

New Products from AO Development

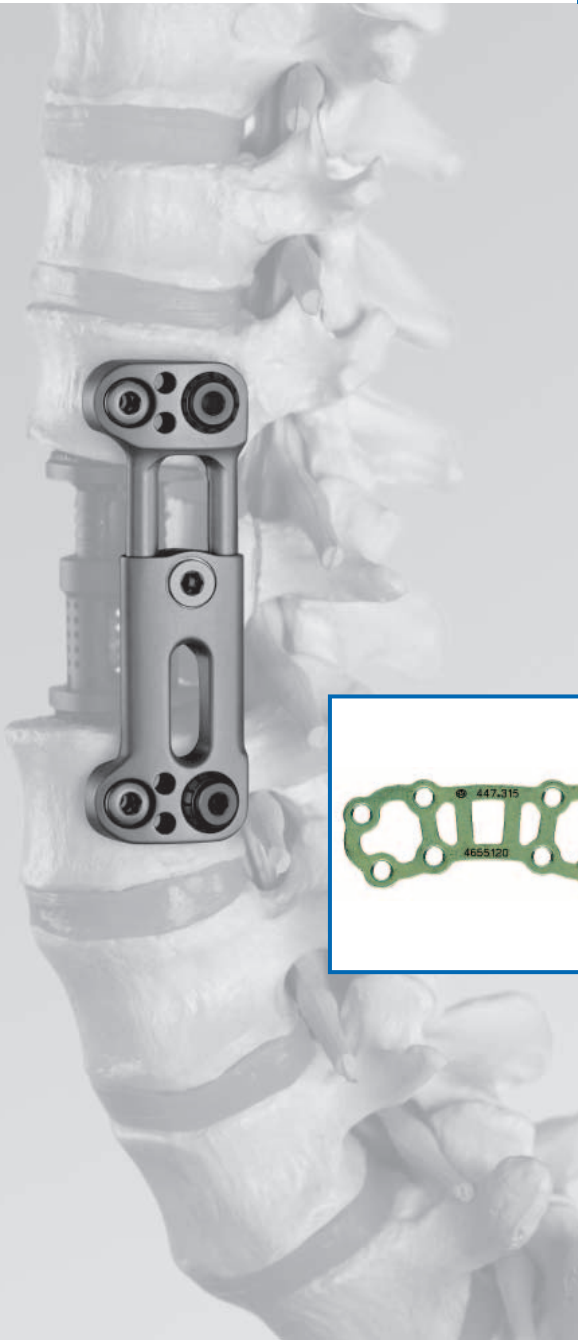


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Due to varying countries' legal and regulatory approval requirements please consult the appropriate local product labeling for approved intended use of the products described in this brochure.



Dear reader,

Minimally invasive surgery (MIS) is something everybody talks about—but not in the same language, indicating very different interpretations. The AO Foundation has a very clear philosophy which Dr Dankward Höntzsch, the chairman of AO's MIS group, will present to you in the lead article. He clearly shows how the evolution of new approaches in patient treatment is based on research results and the collective clinical experience of AO surgeons.

AO solutions are special because of its sound scientific background and its consistent philosophy, as well as the tremendous teaching efforts in which they are embedded. At the moment AO is working hard to adapt all its teaching materials to the Locking Compression Plate (LCP) concept. A new book and long-distance learning materials will be available soon.

The LCP concept is the “state-of-the-art” worldwide. Almost all plates are now available with the combination hole. In the last issues of *TK News*, you received information on these new angular stable implants. But in the OR, little things often make a huge difference in the outcome and influence the stress factor on us surgeons and our OR personnel. Therefore, AO pays a lot of attention to its instruments, their ergonomics, power tools, and a huge variety of line extensions. Even little devices, templates etc make procedures more convenient

and this issue of *TK News* features quite a few of these. Many of these improvements result directly from the feedback of surgeons and OR personnel. If you have any proposals or critique on existing devices, please tell us.

