IBRA International Bone Research Association

# FLASH
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## Content

## Foreword

**Over a decade experience in continuous medical education**

Dear IBRA members, friends and colleagues

This year in September, the International Bone Research Association (IBRA) will be celebrating its 12-year anniversary. Since the beginning, we made it our mission to respond to the needs of participants by providing new course concepts and training formats. This has given us an opportunity to conduct many valuable discussions over recent years – in both a scientific and a social context, and we are very grateful for that. The standardization of training content and established training events was and still is very important for our Association. Our members, international training centers, course organizers and course instructors are constantly committed to implement both the content and the events consistently, and, of course, to improve them on an ongoing basis. For example, our training events are usually divided into a theoretical section and a practical section, as our objective is to use our courses to present current treatment concepts and the latest osteosynthetic treatment techniques in the most relevant manner for the target audience, and to stimulate personal exchange between colleagues. Innovative and unique course concepts – such as the Master Training courses, which have been developed in close collaboration with the University of Cologne – help us to achieve this while also providing perfect conditions for participants. With the specialized courses in Cologne, our established advanced courses and the basic courses, which we started running last year, we now have a comprehensive program structure, which we will expand into all IBRA segments in the future. And rather than stopping there, we are also getting involved in new areas. As an example, we are holding our first German-language "Advanced instructional course for foot and ankle surgery" in Basel on September 9 – 10, 2016 under the scientific direction of Prof. Dr. Dr. Victor Valderrabano.
These are just a few of the reasons for becoming a member of the IBRA.

José M. Vázquez
Executive Director
IBRA Administration Office

## IBRA Membership

Membership is open to professionals with an expressed interest in any facet of bone and soft tissue surgery of the musculoskeletal system.

An IBRA Membership entitles you to a variety of benefits:

- Prioritized Member Scholarship & Research Grants applications
- Considerably reduced course fees for members
- Favorite Member rates for all IBRA events & workshops
- Free participation to IBRA Scientific Seminars
- Worldwide Networking (Members and Training Centers)
- The first year of the IBRA Membership is free of charge

**How to apply for an IBRA Membership:**

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| Download the application form at www.ibra.ch/ Membership-Requirements | Send the completed application form and your CV to the IBRA Administration Office | The Board of Directors (BOD) reviews all applications at least once a year. | The IBRA Administration Office will inform the applicants accordingly. |

If you are interested in becoming an IBRA Member, the IBRA Administration Office will be delighted to support you.

→ www.ibra.ch

## Interview with IBRA President Prim. Dr. med. Wolfgang Hintringer

Prim. Dr. med. Wolfgang Hintringer
Specialist on Hand and Microsurgery
Private Clinikc Döbling
Heiligenstädtersrasse 46-48
AT-1190 Vienna

Phone +43 699 190 53 412
w@hintringer.at
www.hintringer.at

***You have been an IBRA Member for many years, actively participating as lecturer and moderator of numerous IBRA events all over the world. From your perspective, what are the main strengths of the IBRA?***

IBRA's core activity is the future-oriented advancement of bone-tissue research and management. Ideas and know-how from science and industry in the fields of research, development and education associated within the IBRA through networking and without interest in financial gain. This provides an excellent base of expertise for groundbreaking innovation.

***At the last IBRA General Assembly in July 2014, you were elected President of the IBRA for the term of 3 years. Which goals do you want to achieve?***

I intend to pursue the further improvement of our continuous educational program by the means of standardizing educational contents. The aim of the IBRA is to provide an international platform reaching across geographic and cultural borders, exchanging expertise and up-to-date knowledge

***You were one of the students of the famous late Professor Böhler from Vienna and you continue to support his philosophy and understanding of hand surgery. What is the main difference between Professor Böhler's understanding compared to other philosophies?***

Prof. Böhler was famous for his standardized approaches for certain indications. Young doctors need precise guidelines about what has to be done and when. Sticking to these parameters increases the quality of the outcome considerably.

***Together with Dr. Martin Leixnering and Dr. Christoph Pezzei, you are managing the very popular "Wiener Handkurse". What is your understanding of theoretical and practical training?***

We have been teaching the dogmas of Prof. Böhler since 40 years and had approximately 8000 doctors participating in our courses until now. These courses are being held and monitored according to standardized guidelines for surgery techniques and we are also using specifically produced educational videos showing the techniques on specimen hands.
Of course these experiences have an influence on the IBRA course concept and we are trying to implement our long established principles into the very similar organized IBRA courses.

