixed securely using a screw. The whole augmentation—about the length of the screw—had been prepared using a 3D model. The surgery made me really want to try and use 3D models for surgeries back home. After the operation, Professor Bauze said, "He'll be able to start running again tonight!"

Afterwards, they gave me a tour of the hospital. They said they felt a duty to give 110% of their efforts to their patients during their treatment from start to finish. The facilities certainly gave that impression; they showed us a rehabilitation room and a big room I thought was probably for occupational therapy. In another room, numerous staff were making a variety of customized orthotics and instruments. There were also a church, relaxation room, and freezing coagulation room. They had a classroom, since some pediatric patients need to be hospitalized for long periods. For those children who need to avoid putting weight on their legs, hips, etc., they even had bicycles where they could move around in the hospital to avoid boredom. I was impressed at how well organized their process was when a patient was switched from a pediatric to an adult specialist, involving face-to-face interviews between doctors and a kind of 'shift-changing' procedure. There was even a logistical support center for elderly patients. The tour showed me that this hospital was an excellent one that could handle patients of all ages.

Before we returned to the resident home (dormitory), we went to a nearby supermarket to pick up supplies for our first attempt at cooking for ourselves, a challenge we had decided on a little while ago. We made salad and udon. It was a fun night; we recalled the surgeries at Rostock, our sightseeing, and our impressions of the first day. We compared notes about patients who had caught our attention and about diagnoses of body parts with overlapping symptoms seen by members of the spine group and the joint group. I learned a lot from sharing information with the other fellows.

11/8: Today, I have observed two THRs performed using the OCM technique in the lateral decubitus position and one revision THR. Whenever the surgeon for the first case called for a time out, he had everyone in the room—doctors, nurses, and fellows—do squats. Somehow, he seemed like an immaculate person, and his operation was also tidy and clean. It was a fun surgery; while explaining the OCM procedure and points to watch out for, he occasionally burst out whistling along with the

music playing in the background.

On the last day, I was allowed to take part in two THR operations using the OCM approach. I was starting to understand the doctor's English better, and he taught me how to deal with the blood vessels after the muscle was split (upward and downward, one fiber at a time, opening up the incision and coagulating the vessels tidily). The surgeon asked for my opinion on the selection of the final ball size for the femoral neck. It seemed a little loose, so I recommended the next size up. He took my advice, which pleased me a little. The second patient was about as big as an old Japanese lady; I felt a little nostalgic for home.

Professor Bauze told me he would like to go to the Japan-Germany conference in Hirosaki. The hospital was so wonderful and accommodating to all its orthopedic surgery patients, from children with arthritis to elderly undergoing rehabilitation (although they did not treat tumors there). I felt a little bit sad when I parted with Professor Bauze in the operating room. I really hope to see him again.

11/13: I arrived at Koblenz today. The hospital was rather close to the train station. After sorting out my luggage, I went off to see Deutsches Eck. This confluence of two large rivers was a magnificent sight. We had an enjoyable banquet in the evening with Dr. Hauschild, a joint specialist. This fellowship has made me appreciate just how smooth and good a system it is, since you get to meet the doctors the day before starting the training.

11/14: We had a meeting in the morning. When we went to the operating suite, it was the same procedure as in the other hospitals: enter through the service door, go to the anesthesia induction room, get the patient in position there, and then transport them to the operating theater. What was different here is that we briefly disinfected ourselves with iodine spray before getting patients into position. The operating suite's set-up was unique: it was a large room divided into three areas and surrounded by glass walls and curtains. We just washed our hands with ethanol, not under water. There were two cases today: a case of lateral pain after a THR (greater trochanter area) and a case needing a THR using the OCM technique in the lateral decubitus position.