The AO Foundation is not only searching for technical perfection but also trying to consider regional differences worldwide. As a truly global organization, AO Development involves surgeons from Asia and Latin America to incorporate differences in mentality or anatomy, eg, the Small PFN for Asia. Reflecting the dynamics of these regions, AO Development participated in the AO Alumni meetings of AO East Asia and AO Latin America in 2004. The case discussions showed a high level of orthopedic trauma care equivalent to European and North American standards. The spirit, engagement, and dedication of the AO Alumni members must be similar to one of the founding days of the AO. To share this experience with you, the column *Portrait* features Frankie Leung, MD, from Hong Kong.

Once again, I would like to stress that none of the product descriptions in this publication is a substitute for the AO's surgical techniques or AO teaching tools. You can obtain more detailed information on these products from AO or your local SYNTHES® representative.

If you have any comments or questions on the articles or the new products, please don't hesitate to contact me.

Yours faithfully,

Norbert P Haas

Dankward Höntzsch

Minimally invasive techniques in trauma surgery

In all surgical disciplines, the operative methods that are described as minimally invasive are those methods that effectively reduce any additional trauma caused by the approach and the surgical procedures. Less intervention means that the integrity of the body's structures suffers the least possible additional damage.

It is important to realize that the abbreviation MIPO does not stand for "minimally invasive plate" but rather "percutaneous" osteosynthesis. This needs to be borne in mind since the expression "minimally invasive surgery" (MIS) is being increasingly used. Thus the goals are underlined as: minimization of input or load for all procedures from positioning, operation with reduction, retention, and intraoperative assessments, eg, by radiographic means, through to aftercare.

Intramedullary nailing

Intramedullary nailing is basically the minimally invasive method par excellence: a small incision far away from the injured region, indirect reduction and bridging, providing relative stability.

The intramedullary methods include stabilization of the proximal and distal femur and proximal humerus. Work is going on to improve these methods. This is also true with regard to further indications and implants: Titanium Elastic Nails (TENs), elastic wiring of the clavicle and arthrodesis nails, to name just a few.

External fixation

Basically, external fixation can be taken as a prime example of a minimally invasive stabilization method. This means that the tissue damaged by the injury is preserved as much as possible and is not subjected to additional trauma. This is one reason why the method is applied in particularly critical situations, namely, when the soft tissues and the bone have been traumatized and have sustained serious damage, or in severely injured patients (polytrauma). Discussion of "Damage Controlled Surgery" indicates the value of external fixation. The external fixation method

reaches its limitations during the course of the healing and treatment process so that we, as many others, advocate a two-stage procedure whereby conversion to another minimally invasive method, eg, intramedullary nailing or a percutaneous insertion of a plate, is performed as soon as possible.

AO modular external fixators are available in various sizes. With these fixators primary, secondary, and intraoperative reduction manoeuvres are possible. The latter are achieved with the so-called External Reduction Device (ERD) that is a part of the MIPO/MIS instrument set.

Percutaneously inserted plates

The development and application of minimally invasive plate osteosynthesis has rocketed in the last few years. Due to two major developments these innovations are here to stay. One thing we have learnt is that it is advantageous for plate osteosynthesis of diaphyseal fractures to be performed using the bridging technique. A further development and complementary aspect of this method is that these plate systems can now, in many cases, be slid into position in a semi-closed procedure. This technique means that not only the operative trauma (bridging plate) is reduced and kept to a minimum, but also the trauma of the approach.

Minimally invasive plate osteosynthesis was and still is realized using conventional plate systems. However, thanks to the internal fixator principle with locking head screws, plates and/or stabilization systems have been developed that are especially suited to this operative method, eg, the Less Invasive Stabilization System = LISS and the whole spectrum of Locking Compression Plates (LCP). Instruments such as tunneling aids, plate holders, spreaders etc are a great help in achieving minimally invasive plate insertion with accuracy and performing

gentle reduction manoeuvres in this osteosynthesis technique. It is not the size of the skin incision but rather the extent of manipulation actually applied internally that is critical for the additional trauma.