***Former IBRA President Prof. H. Krimmer put a lot of emphasis on the development of the Education section as well as the IBRA Training Centers. What do you plan to focus on?***

One of the first ideas was to install an international Training Center in Vienna. This has been successfully done in November 2015. Since then, four scholars from the USA, Czech Republic, Switzerland and Japan have visited the Vienna Center. Together with Professor Krimmer, we are also planning to adapt the standards and further develop the successful international IBRA courses worldwide.

***What are your ideas to further improve scholarships for younger surgeons?***

Besides the courses, young professionals will also have the possibility – in appointed Training Centers – to look over the Masters's shoulders and to deepen their professional know how through scholarships.

*Prim. Dr. med. W. Hintringer, Prof. Dr. med. H. Krimmer and Prof. Dr. med. R. Giunta at the 2015 IBRA Basic Course in Frankfurt, Germany.*

***If colleagues ask you about the benefits of being an IBRA Member, what would you tell them?***

The IBRA offers colleagues of all educational levels the possibility to

constantly enlarge their professional knowledge at the highly professional symposia and thanks to the many valuable scientific discussions.

***Which significances do the worldwide IBRA symposia, courses and workshops have for members and participants?***

IBRA offers its members and participants of workshops and congresses the possibility to learn about new methods and to extend their professional knowledge. This not only at international courses, but at the many national educational courses that were and are organized locally in countries such as for example Oman, Brazil, Singapore, to name a few.

***You recently retired after 29 successful years as Primarius at the Landesklinikum Korneuburg, Austria. Will you miss the daily hospital routine? What are your plans for the future?***

Yes, a new stage in my life has begun. One of my favorite professional activities has always been teaching and I am therefore planning to enforce this in the future and put my knowledge at the disposal of young colleagues at workshops and courses.

***We know that you have various hobbies such as art, watches, surfing or a strong affinity for Apple products. Can you tell us a little bit more about this wide range of interests?***

I believe that everyone needs to have some distraction besides his professional life. When I am windsurfing, I can forget this world and I need this sometimes after stressful days or periods. Painting is also one of these hobbies that take you from reality into the spheres of different realities.

Watches have always fascinated me. They hold a good structured microcosm and as a surgeon, I sometimes interfere in such as well.
Repairing watches resembles a lot to microsurgery, but is a bit more sensitive.

Apple products, oh well, in my point of view, they are simply more esthetical and give you a better feeling when working with them, despite the fact that their shares are not what they used to be.

## IBRA Research & Education

- Level-oriented Medical Education Events
- Master Training Courses
- Practical Surgical Workshops
- National and International Congress Symposia
- Research Grants
- Scholarships

### IBRA Education Program


Recommended for head of departements and senior surgeons


Recommended for senior surgeons and physicians in private practice


Recommended for residents and physicians in training


(e.g. IBRA Satellite Symposia)

→ www.ibra.ch

## A Success Story from Cologne

Realistic Fracture Treatment — The New Course Concept in The IBRA Master Training Education

Prof. Dr. med. Lars P. Müller
University Hospital Cologne

PD Dr. med. Klaus Burkhart
Pforzheim

PD Dr. med. Kilian Wegman
University Hospital Cologne

Five years ago, trauma surgeons at the University Hospital Cologne joined forces with scientists at the Institute of Biomechanics and Orthopaedics at the German Sport University Cologne to investigate the mechanism of injury for the Essex-Lopresti lesion. Specifically for this purpose, a fracture simulator was developed, which enables cadaver arms to be clamped in a variable manner in order to reconstruct the mechanism of injury as accurately as possible. In addition to Essex-Lopresti lesions, simulation of all other elbow injuries was also possible. As the simulator was able to realistically reproduce not only the bone injuries, but also the concomitant ligament injuries, it seemed only natural that fracture simulation should be used for training purposes. The intention was to improve the training of trauma surgeons, which was currently taking place on either intact cadaver arms or on "sawed up" saw bones. Although intact cadaver arms can be used for surgical incision training, the osteosynthesis materials must then be attached to intact bones. Unrealistic fracture models produced with a saw are often provided for saw bones, but the surrounding soft tissue and concomitant injuries are missing. Therefore, neither scenario enables realistic fracture treatment. For this reason, plans were put in place to establish a course system in which it would be possible to practice on realistic fractures along with the concomitant ligament injuries on cadaver arms with the surrounding soft tissue intact.

