AO Foundation continues the mobile march
AO Education adds to its mobile portfolio on behalf of the AO Specialties

Olga Harrington, AO Dialogue

With constantly improving wireless technologies and the growing impact and convenience of virtual and mobile technologies, AO Specialties (AOTrauma and AOCMF) took the bold step of launching mobile versions of the hugely successful resources AO Surgery Reference and Müller AO Classification of Fractures at the end of 2010. The response to both has been phenomenal, with more than 47,000 downloads for the AO Surgery Reference app and in excess of 25,000 downloads of the Müller AO Classification of Fractures app in their first year. Encouraged by the rapid uptake by both new and existing users more mobile resources (AO Traumaline, EBSS.live and CMFline) are being launched at the AO Foundation Davos Courses 2011. These apps give surgeons easy access to an even greater range of AO learning and reference material.

For those unfamiliar with AO Education’s online and mobile learning resources, AO Surgery Reference is a resource for the management of fractures, based on current clinical principles, practices and available evidence. While AO Surgery Reference is primarily directed at surgeons in learning situations, it

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AO Foundation continues the mobile march
continued...

also offers valuable content for experienced surgeons. AO Surgery Reference presents relevant advances in fracture fixation and established techniques of proven value in order to offer a range of fracture solutions to the widest possible surgical community. The guide is extensively illustrated with over 20,000 illustrations on the website and hundreds of clinical photographs and x-rays. While describing the complete surgical management process from diagnosis to aftercare for fractures in a given anatomical region (in the fields of orthopaedic and cranio-maxillofacial trauma), AO Surgery Reference also offers valuable content for experienced surgeons.

Confident of the usability, accuracy and success of its recent launches, AOTrauma, AOSpine and AO CMF are now launching three clinical evidence database applications for iPhone and Android, namely Traumatime (trauma content), EBSS live (spine content), and CMF line (CMF content). Unlike Traumatime, which is freely available, EBSS live and CMF line will initially be free to use and at a later stage, be offered as a membership benefit to Specialty members only. These three databases of clinical evidence contain summarized information on relevant specialty literature. They provide not only access to bibliographic information on articles of therapy, prognosis, and diagnosis but also list key study results. Individual studies are graded according to Class of Evidence allowing users to find relevant clinical evidence. Regular updates will ensure that the database is always up to date, making them a premier tool for clinical research and practice. Stay tuned for the launches.

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13th European Congress for Trauma and Emergency Surgery in Basel

Just another congress?

The annual Congress of the European Society for Trauma and Emergency Surgery (ESTES) will take place in Basel from 12-15 May 2012. Switzerland has been chosen as the location for the congress next year as part of the one hundredth anniversary celebrations of one of the two organizing Swiss societies, the Swiss Society of Traumatology and Insurance Medicine (S. G. T. V.).

ESTES is a product of the merger of the European Trauma Society (ETS) and the European Association for Trauma and Emergency Surgery (EATES) in 2007. It is the home of 26 national trauma and emergency societies in Europe with more than 10,000 institutional members. Its first joint congress was held in Graz in May 2007 and since then its annual congresses have been held in Budapest, Brussels and Milan. The broad scientific approach taken by the ESTES congress—ranging from trauma sessions about proximal humerus fractures to keynote lectures on cholecystectomy in acute cholecystitis—makes it a good reflection of current discussions about acute care surgeons in a world where each specialty has a role to play in the management of the complex trauma and emergency patient.

There are several congress sessions organized in association with the AO, in particular one addressing the past, present and future of the Foundation. Other sessions will highlight current research, documentation and quality care, and the most up-to-date techniques in trauma care.

The main congress topics are: minimally invasive versus conventional surgery; unessential surgery; vascular injuries; sport injuries, implant removal and mountain rescue. Special sessions will be dedicated to the Red Cross, trauma in Asia (with the participation of members of AOTrauma Asia Pacific) and the latest research findings from the University of Basel. In the “12 to 12” sessions (just before lunchtime) some prominent speakers will presen short statements on the state-of-the-art in trauma and emergency situations. “How I do it sessions” in the early morning offer the chance to learn more about personal attitudes and convictions regarding specific problems while lunchtime symposia offer opportunities to experience the diverse product ranges from different implant manufacturers.