Screws and tension band fixation

Other operative methods such as isolated screws, tension band plates, and mixed osteosynthesis can now be performed through a minimal approach and using a minimally invasive technique. For example, single screw osteosynthesis and tension band wire fixation can be performed using a minimally invasive technique. New instruments have also been designed and developed for these procedures.

Spine surgery

For operations on the spine from a dorsal approach, development is still in its infancy with regard to further minimization of approach and surgical trauma. For anterior operative methods, minimally invasive methods became standard procedures.

Arthroscopy

Arthroscopic interventions are basically minimally invasive surgical methods. Arthroscopy of the knee and shoulder joints is the most popular and most explored procedure.

Other arthroscopic operations on the joints include those for the ankle, wrist, and elbow joints. Arthroscopic techniques for the hip joint are in the development phase.

Arthroscopic techniques can be combined to advantage with conventional open and new minimally invasive surgical techniques.

Computer-assisted navigation

Computer-assisted navigation increasingly permits minimization of surgical trauma and facilitates, for example, minimally invasive operations on the axial skeleton and the extremities. An important innovative leap forward in the field of computer-assisted navigation is expected within the next few years.

Instruments, surgical methods, and teaching

Special instruments for minimally invasive procedures have been launched over the last 3 years and others are still being developed. Some of the highlights and the contents of a basic set are presented in the figures and the descriptive text. One purpose of these instruments is to enable minimally invasive surgical techniques to be used also for the application of conventional osteosynthesis implants.

At the same time, teaching modules are being developed that have already proven valuable when first presented at AO Courses and which will gradually become available to the teachers and participants at AO Courses.

AO and its TK-System are particularly dedicated to this task.



Fig 1a–c

- a The “Collinear Forceps” is one of the highlights of the MIS instruments. It creates a collinear reduction and compression. This is very helpful in pelvic surgery, but as well as in other osteosynthesis (tibial head, distal femur). Different hooks are available.
- b The “large reduction clamp” (nicknamed the “king kong clamp”) is a simple tool. This large tool produces minimal footprints by protecting the soft tissues.
- c The “Epi/Periosteal Surfer” allows a proper tunnelling for slipped plates.

Summary

In summary, it can be stated that with the introduction of minimally invasive techniques as the result of modifying long established methods (arthroscopy, intramedullary nailing, and external fixation) and the development of new surgical procedures and implants (plates based on the internal fixator principle, indirect manipulation, spine surgery, etc) a new age has dawned in traumatology. Every procedure in osteosynthesis should take minimally invasive surgery into account.

In addition to the new instruments and implants, the attitude and training of the present and future generation of surgeons is the most important aspect. AO, in keeping with its tradition and mission, will pave the way for this whole spectrum of basic research, development, documentation, and education and set the future trend.



Fig 2a-b A "Handle" for conventional and for new LCP grips the plate very properly. The periosteal slipping is much easier if you can direct the plate with such a handle.



Fig 3 The "Hohmann Holder" holds a Hohmann hook ventrally and dorsally on the femur to control the far end of a long slipped plate like the LISS.

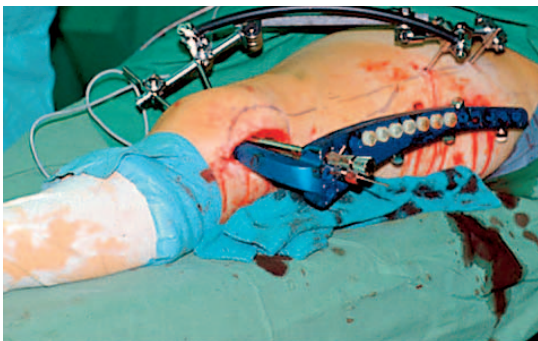


Fig 4 External Fixator as intraoperative External Reduction Device (ERD). The modular technique of the External Fixator (small 4 mm, medium 8 mm, large 11 mm) can be used as an intraoperative reduction device for example in case of slipped plates.



Fig 5 Manipulators are available as mono- and bicortical. These joysticks can be connected and fixed by tube-to-tube technique in a modular way.