While the first experiments were being performed on cadaver arms, which were dissected up to the capsular ligaments, fractures were therefore simulated on arms with intact surrounding soft tissue from that point on. Since 2012, courses have been regularly held at the University of Cologne during which all elbow injuries, from a simple fracture or ligament injury right through to complex combined injuries such as terrible triads, Monteggia-(like) lesions, Essex-Lopresti lesions and transolecranon fracture-dislocations, can be treated. Alongside the elbow courses, hand and wrist joint courses have now also been established. Working in small groups under the guidance of nationally and internationally renowned experts, the X-ray images and CT scans of the arm to be treated are first analyzed and a treatment strategy is determined. Each group then works together to treat the fracture. During the course, image converters are also available, as they would be during surgery. At the end, all fracture treatments are presented to the whole group by the instructors. Following the presentation of the fracture, the incision and choice of implant on the specimen, as well as the radio-logical result, are presented via a video screen. The interactive design of the course allows for positive debate of the cases, thereby ensuring that what the participants and instructors learn is not limited to the specific case that they are working on.

Pictures of the Brazilien IBRA Master Training Course „Realistic Treatment of Elbow Fractures", July 8 – 9, 2016 in Cologne - Germany

→ www.ibra.ch

## Interview with Prof. Dr. med. Dr. phil. Victor Valderrabano

Prof. Dr. med. Dr. phil.
Victor Valderrabano, MD PhD

Head of SWISS ORTHO CENTER and
Orthopaedic Department of the
Schmerzklinik Basel, Swiss Medical Network

SWISS ORTHO CENTER
Schmerzklinik Basel
Swiss Medical Network
Hirschgässlein 15
4010 Basel

Phone: +41 61 295 88 80
vvalderrabano@gsmn.ch
www.swissorthocenter.ch
www.ortho-valderrabano.ch

***Since June 2016, you are a member of the IBRA Board of Directors representing the new Limb-Segment „Foot and Ankle". Which objectives are on top of your list?***

First of all, I believe that it is important to promote this new segment "Foot and Ankle" within the IBRA. The Association's Members as well as specialists from all over the world will be imparted in-depth knowledge through new courses and resulting papers as well as other projects. The promotion through research in this new segment is also crucial.

***Why do you consider this segment to be so important?***

"Foot and Ankle" is a segment in orthopedics that is growing strongly. Leading surgeons from all over the world have a big impact in developing new surgical techniques and technologies through networking. IBRA can offer them an ideal platform as has been proven by the initial segments "Head" and "Limbs".

***Which position do sports injuries have within this new segment?***

Osteoarthritis, sports injuries or diabetic foot to name a few have increasing incidence in "Foot and Ankle". Sports injuries represent certainly the biggest part. People are more active today and this results in more accidents and in injuries that need surgeries, often followed by secondary problems to be reconstructed again later.

***What is your view regarding "Foot and Ankle" Research?***

Research is clearly the basis of the future of "Foot and Ankle" surgery. It will have significant impact on new treatment algorithms as well as surgical techniques. The findings will be an integral part of all our activities as well as in the "IBRA Foot and Ankle Education Structure".

***From your point of view, in which direction are we going in "Foot and Ankle" Surgery?***

I believe that anatomically and biomechanically improved techniques with high quality implants will play a fundamental role in the future. Advanced training and continuous education will thus be of vast importance for the specialists.

## IBRA Seminar and Anatomic Workshop

**„Fortgeschrittener Instruktionskurs für Fuss- und Sprunggelenkchirurgie"**

September 9 – 10, 2016, Basel and Muttenz, Switzerland

Painful malpositions and injuries of the foot and ankle joint are among the most common conditions affecting the musculoskeletal system. Surgical treatment of these conditions presents us with constant medical and technical challenges.
The right strategy and approach, as well as selection of the correct osteosynthesis procedure and appropriate materials, are crucial for the postoperative function of the foot and ankle joint — and therefore for the patient's wellbeing. The framework for the first day of the course consists of two sections, the first being lectures regarding current scientific status and advances in foot and ankle joint surgery and the second being group discussions regarding specific cases and medical evidence. Within this framework, great importance is placed on presenting current treatment options.
On the second day of the course, participants can consolidate what they have learnt by practicing on a fresh specimen.
A very experienced member faculty will provide all the guidance the participants need.