All this will be embedded in a rich, cultural program in the town of Basel. For more information see www.estesonline.org
The Surgical Implant Generation Network (SIGN) international orthopedic conference is beyond a simple scientific conference, it is a family of partners networking with common fracture-treating goals. The purpose of SIGN is to continue to understand fracture treatment and treat more patients with different types of fractures. 165 surgeons from 30 countries came together at the 10th Annual SIGN Conference in September 2011 to:

• Provide a venue for surgeons in developing countries to discuss fracture care, in a scientific manner
• Promote the dissemination of knowledge between North American and overseas surgeons
• Receive reports from surgeons in SIGN centers of excellence on new SIGN products
• Facilitate relationships between surgeons from different parts of the world

The keynote speaker at the three day event held in Richland, Washington was Andrew N Pollak, Orthopedic Trauma Association (OTA) President who spoke on the development of an Orthopedic Trauma Education Program for developing world surgeons.

Long bone fractures

Daniel Laverly’s cost effectiveness study from Sierra Leone confirmed that IM nail treatment of fractures decreases hospital costs and disability. The SIGN nail used in infected nonunions combined with bone transport was presented by participants through cadaver, hands-on and video demonstrations by renowned plastic surgeons at the institute. Negative pressure wound therapy, using a low cost, locally-made machine was described by Dr. Jinco from the Philippines. Dr Farague from D’Haka presented 12 grades HIB tibia fractures where gastroc flap over SIGN nails done within 72 hours with nine having excellent outcomes!

Hip fractures

The SHC (SIGN Hip Construct) continues to grow in popularity. An Ethiopian study compared different implants for pertrochanteric fractures, demonstrating that the SHC allowed surgery with fewer complications in patients with medical co-morbidity. Dr Shah from Pakistan following 29 of 46 hip patients and concluded that in resource-limited centers, SHC done without C-arm gives stable fixation and good early results. Among the 211 SIGN surgeries reported by Dr Mukherjee from India, nine were hip fractures with SHC showing good results.

Pediatric fractures

The new SIGN semi rigid pediatric nail is being evaluated in a sheep study in Ethiopia to assess damage to the distal femoral epiphysis. This nail is inserted retrograde fashion so this will be an important proof-of-concept study to evaluate using pediatric nail in a retrograde approach.

Workshops

The workshop topics ranged from Afghan Exfix (AEF), rods for forearm fractures, distal humer-us plating osteotomy to treat hip deformity, to Ottawa sterile drill system and the Portland design and new designs for negative pressure wound therapy all of which provoked robust discussions. Breakout sessions studying the Ponseti method, pelvic fracture and sawbones workshop provided plenty of opportunity for knowledge exchange. The IT workshops and presentations to the benefit of the entire orthopedic community. The value of follow up was emphasized as the basis for fracture treatment studies.

Research Presentation by AO Dialogue-SIGN fellow

Sacriey of orthopedic research output from a developing nation (Ethiopia)

There were a total of 4,687 biomedical research articles published in Ethiopia between 1980 and 2010 (this was reviewed using PubMed). Even though the impact Factor is low, the Ethiopian Medical Journal is a leading publisher of scientific articles from Ethiopia with 839 publications during the 30 year period under review. HIV/AIDS and tuberculosis related health issues were the most frequently published research. The total number of articles published yearly showed steady growth from 49 in 1980 to 367 in 2010. The increase in the number of published articles matched the growth of the National Domestic Product, per capita. In conclusion, the number of published works from Ethiopia over the last three decades is one of the lowest in the world. Ethiopian first authorship emerged 15 years ago. This trend of knowledge transfer through collaborative research must continue.

Research

A one day Research Symposium was given prior to the flap course. Dr Bhandari and his colleagues equipped attendees with a sound knowledge on basic surgical research. The goal of the symposium was to instruct SIGN surgeons on how to better document research results in a statistical manner and improve publications and presentations to the benefit of the entire orthopedic community.