Dankward Höntzsch

New MIS products



Chisel for plate extraction

The chisel for plate extraction was designed for minimally invasive percutaneous osteosynthesis to avoid long incisions and extensive soft tissue stripping. The long shaft of the chisel permits application through a small incision. The tip of the chisel has a 90° angle to glide the instrument subcutaneous along the shaft of the plate and to remove bony bridges which may hinder smooth plate removal.

Dankward Höntzsch, Chris van der Werken, Pietro Regazzoni, Phil Kregor

New long bone products



Locking Trochanter Stabilization Plate

The Locking Trochanter Stabilization Plate is intended for the treatment of unstable pertrochanteric fractures in combination with the Dynamic Hip Screw (DHS), especially for 4-part fractures with greater trochanter. Using the plate limits the possibility of varus deformation of the proximal fragment by cutting out the screws and medialization of the distal femoral fragment, without impairing the function and dynamization capacity of the DHS.

The Locking Trochanter Stabilization Plate limits diaphyseal medialization by fastening onto the greater trochanter relief. The additional proximal internal fixation can be achieved by using 3.5 mm locking head screws. Cerclage is still possible.

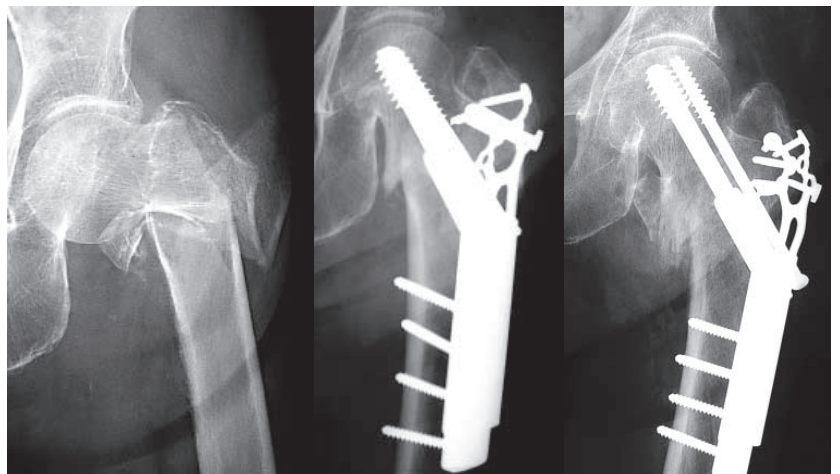


Fig 1 79-year-old woman.



Basic Percutaneous Instrumentation Set for Locking Condylar Plates

The Basic Percutaneous Instrument Set facilitates minimally invasive implantation of the Locking Condylar Plate.

The instrument set allows insertion of drill sleeves through stab incisions in soft tissue and subsequent drilling and screw insertion without large incisions and full exposure. The aiming arm ensures proper placement of both cortex and locking head screws and proper locking of the screws to the plate.



Large Distractor/Compressor Instrument

The Large Distractor/Compressor Instrument applies distraction or compression as an aid to fracture reduction and stable fixation. It is used in conjunction with plates whenever larger fracture or osteotomy gaps must be closed.

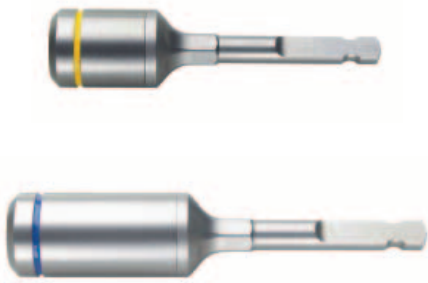
The Large Distractor/Compressor Instrument has the same indications as the existing Articulated Tension Device, except that the span is greater and no use of a wrench for adjustment is required.



Drive Adaptors with Quick Connect for Schanz Screws

The Drive Adaptors enable power insertion of self-drilling Schanz Screws and Steinmann Pins in a quick one-step procedure which reduces insertion temperature and time. The drivers have a retention mechanism with a snap-in feature for easy insertion and removal of the screws. They can be used with a T-handle Chuck for manual insertion.