→ www.ibra.ch

## Technical report: Lapidus arthrodesis

**Dr. med. Christian Plaass**
Orthopädische Klinik der Medizinischen Hochschule Hannover, Diakovere Annastift
Germany
christian.plaass@diakovere.de

**Prof. Dr. med. Christina Stukenborg-Colsmann**
Orthopädische Klinik der Medizinischen Hochschule Hannover, Diakovere Annastift
Germany
christina.stukenborg@diakovere.de

**Introduction**

Hallux valgus (HV) is one of the most common pathologies orthopedic surgeons have to treat. For different severities of HV more than > 100 operative techniques have been described. The chosen method is mainly depending on the angulation between the first and second metatarsal bone (Intermetatarsal angle = IMA). For severe cases a fusion of the tarso-metatarsal joint 1 (TMT1) is recommended. This technique was introduced by Albrecht in 1911 and later popularized by Lapidus, who included a fusion between the first and second cuneiform joint.

Further indications for a TMT1 Fusion are primary arthritis, failed hallux valgus surgery or instability of the joint. The "instability" of the joint is under discussion for many years. Previous studies focused on the vertical stability of the joint, as this is clinical accessible. It has been shown, that the increased vertical mobility vanishes after HV corrections, probably due to the stabilizing effect of the plantarfaszia. Nevertheless, newer studies showed that the TMT1-instability is more a rotational instability, which is clinically hardly accessible. This may help to understand the etiology of HV and number of HV relapses after non-fusion techniques.

Initially due to insufficient osteosynthesis techniques TMT1 fusions were associated with high complication rates. Biomechanic testing showed that a combination of a lag-screw with a plate is the most reliable fusion technique. Further on the more plantar the plate is placed the more stable the construct becomes and the more soft-tissues sheets the plate and less hardware removal is necessary.

Therefore, plantar placing of the plate was introduced, with good clinical results. Nevertheless, plantar placing of the plate may be cumbersome due to the soft-tissues plate positioning and bony contour and many surgeons stay with medial plating. Until today no large series showed superiority of one of the plate positions.

With the increasing number of TMT1 fusions for HV corrections, also with this technique relapses with a secondary increase of the IMA have been described. Analysis of these cases showed, that a more proximal instability occurred, leading to a gap between medial and intermedium cuneiform, therefore some surgeons returned from the isolated TMT1 fusion to the original Lapidus-technique and an intermetatarsal or intercuneiform arthrodesis, with a lag screw.

To allow surgeons the most freedom for all these techniques Medartis designed plates for TMT 1 fusions. A biomechanical and anatomic optimized plantar plate which eases the operation and helps to avoid tendon irritation and a medial plate also anatomical optimized to reduce irritation of the Tibialis anterior tendon and allows placing a lag screw to the base of the second metatarsal to tread intercuneiforme instability.

**Technique**

The patient is placed supine and an antibiotic single shot dose is recommended. Soft tissue balancing is done according to surgeon's preferences. We usually use a single medial approach but also a combination of medial and dorsal or double-incision technique is possible. When a plantar plate is planned the incision is done a little more plantar than for the medial plate. Preservation of the veins of the medial foot border is crucial to reduce postoperative swelling. After TMT1 joint preparation, either with chisels or with a saw, the first metatarsal is repositioned. The technique of removing a wedge has been abandoned to avoid shortening. The repositioning is done by a rotational move to centralize the sesamoids and correct the DMAA. The position is stabilized with a K-wire and checked radiographically. A Medartis Speedip CCS 5.0 screw is used as a lag-screw for compression of the arthrodesis. A "hook" test is done to test the intermetatarsal mobility and if judged insufficient an intermetatarsal screw is planned. In these cases, the space between medial cuneiforme, metatarsal 1 and 2 is debrided and spongiosa from the metatarsal head placed in between.

**Medial plating**

The medial TMT1 arthrodesis plate has been developed to reduce irritation of the tib. ant tendon, therefore it is placed from a slight proximal dorsal to a distal plantar position. The plate is then fixed in the medial cuneiform with 3 interlocking screws. The plate offers with the TriLock -plus hole the ability to further compress the arthrodesis site. Further on a lag screw can be placed through the plate into the base of the 2nd metatarsal. Due to the exact anatomic fit of the plate an optimal placement of this screw is possible even without radiographic control.
Plantar plating:
For placing the plantar plate, the M. abductor hallucis is mobilized plantar. The plate is optimized to completely spare the tib. ant. tendon insertion, therefore it is slided beneath the tendon and fixed proximal first. The angulation of the proximal hole allows a better placement of the pate with less soft tissue irritations compared to a straight plate. Then the most distal screw is inserted and afterwards the other four screws. In our series of > 100 cases bending of the plate has seldom be necessary, if at all mostly in cases with TMT1 arthritis and plantar osteophytes.