We wondered what the issue could be, since there was no infection or apparent problem with the implant. When Dr. Hauschild asked the patient what situations or movements caused the pain consistently, he just answered, "Every time." The surgery then began. There were no signs of bursitis, and his synovial fluid appeared normal. I recommended we test his synovial fluid, so they sent some for testing. We made observations of different parts of the region for a while. Dr. Hauschild speculated that the patient had a partial rupture of the gluteus medius attachment to the greater trochanter, so we fixed the muscle with two anchors. He said they sometimes see this condition when a patient complains of lateral hip pain of an unknown cause.

The second patient's bone was frail, so we ended up using cement together with a cup stem. Dr. Hauschild said they don't use cement in over 90% of THRs, but they do in cases of frail bones. The cement technique was the most similar method to the ones we do in Japan I'd seen so far. Dr. Hauschild was very candid and well spoken, somehow similar to Dr. Mittelmeier.

We had dinner that night with Dr. Murakami, who is about my age and had been studying at the hospital here. He told us he was glad to be able to have a conversation in Japanese for the first time in a long time. His internship was planned to run from April to December; he had 1 month left. Before returning to my lodging, I gave him some food, medicine, compresses, and hot packs.

On the next day (11/15), I observed a THR with a different surgeon using a direct lateral approach.

Previously, I had seen Professor Higuchi use a Charnley retractor to apply weight to keep the surgical incision open, but I was surprised at the big, long chain they used here. It was a stirring operation. Between the two surgeries, we were allowed to observe a spinal revision performed by Dr. Kerrigan from outside the theater.

11/16: We moved to Tutulingen today. On the next day, we did a tour of the Aesculap factory building and were shown the manufacturing process for surgical tools, such as scissors and KAIRison spinal punches. The workers prepared the different instruments piece by piece in different teams with great care. I made a mental note to use our own Aesculap instruments with great care. The tour ended by showing us the manufacturing process for cup stems, and we got to see where they did the plasma coating.

After lunch, we had a final meeting with company personnel. It started with a discussion of the Japan-Germany conference, then four of us did a presentation about our three hospitals. The company had questions about differences between Germany and Japan and how they could improve the program. We mentioned the different indications for operations in the two countries and having a separate room for anesthesia in Germany. We shared our own opinions as well, making suggestions about the dormitories, having a consistent number of cases of different surgeries, and maybe having days in outpatient settings or touring laboratories, not only surgery observation days. I hoped our opinions would be useful for next year. Nonetheless, I felt that a great number of Aesculap staff had done their utmost for us during our visit, and I was deeply moved. I am deeply grateful to Aesculap for taking care of us during our time in Germany.

11/18: Today was the trip home. Looking back, this past month flew by. I feel the fellowship was truly valuable, allowing me to meet lots of doctors and professors and to connect with Germany's people, history, and culture. I am deeply grateful to Dr. Okawa, Dr. Kume, and the other doctors who took care of things at the hospital in my absence. I would love to stay involved in Japan-Germany exchange and friendship activities as they continue in the future.



Professor Mittelmeier's office in Rostock University Hospital



Morning Conference



Lunch room



Laboratory tour in Rostock University Hospital



Festung Ehrenbreitstein in Koblenz



Speicherstadt in Hamburg



St. Josef Stift Hospital in Sendenhorst



Professor Bause in St. Josef Stift Hospital



Professor Bause and Dr Maeda



Professor Kilian and Dr Hayama at operation room



Professor Haunschild in Katholisches Klinikum Koblenz



Morning Conference



Professor Kilian and Dr Funayama at operation room



Professor Haunschild at operation room



Professor Kilian at operation room



Final meeting in Tuttlingen

Experiences for German-Japanese Society for Orthopaedics and Trauma Fellowship Program

Sachio Hayama
Department of orthopaedic Surgery
Osaka Medical College, Osaka

This time, I participated in the fellowship program sponsored by the German-Japanese Society for Orthopaedics and Trauma. This program consisted of two from the orthopaedic surgery team and two from the spinal surgery team, for a total of four members, and I trained as a member of the spinal surgery team. Also, this time, prior to the fellowship program, the 19th German-Japan orthopedic society meeting was held in Berlin in conjunction with the DKOU, and I also presented there. I departed from Itami Airport on 10/25 and arrived in Berlin, via Haneda and Munich, on the night of 10/25. The next day was an adjustment day, and I spent time sightseeing in Berlin with doctors scheduled to participate in the academic conference and the fellow program.