Until now, no drive adaptors were available from AO, therefore forcing surgeons to use other chucks which are not optimal. The Drive Adaptors are available for 4.0, 4.5, 5.0 and 6.0 mm Schanz Screws. They are color-coded and etched for easy identification.



Medium External Fixation System: additional clamps, MR safe

MR safe external fixation clamps and carbon fibre rods allow patients to undergo MRI without the need to remove clamps and rods, maintaining the fracture reduction. Therefore, AO decided to upgrade all External Fixator Systems to become MR safe by using 3/6 L implant stainless steel and Ti-6Al-4V material. With the new clamps, clips, and rod attachments, the Medium External Fixator is now available as an MR safe system.

The range of applications has been broadened to treat pediatric and small stature adults.

The improved snap-on fit offers three tightening options: a knurled nut, an internal and an external hex.

The Large and Small External Fixators as well as the Distal Radius Fixator are already MR safe.

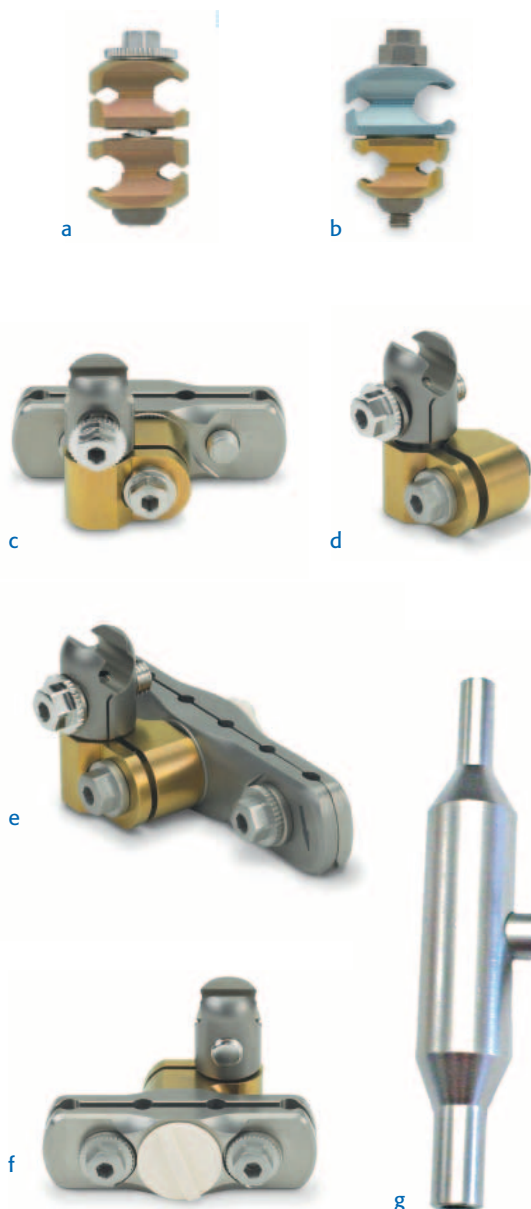


Fig 2a–g

- a Medium Combination Clamp, MR safe.
- b 8.0 mm/11.0 mm Combination Clamp, MR safe.
- c Medium Multi-Pin Clamp, 4-position, MR safe.
- d Rod Attachment for Medium Multi-Pin Clamp, MR safe.
- e Medium Multi-Pin Clamp, 6-position, MR safe.
- f Medium Multi-Pin Clamp, 4-position, MR safe.
- g Combination T-Wrench, 8 mm.



Small External Fixator System: Wire Cutter

The two-handed Wire Cutter for small fixation wires effectively cuts K-wires up to 2.5 mm without creating a burr. The Wire Cutter will be part of the Small External Fixator System.