AO Dialogue-SIGN fellow Biruk Lambisso Wamisho reports from the 2011 SIGN Conference

Surgical Implant Generation Network

Biruk Lambisso Wamisho reports from the
2011 SIGN conference organizers and attendees

Biruk Lambisso Wamisho giving his presentation
AO Research Institute Davos
Osteoporotic fracture treatment:
in Focus
a systematic approach to a growing problem

Decision making → Implant positioning → Fracture stabilization → Reinforcement

Approximately 75 million people in Europe, Japan and the US suffer from osteoporosis resulting in over 5.5 million fractures every year. With an ageing population, the medical and socioeconomic effect of osteoporosis, particularly postmenopausal osteoporosis, will further increase. AO Trauma has, therefore, nominated osteoporotic fracture care as a research focus. The AO Research Institute Davos (ARI) has put this mandate into practice by systematically improving the various steps of fragility fracture treatment. These involve intraoperative decision making by assessment of local bone quality, enhancing accuracy of implant positioning, improving fracture fixation in reduced bone mass by computer methods for systematic refinement of implant designs, and reinforcing implant purchase by cement augmentation techniques. Strengthening the different aspects of fragility fracture treatment and interlinking them, carries future potential to prevent devastating and non-devastating complications in fracture care of the elderly.

Intraoperative decision making: Assessment of local bone quality
Bone quality is known as an important indicator determining the biomechanical stability following fracture fixation. Intraoperative measurement of the bone quality carries potential to markedly support the decision making process regarding choice of fixation hardware or operational technique in order to optimize the fracture fixation.

The concept of a handheld mechanical measurement probe was recently introduced (DensiProbe™) consisting of a specifically designed blade and an attached measuring unit. The device is manually inserted into the cancellous bone prior to osteosynthesis to the aimed location of the implant. The torque, necessary to turn the blade about its axis and to break the local trabecular structure, is recorded. The measured value correlates with the local bone strength and suggests e.g., the use of a specific implant or the application of bone cement for additional reinforcement.

The concept was proven by several in vitro studies correlating the DensiProbe measurement with mechanical fatigue tests and image based parameters (CT). Prototypes were developed for several anatomical key regions, namely hip, spine, proximal humerus and hind-foot. A clinical multicenter study is currently ongoing to obtain threshold values for clinical decision making, preparing the ground for successful translation into clinical practice.

Implant positioning
Particularly in reduced bone mass accurate placement of implants is of utmost importance. Adequate implant positioning is a prerequisite to avoid complications since internal body forces are high and bone stock is limited. Not only for the inexperienced surgeon, orientation in anatomical terrain remains difficult and is all too often associated with considerable exposure to radiation.

A novel concept for assisting implant placement is introduced to improve surgical routine interventions worldwide. Opposed to current navigation solutions, the concept utilizes a conventional C-arm as imaging and navigation means extracting hidden information from 2-dimensional radiographic projections. The new method is exemplified on intramedullary nailing using a cephalic hip implant. Application covers center-center positioning of the blade in the femoral head, adjusting anatomical leg rotation and distal interlocking with minimal requirements for radiation. Further applications are in the planning stage.
AO Research Institute Davos

Fracture stabilization: Implant design optimization (Fig 6)

Sound fracture fixation in reduced bone stock requires implant designs optimized to the anatomical environment, under consideration of biomechanical and morphological parameters. We hypothesize that particularly in porotic bone recent implant generations do not fully exploit the existing potential for fracture fixation.

Computational simulation is a powerful tool to predict the performance of new implant designs and to assist in the development process prior to clinical evaluation. Finite element (FE) models allow rapid and systematic pre-evaluation of several test parameters (e.g., screw design, implant arrangement and geometry). Computer simulations and physical experimental models can be cross-validated and can work hand-in-hand as reliable performance indicators. Such a model is currently created and refined in the ARI comprising several key-features.

One of the most important parameters in osteoporotic fracture treatment is the bone (mineral) density. As the distribution of bone content is not homogenous (uniform) inside a bone and between individuals, it appears essential to target specific bone regions with an implant. FE-models allow testing implants in different bone qualities and individual distributions of bone mineral as derived from CT data.

Very little is known about statistical distribution of bone density in the human skeleton. Therefore a goal is to analyze the local bone stock and its variations at osteoporosis relevant sites under consideration of bone surface shape and size, influenced by body height, gender, ethnicity or age. QCT based three-dimensional statistical modelling is performed on the basis of advanced computerized image processing in order to improve the predictive value of computational implant evaluation. Furthermore, the fracture pattern is known to be an important indicator determining the outcome of an osteosynthesis. Clinically realistic fracture patterns will be included in the FE representations.