10/27 was a day for academic conference presentations. A total of seven Japanese individuals had presented in fluent English. I also presented in poor English, and I somehow managed to respond to the questions. That evening, a general reception was held at a restaurant in the German Parliament House. We interacted and had a pleasant time drinking with other doctors that participated in the conference. The next day, I watched a match between Japanese players in the Bundesliga. There was another event this evening. Professor Neo was planning to listen to the Berlin Philharmonic, but due to a conflict in his schedule and being unable to attend, I was given two tickets. For that reason, I attended, accompanied by fellow Dr. Ishibashi of the Kurume University Medical Center. The reserved seats were splendid as we sat close to the performers so that our eyes would almost meet. A few hours after hearing angry roars of Germans from the football stadium, we listened to the world's best orchestra concert. It was a very exciting day as I was able to experience in person a completely different culture.

So, as this is almost turning into simply a travel journal of a trip to Berlin, I will return to the main subject. After warming up in Berlin, the three weeks fellowship program started from here. There was a total of four fellow members consisting of Dr. Maeda of the Aomori Rosai Hospital and Dr. Ishibashi forming the orthopaedic surgery team, and Dr. Funayama of the University of Tsukuba and myself forming the spinal surgery team.

During 10/29 - 11/3, training was held at a university hospital in Rostock. The university is the hospital where Professor Mittelmeier, the representative of the 19th German-Japan orthopedic society meeting, was situated with the orthopaedic surgery team located in this professor's orthopaedic center. The spinal surgery team had participated in a program involving a tour of the surgical unit based in the trauma center under the guidance of Dr. Rotter. There, I had the opportunity to observe ALIF, which was one of the surgery cases I wanted to see. On the days off during training period, the professor and his wife took us out for sightseeing. After that, we were invited to their home where they gave me the biggest welcome ever, treated to his wife's homemade

apple pie. On another day, we had the opportunity to have dinner with Dr. Rotter and younger doctors. We spoke with doctors of the same generation and were able to spend meaningful time throughout the training period.

Since there were no surgeries planned on the weekend, and there was no training, we stayed in a neighboring tourist city. We stayed in Hamburg on the weekend after the training at Rostock. By chance, Bundesliga matches were held in Hamburg, and similarly to the previous week, we continued to visit the stadium again. Three Japanese players also participated in this game, and we were excited to see other Japanese people playing in such an environment, which was highly stimulating despite being in different professions.

On the second week, during 11/7-10, we attended training at the St. Josef Stift hospital in Sendenhorst, a small town near Munster with a population of around 10,000. The hospital is specialized in orthopedic and rheumatological surgery, and I was surprised to see that patients came from very small towns across the country. In the same hospital, we were trained under Professor Blinkmann of the spinal team. Surgery started from around 9 o'clock in the morning, and all surgery was completed by around 4 o'clock. During training at this facility, we stayed in onsite hospital dormitories. There were only few places to eat out in the small town, and it was also a time where Japanese food started to be missed, so we decided to cook for ourselves. We made udon, which I found and bought at a large supermarket in Rostock. We also made pre-packaged curry etc. which I brought over from Japan and we talked about various topics at dinner while drinking a lot. I felt that life at this resident's home was a beneficial few days to strengthen sense of unity within the fellow team.

After completing training at the second facility, we stayed in Cologne over the weekend. The Cologne carnival, one of the three largest carnival in Germany, started during our stay, and the city of Cologne was crowded with Germans enjoying costumes.