**Aftertreatment**

The aftertreatment is done to the surgeon's preference. We recommend elevation and rest for at least two days. Also it has been shown that an after treatment with full-weight bearing and a shoe with hard sole is possible, we recommend for soft-tissue consolidation a protected weight bearing with half body weight. Physiotherapy for MPT1 mobilization is recommended from the beginning. To document secure bone healing weight bearing X-rays are recommended 6 weeks postoperative.

**Results**

Recent studies with actual osteosynthesis techniques have shown low complication and pseudarthrosis rates for TMT1 fusions [1]. One comparison study of plantar and medial plates showed no pseudarthrosis in both groups but the necessity for implant removal and delayed bone healing in the patients with medial plating [2]. Early weight bearing has shown to be save with modern arthrodesis techniques and did not lead to an increase in bone healing complications [3, 4]. 80 % of the patients do return to their preoperative or improve their sports ability after a TMT 1 fusion [5]. Until today only few studies exist regarding the mid to long-term outcome after TMT1 fusion. HV relapses have been described in up to 15% of the patients and an increase of the IMA of 1.4° after 10 years in the modified but no increase in the original Lapidus technique [6-8]

**Conclusion**

The TMT1 arthrodesis is a safe and powerful procedure for the treatment of severe Hallux valgus. With increased understanding of the pathology the indication may even be broadened. Fixation of the arthrodesis with lag screw and interlocking plate allows a stable and secure fixation leading to a secure healing. The new Medartis plates help to improve the operative technique and give the surgeon the freedom to choose the preferred operative technique. The possibility to add an intermetatarsal screw is outstanding and might drive the thinking of surgeons to a new understanding of HV development.

## Clinical Cases:



42 year old female with severe hallux valgus, treated with a TMT-1 fusion. Excellent position of the first ray and fit of the medial TMT-1 arthrodesis plate.
The intraoperative stress test, showed no intermetatarsal instability, so no intermetatarsal screw was placed.





62 year old woman with severe hallux valgus deformity. A TMT-1 fusion was done, using a Medartis CCS 5-0 screw for compression and a plantar TMT-1 arthrodesis plate. The plate shows an excellent fit and did not interfere with the Tibialis anterior tendon insertion during the implantation.

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# Metatarsophalangeal Arthrodesis with dorsal plate and plantar interfragmentary screw

**Mario Herrera-Perez**
MD, Foot and Ankle Unit, Orthopaedic Department
University Hospital of Canary Islands, Tenerife, Spain
herrera42@gmail.com

A first MTP arthrodesis maintains first ray length, relieves pain, and permanently corrects deformities of the hallux, allowing for normal shoe wear. Numerous surgical techniques have been described for the first MTP fusion. These include various approaches, techniques of joint preparation and methods of internal fixation. The author´s preferred technique with a power reaming system coupled with internal fixation using a dorsal precontoured plate and a plantar interfragmentary screw provides a strong construct.

## 1. Indications

- Advanced degenerative arthritis of first MTP joint: hallux rigidus grade III and IV
- Posttraumatic arthritis
- Hallux varus deformity
- Severe hallux valgus deformity.
- Hallux valgus deformity in neurologic patients (after cerebral vascular accidents, cerebral palsy, etc..)
- Failed hallux valgus surgery
- Inflammatory arthropathy
- Failed implant arthroplasty
- Avascular necrosis of the firs metatarsal head

## 2. Contraindications

- Hallux interphalangeal joint arthritis/arthrodesis (relative contraindication)
- Impaired vascularity
- Active infection
- Smoking

## 3. Technique (dorsal compression plate and lag screw)

POSITIONING

- Patient placed supine with a bump under the ipsilateral hip
- A regional block or general anesthesia
- Ankle or calf tourniquet

APPROACH

- Medial skin incision over first MTP joint (my preferred approach)
- Circumferential capsulotomy: release capsule from the medial, dorsal, lateral and plantar aspect of the M1 and F1; a thorough synovectomy is performed, and the MTP joint is inspected for osteophytes and loose bodies

FIRST METATARSAL (M1) HEAD PREPARATION

- Once released, the great toe is flexed plantarly, then a K-wire is inserted from the centre of the head of the M1 along the axis
- Use the specific concave powered reamer to debride the cartilage from the metatarsal head

PROXIMAL PHALANGEAL (P1) PREPARATION

- Then switch to the P1 side: insert a K-wire just in the centre of the P1 along the axis
- Use the specific convex powered reamer to debride the phalangeal cartilage (be careful in this step because aggressive reaming could produce a F1 fracture, especially in osteoporotic patients)