Last but not least, implant performance should be evaluated under realistic physical loading. Recent mathematical concepts allow accurate estimation of internal body loads at patient routine activities providing an important tool for systematic implant evaluation.

Reinforcement: Cement augmentation techniques (Fig 1)

In osteoporotic patients the trabecular bone is strongly reduced in its quality and quantity which makes it difficult to anchor implants. In extreme cases, where metallic implants reach their limits, the concept of additional implant augmentation aims at improving the implant purchase by increasing the area of anchorage. A small amount of bone cement around the implant fills the intertrabecular space allowing a smooth load transition between implant and bone.

Up to now, several investigations were performed to draw an overall picture of the concept and to objectively assess its strengths and weaknesses. A clear biomechanical potential of augmentation procedures could be demonstrated in various applications, namely at the hip (Dynamic Hip Screw, Proximal Femoral Nail Antitrotation), at the foot (Expert Blufoot Arthrodesis Nail) and at the proximal humerus. Further applications will follow.

Aside from biomechanical aspects, it is aimed to continuously improve and optimize augmentation techniques in terms of safety and efficacy. ARI targets diminishing associated risks by reducing the required amount of cement and optimizing the cement properties and localizations. New cement formulations with biodegradable or non-degradable characteristics are coming into focus. Adverse side effects of implant augmentation such as thermal necrosis are critically investigated. Studies revealed, for example, negligible heat generation for augmenting hip implants if properly applied—important base line knowledge for the clinical application. Additional steps will be undertaken to further improve the safety of the procedure. For example, a study investigating the effect of subchondral cement augmentation on the adjacent articular cartilage is planned. The long term goal of ARI is to provide detailed scientific evidence on cement augmentation techniques allowing confident use on the patient for significantly reduced fixation failures in porotic bone.

From experimental research to clinics (Fig 6)

ARI offers multiple medical fellowships annually to create a link between applied research and clinical practice. This practice has enabled An Sermon, a Belgian trauma surgeon undertaking a fellowship at ARI, to strengthen her experimental research clinical practice on osteoporotic fractures through experimental research. Both accumulated evidence from literature and personal experience as a trauma surgeon dealing with an exponentially growing number of geriatric hip fractures, stimulated Sermon to actively approach two of the most important gaps in current knowledge, namely implant design and fixation methods for preventing fixation failure in osteoporotic fractures through experimental research. Within the Biomedical Services Program, Sermon performed several biomechanical studies on the effect of cement augmentation on implant purchase in the osteoporotic femoral head. As a surgeon, Sermon participated in the first clinical trials on this novel technique. In the course of her PhD thesis, further clinical work was planned for implementing a referral pathway for hip-fracture patients, improving patient outcome and potentially reducing the fracture recurrence risk. Experimental and clinical approaches become force multipliers to improve geriatric patient care.

Fig 4 Finite elements representation of a proximal humerus repair construct

Fig 5 Statistical bone model of the distal tibia

Fig 6 Interlinking research and clinics
From the AO Service Units

AO Clinical Investigation and Documentation (AOCID)

Clinical Research Fellowships

Two new fellows began their clinical research training at AOCID in the Fall. Kerstin Schneider (Bürgerspital Solothurn, Switzerland) will conduct research on minimally invasive surgery for hip fractures. Christian Haina’s fellowship is a product of the deepening cooperation between the AO and Audi. The primary objective of this Bavarian surgeon’s fellowship is to review and analyze data collected by the Audi Accident Research Unit (AARU) and a larger German database across certain medical parameters to see if predictive factors regarding injury severity etc. can be established.

Study coordinator training in Switzerland

The fourth AOCID study coordinators’ meeting took place in October with 15 international participants learning clinical research principles and documentation. Feedback was extremely positive.

AO Certified Study Center (AOCSC) program

This demanding program completes its successful pilot phase at the end of 2011. There are 21 recognized candidate clinics, two-thirds of which have been visited and evaluated. Seven clinics have already implemented the necessary processes and are AOCSC certified.