Then we headed towards the final training place, Koblenz, which is said to be Germany's oldest and most beautiful city. Koblenz was where the Rhine and the Moselle rivers met, and the city had spread around Deutsches Eck. There, the Catholic hospital was the third training facility. Dr. Kilian, the chief of the spinal surgery team, is a Japanese sympathizer who has been to Japan several times. I was very surprised by how quickly the operating room at the hospital was replaced. The operating room here has two anesthetic anterior chambers for each operating room, where anesthesia is administered in the anterior room and a surgical position is taken, and after the bed is carried into the operating room, surgery is performed. After surgery, the patient and the bed are taken out of the room, extubation is performed in the anterior room, and at that time the patient that was prepared in another anterior room, was set in the operating room. Here, in addition to general surgery such as PLIF and decompression, we also observed surgery with high degree of difficulty, such as VCR and re-operation after PLIF. Also, at the same hospital, we had dinner together with Dr. Junichi Murakami, an international student from the Kyoto Min-iren Chuo Hospital.

Thus, the program of 3 weeks ended, and after moving to Tuttlingen on 11/16, on the next day at the B-Braun Aesclup headquarters, a factory tour and program review meeting was conducted. After that, we moved to Zurich, where we all enjoyed our last dinner and headed home the next day.

Training at three hospital was also a valuable experience, but I was able to spend quality time days by encountering various cultures and people by interacting with German doctors and watching the Philharmonic, football, and sightseeing. It was a very stimulating four weeks, including the experience of living together with other university doctors for nearly a month and discussing about various things.

Finally, Professor Neo, who gave me the opportunity to participate in this program, the secretariats who prepared fulfilling programs, the doctors of each hospital who treated us kindly during our visits, the doctors who allowed me to take time off for 4 weeks, the three accompanying fellow doctors that gave us so much inspiration, and Mr. Miyazaki of B-Braun Aesclup who escorted us on the trip, I would like to take this opportunity to express my gratitude. Thank you very much.