FINAL PREPARATION AND JOINT ALIGNMENT

- Positioning of the great toe is achieved according to the patient´s needs: 5º to 10º of valgus, 15º to 20º of dorsiflexion, and neutral rotation. Increased dorsiflexion may be used for women preferring high-heeled shoes. Check the desired position with use of intraoperative fluoroscopy or using the simulated weight bearing test (use a flat surface from the plate set for this purpose, the desired position leaves approximately 5 mm of clearance between the flat plate and the tip of the hallux to allow for relatively normal roll-off when walking)

INTERNAL FIXATION

- Assure this alignment with a temporary K-wire fixation between M1 and P1, put it from medial distal to lateral proximal and check the position under intraoperative fluoroscopy
- Then proceed to the APTUS TriLock 2.8 MTP Fusion plate insertion, put it in the dorsal aspect of the joint, the plate is pinned provisionally in place, and the position checked under fluoroscopy. The plates are normally pre-bent, but you can adjust the plate further. The plate is then fixated to the proximal phalanx. Then we remove the K-wire
- Before fixating the metatarsal, put a 2,7 mm cross-compression screw from distal-plantar phalanx to proximal-dorsal metatarsal, in order to compress plantar aspect of MTP joint

**4. Postoperative care**

- The patient needs a stiff-soled shoe with full-weightbearing on the heel for 6 weeks
- X-ray should be taken at one, three and six months after the procedure
- Fusion should be complete at 6 months, to make sure that bone healing has taken place, we recommend the use of CT scan at that time

**5. Results and complications**

- Fusion rate 95% with good and excellent subjective patients satisfaction scores in 92% of cases
- Nonunion 5-23% (less incidence if we use plate and interfragmentary screw; can be asymptomatic)
- Delayed union
- Malunion 9% (especially plantar depression; too straight bone)
- Varus misalignment (problems with shoewear)
- Valgus misalignement (excessive valgus can produce conflict with the second toe)
- Infection (superficial>deep)
- Interphalangeal joint arthritis
- Hardware intolerance (especially too large metatarsal screw that can injury the metatarsosesamoid joint)

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## Technical report: Chevron-Osteotomy

**Dr. Lisca Drittenbass**
Centre du Pied et de la Cheville Dr. Assal, Clinique La Colline
Genève, Switzerland
lisca.drittenbass@gmail.com

**Introduction:**

The chevron osteotomy for correction of hallux valgus was initially described by Corless (1) as well as Austin and Leveten (2) in the 70s and 80s as a modification of the Mitchell procedure. Over the years the technique has been modified; the originally V-shaped osteotomy is now performed with a longer plantar cut to protect the vascularization of the metatarsal head (3) and screw fixation provides improved primary stability.

The chevron osteotomy is indicated for the correction of mild to moderate hallux valgus deformity showing an intermetatarsal angle up to 15°. An increased distal metatarsal articular angle (DMAA), as it often occurs in the juvenile hallux valgus, can be corrected by performing a biplanar chevron osteotomy.

**Technique:**

A medial longitudinal incision is performed. The capsule of the MTP joint is exposed and incised longitudinally.
The chevron osteotomy is performed using a small oscillating saw; the plantar cut is usually twice as long as the dorsal cut, creating more of an L-shaped osteotomy. By choosing to give a plantar direction to the cuts, the MT head can be plantarized in patients suffering of transfer metatarsalgia. An increased DMAA can be corrected by additionally excising a small wedge of the dorsal cut. (4.5)

Fig. 1: Modified Chevron osteotomy

Fig 2.: Correction of the DMAA by resecting a small wedge of the dorsal cut of the chevron osteotomy

The metatarsal head is then translated laterally by half its width and fixed with a screw. If the head can not be sufficiently shifted, a lateral capsulotomy is added.

Fig.3: The laterally translated head is fixed with one or two screws

Medartis SpeedTip CSS 3.0

Medartis SpeedTip C 2.8

If the first ray is not perfectly aligned at this stage, an Akin Osteotomy should be added. If it remains undercorrected, the tendon apparatus remains unbalanced and will continue to act as a deforming force. One should not rely on medial capsulorraphy to complete the correction. Before closure, all excessive medial bone is removed with the saw.

**Aftertreatment:**

The intrinsic stability of the chevron osteotomy combined with screw fixation allows for immediate full weight bearing under protection of a medical hard-sole shoe, which is worn for 6 weeks. However, to avoid excessive swelling, walking should be limited and the use of crutches is advised.