Webinar

AOCD Director Beate Hanson was invited by AO Trauma to put together an entertaining webinar on an aspect of clinical research. The Clinical Research Casino—Statistical Concepts used in Gambling and Clinical Research was held in September 2011. Over 100 international participants joined in. A recording will be made available online in due course.

AO Davos Courses 2011

AOCID continues its series of fun studies at the AO Davos Courses with a mechanism that was set-up for course participants’ coordination using an automobile simulator. The Roadmap of Research Breakfast course is offered on 6/7 December and again on 13/14 December to what surgeons’ appetites for clinical research. AOCID has developed a Good Clinical Practice (GCP) course to meet the needs of site investigators and this 8-hour training will be held on 9 December 2011 in Davos. This accredited course counts for 6 CME credits.

Statistics:

AOCID has 18 running studies. So far in 2011, AOCID released 18 peer-reviewed publications and was cited 300+ times by researchers around the world.

AO Research Institute Davos (ARI)

Basic Scientific Highlights: Musculoskeletal Regeneration

A combination of shear and dynamic compression leads to mechanically induced chondrogenesis of human mesenchymal stem cells was published in the ECM Journal (Impact Factor 9.67). The study demonstrated that mechanically induced chondrogenesis of human bone marrow derived stem cells requires a shear component. This could play a major role in rehabilitation protocols after intra-articular trauma. The data obtained will also be able to improve the outcome of stem cell-based repair for articular damage.

In collaboration with the National University of Ireland, Galway, an injectable hydrogel, acting as a reservoir for cell delivery and mimicking the native environment, was developed for intervertebral disc repair and regeneration. Culture in the injectable gel did not influence the disc cell phenotype. The optimally stabilised and functionalised type II collagen/HA hydrogel system developed in this study shows promise as an injectable reservoir system for intervertebral disc regeneration. This study was published in Biomaterials (Impact Factor 7.88). See Fig 1 below.

Good news

Prof Georg Richards, (ARI Director) co-organized with Ted Miclau and Dr Fintan Moriarty (ARI) presented on implant surfaces and endothelial cell based repair for articular damage.

In 2011 the existing AO online video library drew an average of 40,000 viewer requests per month. This significant growth in interest from surgeons prompted the AO Education Video and Visual Media Department, in conjunction with the AO Specialties’ Commissions, in education and community development to think about a range of new formats. This involves moving beyond the traditional filming of techniques for the support of hands-on simulations at face-to-face courses.

The changing technology landscape enables new interactive distance learning on a large global scale. Hundreds of surgeons participated in four live webcasts (moderated live surgery on anatomical specimen) and five webinars (interactive online lectures) run by AO Trauma in 2011. This new format allows direct interaction with presenters while creating valuable content for A0’s fast growing video repository.

Go beyond practical exercise videos

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With the support of AO Education’s video team, AO Spine has explored ways to expand the ‘traditional’ practical exercise video. Using the same basic material (showing the procedure and functionalised type II collagen/HA hydrogel system developed in this study shows promise as an injectable reservoir system for intervertebral disc regeneration) the videos were expanded and enriched with both extra clinical footage and an expert surgeon providing his personal “pitfalls and pearls” experience. This new format forms as both a stand-alone learning experience and a teaching tool to be used in education in hospitals or other self-directed training.

AOCMF and AO VET started to use short video clips featuring research results and evidence in a new time-saving way. Short video clips were produced to make the AO Playground skills-simulation parcels a self-explanatory educational tool. Specialties put more emphasis on the use of video in their overall communication announcing educational activities, reporting from events and congresses, promoting membership and expanding educational offerings.

AO Education (A0E)

AO Technical Commission (A0TK)

The TK System—A TK System—an interface between AO surgeons, engineers, scientists and industrial partners—manages the development and approval of products and techniques aimed at improving the treatment of injuries, deformities and diseases of the musculoskeletal system. This work is conducted in accordance with the philosophy of the AO Foundation and to the benefit of patients. The development process takes place through the TK System’s Expert Groups, where surgeons worldwide contribute their clinical experience in the relevant field.