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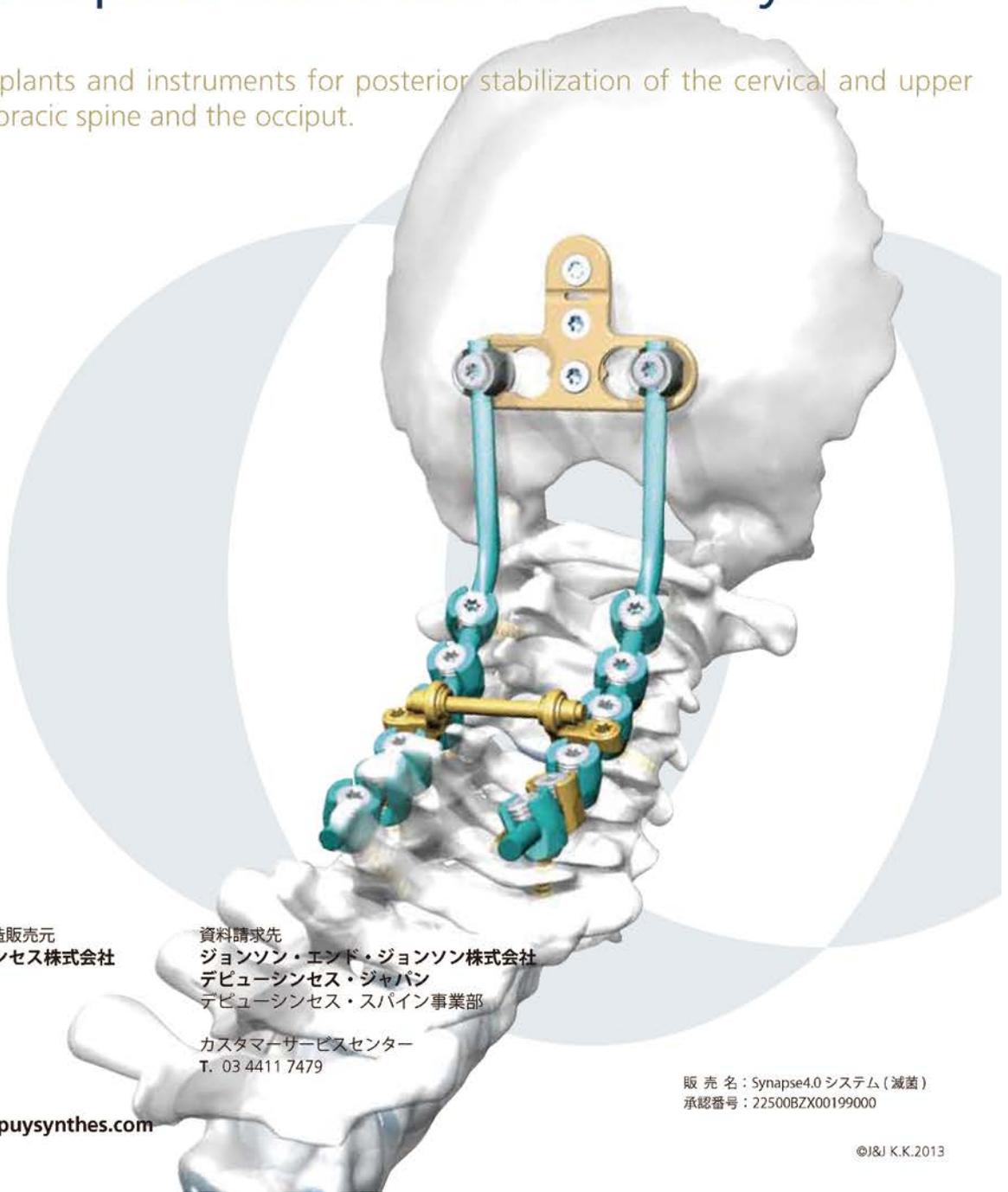
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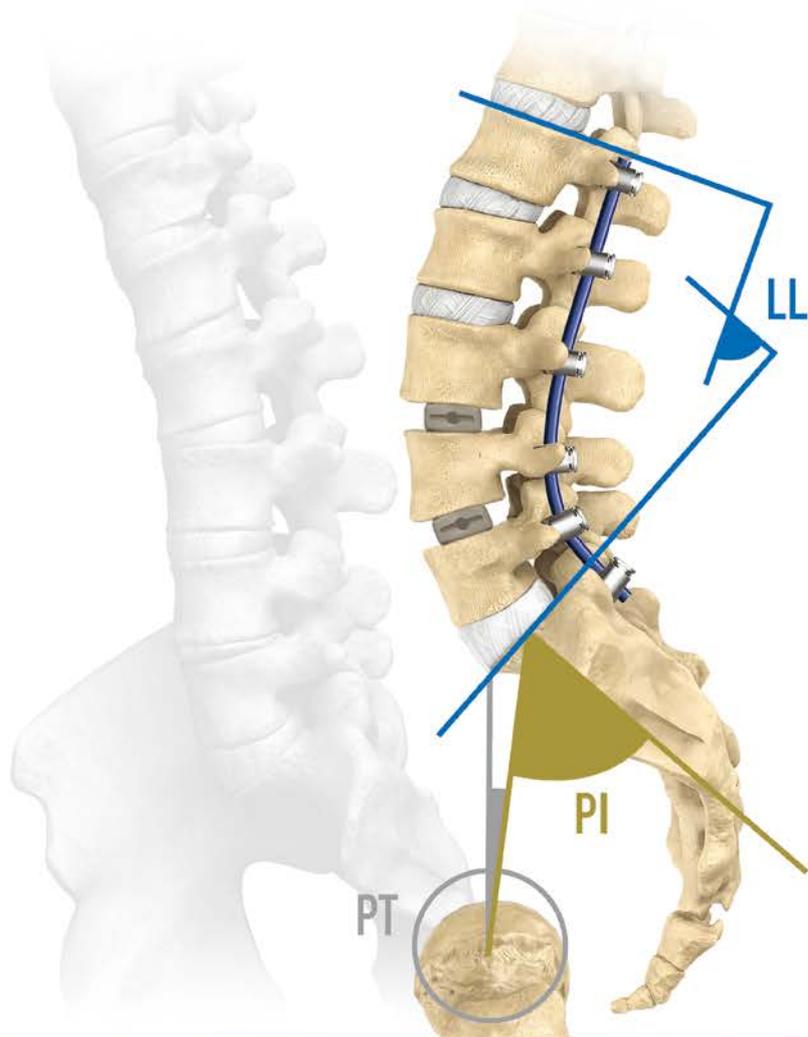
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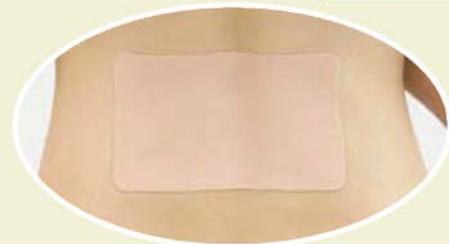
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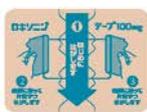