**Results:**

Literature shows that the modified chevron osteotomy leads to good/excellent clinical results in correction of mild to moderate hallux valgus deformity. It provides permanent correction of the intermetatarsal angle. Complications like nonunion or avascular necrosis are rare. (6, 7) Screw fixation has been shown to be mechanically superior to fixation by K-wire, staples or no fixation at all (8).

**Conclusions:**

The chevron osteotomy with a long plantar cut and screw fixation is an excellent technique to address mild to moderate hallux valgus deformity. A biplanar osteotomy allows for correction of the DMAA. It remains, however, a procedure that needs to be performed with accurate technical precision.

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## Epidemiology of Foot and Ankle Disorders

**Dr. Ahmed Galhoum,**
SWISS ORTHO CENTER
agalhoum@gsmn.ch

**Prof. Dr. Dr. Victor Valderrabano**
Schmerzklinik Basel, Swiss Medical Network
vvalderrabano@gsmn.ch

The foot and ankle have been very special in the evolution of human species. Standing, walking, running with weight-bearing from bottom up has been possible by unique design and geometry of foot and ankle bones, ligaments, tendons joint congruity and very rhythmic involvements of muscles and nerves.

Foot and ankle surgery is a growing subspecialty and one of the most developed divisions of orthopaedic surgery. This progression can be rendered to several factors; evolution in the knowledge in the field of anatomy, pathology, biomechanics, diseases and the available concepts to cure and heal has been very challenging for health care providers including the increasing number of sports related injuries, traumatic and degenerative conditions, and higher expectations of the patients, which necessitate the presence of dedicated sector of orthopaedic surgery to deal with such complicated problems.

First the problems came from congenital conditions, deformities neuromuscular disorders, infection, and trauma. These conditions still exist in developed and underdeveloped countries. But on top of that, additional problems emerged: Sports related injuries and the interest of quality of life and functional performance in the aging population are the new challenges that should be faced.

The advancement of knowledge and experience in foot and ankle surgery and innovations in diagnostic modalities made the improvements of functions and reduction of disabilities possible.

Innovations such as anatomic and biomechanical ideal plates and screw, arthroscopic surgery as diagnostic and therapeutic, joint preserving surgery with osteotomies and cartilage repair, and total arthroplasties have added to our knowledge in managing the hurt better, faster and with long-standing functional improvements. Growth factors, allografts, synthetic soft tissues, stem cells, and other orthobiologics add to the overall high standard treatments in foot and ankle surgery.

Injuries to the foot and ankle can have a dramatic impact on the overall health, activity, and emotional status of patients. A study looking at the outcomes of multiple-trauma patients with and without foot involvement found a significant worsening of the outcome in the presence of a foot injury.(1) The epidemiology of foot and ankle fracture is interesting to follow. Population-based studies suggest that the incidence of ankle fractures has increased dramatically since the early 1960s. A study in Finland showed that the incidence of ankle fractures in persons older than 60 years of age increased from 57 per 100,000 persons in 1970 to 130 fractures per 100,000 persons in 1994. (2) A follow-up study of the same population showed that the incidence of these fractures increased to 174 fractures per 100,000 persons in 2000, and estimates a threefold increase in these fractures by the year 2030 (3).

Another example is calcaneal fractures which account for approximately 2% of all fractures and the annual incidence is 11.5 per 100,000, with displaced intra-articular fractures comprising 60% to 75% of these injuries. (4, 5)

A recent study from in USA reported 280,933 foot and ankle fractures or dislocations between 2007 and 2011, Ankle fractures were the most common fractures (56%), rearfoot and forefoot fractures was similar, at around (17%) of all foot and ankle fractures, and midfoot fractures were the least common(9%). Open fractures accounted for (20%).(6)

Ligamentous injuries are of high incidence too. Ankle sprain accounts for between 3 and 5 % of all Emergency Department visits in the UK, equating to approximately 5,600 incidences per day. (7) In the USA one ankle sprain occurs per 10,000 person-days, and an estimated two million acute ankle sprains occur each year.(8) The incidence of residual symptoms following acute ankle sprain is variable, but has been reported with rates of between 40 and 50 %.(9,10) The economic burden of ankle sprain cannot be disputed, as the mean total cost of one ankle sprain in the USA was 2 billion dollars annually.(8) Netherlands in 2001 reported an estimated annual cost of €84,240,000 in the Netherlands alone.(11)