TK Innovations: Meet the Experts

The AO Foundation Davos Courses 2011, with its large number of participants, presents the TK System an ideal opportunity to introduce the newly-devised "TK Innovations: Meet the Experts" workshops. These sessions offer live demonstrations of current clinical needs that have been translated into tangible solutions. Daily lunchtime sessions are hosted over the two weeks of the courses by expert surgeons directly involved in product development. These workshops feature the latest TK-approved technology in the fields of trauma, CMF and spine. Some workshops showcase a cross-specialty approach: the piezoelectric used in craniofacial osteotomies could also be used in spine, plastic, hand or foot surgery; the sternal closure system is also relevant to cardiac thoracic, trauma or plastic surgeons.

Free participation for all Davos Course delegates means that workshop attendees gain firsthand information from the experts about new technology, products and, most importantly, their clinical basis and applications. The experts in turn gain preliminary surgeon feedback from international surgeons to take into consideration in further development.
New concepts at the AO Foundation Courses Davos 2011

An exciting new educational format—AOTrauma Masters Course—Current Concepts—makes its debut at the Davos Courses this year. Two of the five regions (Asia Pacific, Europe, Latin America, Middle East and North America) continued with focused activities meeting the needs of their regions. 2012 will see exciting educational activities for AOTrauma for example the scientific meeting “Challenges in Fracture Care Across Disciplines” on February 23-25, 2012 in Florida, US. The meeting theme, “The Magic of Synergy—Working Together For A Stronger Tomorrow,” is uniquely designed to bring together and share the knowledge of orthopedic trauma, cranio-maxillo-facial, veterinary and spine surgeons addressing the challenges of musculoskeletal fracture management.

AOTrauma

From the Specialties

AOSpine

AOSpine is pleased to report significant progress with the AOSpine Curriculum and the AOSpine Knowledge Forums.

The AOSpine Curriculum

With the recent completion of ten AOSpine Curriculum pilot courses, the information gathered has been analyzed by the Curriculum advisory group under the leadership of Germán Ochoa (AOSpine Education Commission Chairperson) and Bryan Ashman (AOSpine Asia Pacific Chairperson). This information now guides the broader implementation of the AOSpine Curriculum worldwide.

The Davos Courses 2011 sees the first large-scale implementation of the new AOSpine Curriculum at an international educational event, with all activities—the Advanced Courses and the Masters Symposium and Knowledge Forum—structured around the Curriculum. The Curriculum provides a framework of competencies and key learning outcomes for several spinal pathologies. These guide the delivery of education that meets the needs of spine care professionals at different levels of their career (Principles, Advanced, and Masters).

Our educational content is also based on the AOSpine Principles of stability, biology, alignment, and function. Spine surgeons who participate in our educational learning activities will be better able to:

- Perform effectively across the various areas of pathology in their practice setting.
- Meet the overall standards of the profession.

The Curriculum is delivered using a combination of face-to-face educational events, distance learning, and self-directed resources, supported by many educational tools that enable measurement of knowledge and skills and the implementation of learning into practice.

AOSpine Knowledge Forums

AOSpine Knowledge Forums are working groups led by 5-10 worldwide key opinion leaders in a specific spine pathology. Their aim is to generate knowledge by performing clinical studies and publishing evidence-based recommendations as well as to integrate their latest advances and outcomes into AOspine’s education program to assist surgeons in clinical decision-making.

At this time the Knowledge Forum Tumor is performing two clinical studies:

- Predictors of Mortality and Morbidity in the Surgical Management of Primary Tumors of the Spine: A multi-center retrospective cohort study with a cross-sectional survival check.
- Interdisciplinary validity and reliability of the Spinal Instability Neoplasia Score (SINS) in radiologists and oncologists.

The first project of the Knowledge Forum Deformity is a collaboration with the Scoliosis Research Society (SRS) joining forces to conduct a multi-center study to evaluate risks and complications associated with Adult Spinal Deformity surgery. AOspine’s Knowledge Forum Spinal Cord Injury & Trauma is currently evaluating several opportunities for its first research initiative.

AOSpine Curriculum planning meeting

SRS and AOspine kick-off Scoli-RISK-1 Study
AOCMF

At this year’s AO Foundation Davos Courses 2011 an AOCMF Neurocourse is on offer for the second year running to neurosurgeons who manage neurotrauma and reconstruction. The course goal is to teach the theoretical basis and practical principles of neurotrauma management and complications, and considerations for state-of-the-art reconstructive surgery. Covering the strategies and considerations in managing neurotrauma patients, the course has been developed for neurological surgeons who have a strong interest in trauma and is taught by an international faculty and guest lecturers focusing on their areas of expertise.