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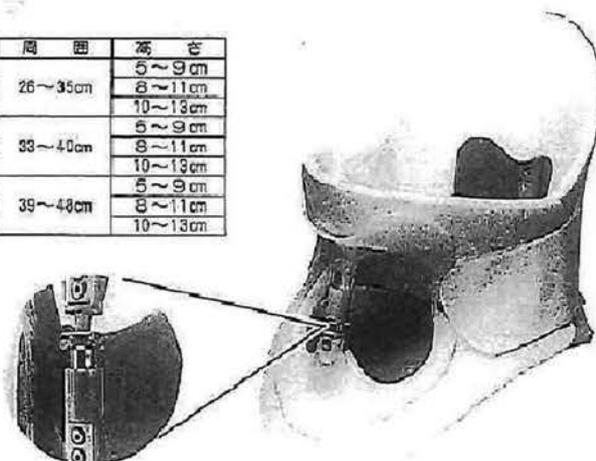
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- ① 前・後中央部のターンバックルにより、適応サイズに幅を持たせると同時に、若干の牽引効果が期待出来ます。
- ② 外殻フレームには丈夫なサブオルソレンを使用。長期使用にも形くずれなく頭部を支えます。
- ③ 内面にはプラスターソル発泡材を使用し、肌ざわりがソフトであります。
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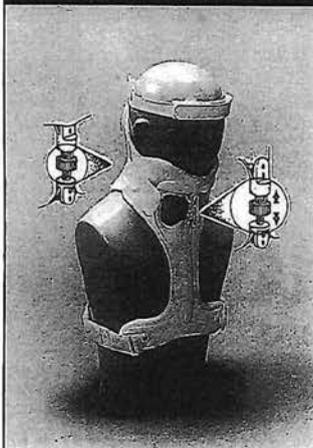
〈サイズ〉

サイズ	周 囲	高 び
S-S	26～35cm	5～9cm
S-N		8～11cm
S-H		10～13cm
M-S	33～40cm	5～9cm
M-N		8～11cm
M-H		10～13cm
L-S	39～48cm	5～9cm
L-N		8～11cm
L-H		10～13cm

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■ 広島営業所	〒733-0012	広島市西区中広町2丁目26番3号コーポ中広1F	TEL 082-297-5877	FAX 082-297-5810
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■ 愛媛営業所	〒790-0003	愛媛県松山市三番町7丁目7番2号	TEL 089-931-8333	FAX 089-931-8334
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■ 五島出張所	〒853-0007	長崎県五島市福江町6番地13平山ビル1階101号室	TEL 0959-75-0401	FAX 0959-75-0403
■ 日向出張所	〒883-0062	日向市大字日知屋4726番3の2コーソクビル1階D室	TEL 0982-50-3745	FAX 0982-50-3746

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