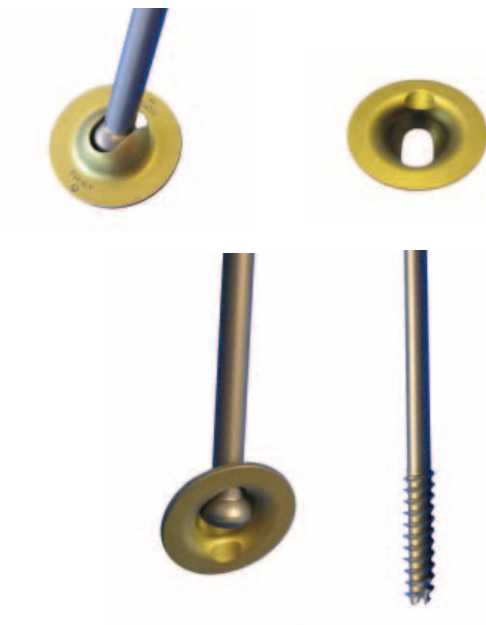
4.0 mm Schanz Screw, spade point, with 38 mm thread length (no picture available)

The 4.0 mm Schanz Screw with a spade point is now also available in an overall length of 100 mm and a 38 mm thread length.

One of the possible applications is to prevent foot drop when using a large external fixation ankle bridge frame. Another one is the performance of an open reduction with an internal fixation procedure to restore forefoot and hind foot alignment. When inserting a Schanz Screw on the lateral side of the foot, through the fourth and fifth metatarsals, the additional thread length prevents the unthreaded part of the Screw from pushing the fifth metatarsal into the fourth metatarsal.

Hans Zwipp

New foot and ankle products



Spherical Washer

The Spherical Washer is indicated for screw arthrodesis of the ankle joint especially in cases of osteoporotic bone. It enables compression in combination with Cannulated Screws 6.5, 7.0 and 7.3 mm. The Spherical Washer allows insertion of the screw in an angle of 0–70°. The head of the screw countersinks level with the bony surface and, through its design, distributes the load widely across the thin cortical surface. Therefore, it is especially useful in osteoporotic bone.

The Spherical Washer is available in a small and a large size, each in Stainless Steel or TiCp.

Jesse Jupiter, Norbert Südkamp

New power tools

Electric Pen Drive (E-Pen)

The Electric Pen Drive is a pen shaped, electric power tool for small and micro bone surgery. It combines the latest in technology with extraordinary versatility that will allow it to be used through out the peripheral skeleton hand, craniomaxillofacial, spine, foot, and neurosurgery. The Electric Pen Drive consists of two hand pieces, two consoles, 23 attachments, 250 burs and 36 saw blades as well as various other accessories.



Torque Limiter for AO Quick Coupling and Mini Quick Coupling

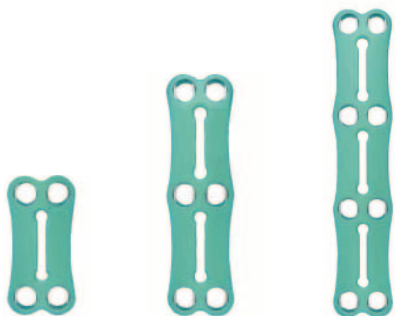
The Torque Limiters permit safe screw insertion and tightening with a defined torque of 0.4 Nm or 0.8 Nm. The Torque Limiters may be used with every screw-plate fracture fixation system where a torque of less than 0.4 or 0.8 Nm is recommended, eg, 2.0, 2.4 and 2.7 mm Locking Head Screws for Compact Hand System, Compact Foot Systems, Distal Humerus Plates, Distal Radius Plates, or the UniLOCK System.

The Torque Limiter feature quick coupling for easy fixation of drill bits and screwdrivers for AO Quick Coupling Shaft or Mini Quick Coupling Shaft.