The main topics dealt with over the 2-day course range from: neurotrauma and interdisciplinary management of the neurotrauma patient to special topics such as reconstruction and dural repair. A variety of pedagogical approaches are used in the course delivery—comprehensive lectures concentrate on the understanding of core material, practical sessions teach the application of AOCMF principles to the management of common injuries and case-based discussions link the lecture material and practical skills taught with the problems encountered by the course participants in real practice.

AOCMF webcasts build on success of previous two years

This year’s Craniomaxillofacial Fracture Management course features two 2-hour webcasts. Both sessions are made up of a number of different keynote lectures each lasting 30 minutes including 5-10 minutes where webcast participants post questions online to the keynote speakers.

AOVET

The AOVET community welcomes more than 50 veterinarians to the AO Foundation Davos Courses 2011 with two high-quality educational events. The AOVET Equine Advanced Fracture Management Course offers an introduction to the field of advanced equine fracture treatment delivered by a team of international experts. In addition to the core course topics, delegates also learn the application of locking head plates to different fractures, practice arthroscopic control of fracture reduction, participate in the “Playground” (experiencing how basic fracture treatment principles work) and discuss their cases with experts. Two lectures from the equine event will be streamed live over the internet during the Davos Courses.

The AOVET Principles of Small Animal Fracture Management Course brings together recognized leaders in small animal orthopedics from Europe and North America. Through pre-course eLearning, seminars and hands-on laboratory sessions, course participants are presented with the most up-to-date information in the art and science of fracture repair in veterinary surgery. Participant interaction with faculty is an important part of this course.

As usual all AOCMF course participants will have an opportunity to get to know AOVET faculty, the researchers at the AOCMF Institute Davos and the members of the AO Foundation at the annual AOVET Fondue Party. In addition the AOVET membership booth is open daily to all participants at the AO World in the Congress Center.

Practical exercises at an Equine Advanced Fracture Management course

AOVET practical demonstrations during the AOCMF Neurotrauma Course 2010

Interleukin-12 local delivery for infection prevention after a traumatic open fracture

Berton Rahn Research Prize: award winner summary

From the Specialties continued…

Liti Biegemy, Assistant Professor, Department of Orthopedics, School of Medicine, West Virginia University, US

Two major issues related to open fractures have driven us to conduct this project. (i) Large number of bone fractures and high infection rates. Millions of patients are hospitalized annually for bone fractures, and such injuries are increasingly common because of increased survivability of high energy trauma in civilian settings as well as continuing military conflicts. It is well documented that patients with traumatic open fractures have a high risk of infection: the incidence of infection in Gustilo grade III open fractures may exceed 50% [1], and 2-15% of the extremity injuries inflicted in war developed osteomyelitis or infection [2]. (ii) Ongoing and widespread emergence of virulent and multi-drug resistant bacterial strains. Strains of Staphylococcus aureus (S. aureus) that resist or have reduced susceptibility to methicillin, vancomycin, and other antibiotics emerged decades ago, and “Superbugs” like methicillin-resistant S. aureus (MRSA) now kill more Americans than AIDS [3]. The causes of multi-drug resistance are mainly attributed to overuse of antibiotics and bacterial mutation. In time, without the development of new and effective antibacterial treatments, it is possible that multi-drug resistant pathogens will be untreatable with conventional antibiotic therapies.

Interleukin-12 (commonly designated IL-12) is a natural cytokine that plays a central role in cell-mediated immune response and bridges innate and adaptive immunity [4,5]. Our objective was to explore local delivery of IL-12 at the implant/tissue interface for infection prevention in rats following traumatic, open femur fracture and internal fixation. We hypothesized that IL-12 embedded as multilayer nanocoatings at the implant/tissue interface will restore resistance, decreased due to trauma [6], to pathogenic infection and reduce the severity of infection after a traumatic open fracture.