The reported incidence of ankle sprain in military and select athletic cohorts can be up to twenty-sevenfold greater than that reported in the general population. (12)

Although ankle osteoarthritis (OA) is much less common than knee or hip OA, but it is one of the conditions that severely affect life quality.(13) The incidence of ankle OA in the UK has recently been estimated to be 47.7 per 100 000. Of the 29 000 symptomatic cases referred to specialist surgeons in the UK each year, approximately 10% undergo arthrodesis or arthroplasty.(14) The ankle is rarely affected by primary OA (7%), while the rest of cases being secondary to other causes, 70 % are post traumatic, 12 % are secondary to rheumatoid arthritis, the remaining portion is shared by neuropathic, septic and osteonecrotic aetiology.(14,15)

Charcot arthropathy is one severe form of joint destruction that represent a powerful challenge in foot and ankle surgery. It is important enough to be placed in the second priority of the list for investigation of problematic foot conditions by the Research Council of the American Orthopaedic Foot and Ankle Society.(16) it was estimated to affect 1 in 680 of diabetics and affects 29% of those with diabetic peripheral neuropathy.(18,19) The ankle is a common site of involvement, comprising 3% to 10% of all cases.(20)

Achilles tendon disorders are a group of the most encountered problems in orthopaedic surgery which range from tendinopathy to rupture. Tendon injuries occur in 30%-50% of all sports related injuries. Sixty-six percent of joggers complain of Achilles tendon pain and 23% of them usually have insertional Achilles tendinosis.(21) The incidence of chronic tendon rupture in
top level runners has been estimated between 7% and 9%,(21) and 30% of patients have a sedentary lifestyle.(23)
On the other hand, the incidence of acute Achilles tendon rupture was estimated at 2001 to be 47 per 100.000 in men and 12 per 100.000 in women of which 43% underwent surgical treatment. This incidence increased by 17% and 22% in men and women respectively in 2012.(24)

When addressing deformities hallux problems may be taken as a good example. Hallux valgus prevalence was estimated as 23% of general population adults aged 18-65 years, which increased to 35.7% in elderly over 65 years. Also the incidence was higher in females 30% in comparison to males 13%. Patient satisfaction with the post-operative functional outcome was reported. (25)

Continuous progress in foot and ankle surgery is present and required, everyday increasing numbers of patients demand surgical solution for their problems. This success is the fruit of the critical thinking, technology implication in diagnosis and treatment and based on the spread of the knowledge between different foot and ankle centres and societies.

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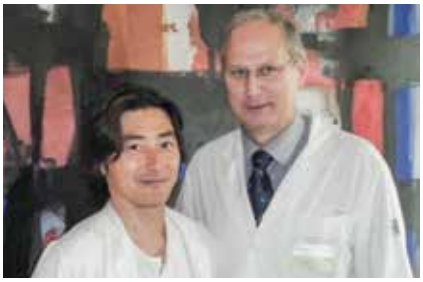
## Scholarship

Dr. Keikichi Kawasaki from Tokyo took part in The IBRA Scholarship Program. This program was conceived in order to strengthen scientific and international exchange between doctors, IBRA members and IBRA training centers. In particular, the objective is to enable the scholar to gain clinical experience in selected IBRA training centers and to learn from experienced surgeons. In turn, the fellows from the IBRA and the respective training center are provided with logistical support and a grant. Between April 2014 and March 2015, the IBRA used this scholarship program to support Dr. Keikichi Kawasaki (IBRA member since July 2013), enabling him to visit various clinical and scientific locations in St. Gallen, Switzerland (Prof. J. Grünert), in Ravensburg, Germany (Prof. Dr. H. Krimmer) and in Lorenz Böhler Hospital in Vienna, Austria. In Vienna, he was able to attend last year's "Hand and Wrist – New Solutions for Difficult Fractures and Salvage Procedures" IBRA seminar and workshop as a guest of the IBRA and to establish further international contacts. During this period, he also performed two biomechanical experiments (on the olecranon and on the distal radius), which were characterized by their realistic experimental set-up:
A clever choice of substrate material enabled Dr. Keikichi Kawasaki to successfully simulate not only a hardware failure caused by a breakage of a plate or screw, but also a loose screw, which is often more important from a clinical perspective. The results of these experiments were presented at FESSH 2016 in Santander.



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There is a specific application form for each type of scholarship program. The application forms can be downloaded from the IBRA Website: www.ibra.ch/Scholarships

We also recommend to download and study the Guidelines and the FAQ sheet, which answer the most frequently asked questions.

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