To prove our hypothesis, we first developed polypeptide multilayer nanocoatings on an implant model (i.e. Kirschner-wire or K-wire) using layer-by-layer (LBL) nano-assembly and we incorporated drugs like IL-12 into the nanocoatings [7,8]. We were able to finely tune the incorporated amount (0-50 ng/cm2) and the release duration (0-9 days) of IL-12 by controlling the LBL process. Next, we created an open femur fracture infection model using Sprague-Dawley rats. The rats’ femurs were fractured, infected with a clinical isolate of S. aureus, left open for one hour, mimicking the “golden hour” of trauma patients, and then fixed with a K-wire [7]. This model was used to examine the stability of IL-12 nanocoatings and the effect of IL-12 nanocoatings on preventing infection. We found that the IL-12 nanocoatings on K-wires were stable and could withstand the implantation process in our rat model. IL-12 nanocoatings substantially decreased S. aureus-induced infection: infection rates decreased from 100% (control) to 50% (IL-12 treated) at post-operative day 6 and from 90% to 20% at day 21 [7]. Moreover, the effect of IL-12 on infection prevention was found to be dose dependent [7,8]. Our data also showed that local IL-12 treatment improved fracture healing (data not published) and better callus formation and bone quality were observed.

Therefore, we proved our hypothesis that IL-12 nanocoating could reduce open fracture-associated infection [7-9]. Our study has laid the conceptual foundation for the development of IL-12 therapeutic approaches that may decrease the use of antibiotics and thus to a reduced emergence of antibiotic resistant “superbugs.”

References:

From the President
Norbert Haas talks to AO Dialogue

This past year has been an exciting one for the AO Foundation, especially in the area of education where we are at the forefront of almost revolutionary changes. The progress is so rapid that I strongly recommend you visit the AO Foundation and AO Specialty websites as often as you can in order to keep up-to-date with all the newly available tools for further education and faculty support.

This year’s AO Foundation Courses in Davos delivers new several education initiatives such as the “Current Concepts Course” in which participants can select four from eight available modules, and the “Technological Innovation Programs” which is a series of daily events on new treatment options in CMF, spine, and trauma surgery. Three AOSpine Knowledge Forums on “Spinal Cord Injury & Trauma”, “Tumor”, and “Deformities”, and the AOCID eLearning module on Clinical Research are also being launched during the courses.

In research, AOTrauma has run an open call for proposals for the “Clinical Priority Program on Bone Infection”, while AOCMF has open calls for “Bisphosphonate-related Osteonecrosis of the Jaws” and “Imaging & Planning”. AOCID’s research was recognized by a record number of citations. It has also started to build up a network of “AO Certified Study Centers” to improve and standardize the quality of clinical research, and to foster an exchange between these centers.

The AO Trustees’ meeting has supported the social bonding of our ambassadors and fostered the unity of the AO Foundation. The return of focus to central core institutes for basic and clinical research, as well as education was important in order to balance our organizational evolution in respect to the clinical specialties and regionalization. This also ensures that Davos remains the focal point of the “AO Spirit”.

I would like to thank our volunteer surgeons and AO employees for all their hard work. I am very positive that the AO Foundation can face its upcoming challenges in these interesting times.

Research: Where we are today?
The question of whether the AO Foundation should be doing research has been asked for years. The answers have been many, and have driven multiple reorganizations in the philosophy, methods and types of research. Research is important because it is the premise of the founders that understanding what happens further improves how one delivers clinical care. When the founders began their goal was to understand how bone healed and responded to internal fixation. However, in the past 50 years, bone research has evolved. This has required the Foundation to respond or be left behind. This response has been the reorganization of AO Research to provide clinical direction into what research is performed thus returning to the AO roots but becoming far more diverse in projects. The AO Specialties are responsible for the clinical priority programs which address their primary clinical problems and are translational in nature, hoping for an answer in three to five years. The Exploratory Research Board and the Exploratory Research Programs provide the Foundation with the ability to do basic innovative research in the focus fields of bone healing and cartilage regeneration. The early success of this concept was demonstrated in September when the Exploratory Research Board brought together its exploratory programs along with a symposium on the focused fields of bone healing and cartilage regeneration. These meetings demonstrated that the basic innovational research for the future is on solid footing. The interaction between the basic science and translational aspects are now connected and focused through the Foundation. This new integration will definitely place the AO Foundation back in a leadership position and provide a platform for discussion of issues relating to research and clinical outcomes.