Mike Janssen, Paul Pavlov

New spine products

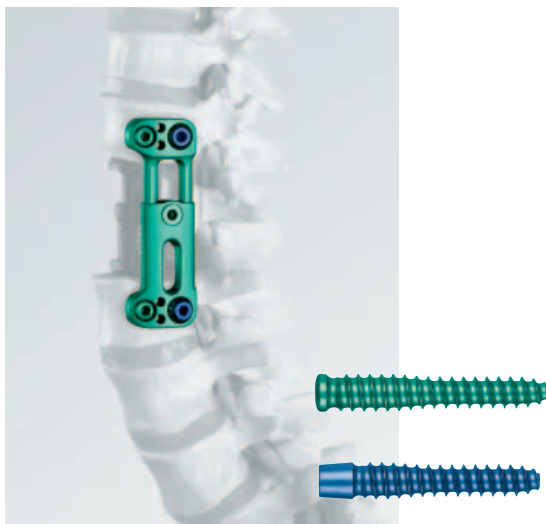


Anterior Cervical Locking Plate (ACLP)

The Anterior Cervical Locking Plate is indicated for anterior stabilization of the cervical spine (C2–C7) in degenerative disc disease, spondylolisthesis, spinal stenosis, tumors (primary and metastatic), failed previous fusions, pseudoarthrosis, and deformity.

The pre-lordosed, low profile plates follow the anatomy of the cervical spine and are available in one-level to four-level plate versions.

4.0 mm and 4.5 mm cortical and cancellous screws, self-drilling or self-tapping are available in different lengths from 6–12 mm.



Anterior Telescoping Fixation System (TeleFix)

TeleFix is a preassembled implant system for the anterior stabilization of the thoracolumbar spine, eg, after partial or complete vertebral body resections. It can be used in combination with a bone graft or vertebral body replacement.

TeleFix combines the benefits of plates and rods in a minimally invasive and/or endoscopic approach. The telescopic mechanism allows simple length adjustment and in-situ compression/distraction. A low profile helps preserve soft tissues. Polyaxial spherical implants bushings permit an angulation of $\pm 15^\circ$ to tailor screw insertion to the individual anatomical situation. Self-locking screws enable angular stable anchorage.

TeleFix can be used from T8 to L5 in

- fractures and posttraumatic kyphoses that can be adequately reduced and secured from anterior,
- tumours, and infections.

TeleFix is available in a monosegmental and a bisegmental version with different screw spacings.

Specific anterior and posterior screws, self-tapping and cannulated, have been designed with a 7.0 mm diameter and lengths of 25–60 mm.

A radiolucent aiming device has been developed for the insertion of K-wires.

The implant spreader enables compression to the optimal position of the TeleFix.





Anterior Tension Band System (ATB)

The Anterior Tension Band System is a low-profile anterior plating system designed to provide additional fixation across ALIF constructs thereby avoiding a posterior procedure and reducing tissue resection and operative site morbidity.

The system consists of two different plates. The sacral plates are designed for anterior placement across the L5–S1 disc space utilizing a “step” procedure for easy placement on the sacral promontory. The lumbar plates can be placed either directly anterior or anterolaterally from L1–L5 depending on the location of the bifurcation of the great vessels. Both plates are pre-lordosed and offered in 1- and 2-level configurations with varying plate lengths corresponding to our ALIF spacer heights.

The plate may also be used in conjunction with posterior instrumentation if a 360° fusion is required.

The convergent 5.5 mm screws, dual core, self-tapping increase the resistance to pull-out and lock to the plate in a 1-step locking mechanism.

The top surface of the final rigid construct is completely smooth to avoid soft tissue irritation.



Axon System

The Axon System is designed for posterior stabilization of the upper spine taking into account the variations of patient anatomy. A posterior fusion and stabilization procedure is often used to treat instabilities secondary to traumatic injury, rheumatoid arthritis, ankylosing spondylitis, neoplastic disease, infections and previous laminectomy.

The Axon System is based on the CerviFix/StarLock System. This allows an extension of a construct from the occiput to the lower spine using the Universal Spine System (USS).

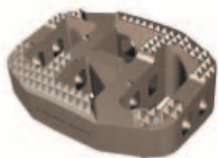
The top-loading screws have a poly-axial head allowing an angulation of 30° based on the locking system of the Variable Axis Screw System. The self-tapping screws are available as 3.5 and 4.0 mm cancellous screws from 8–26 mm thread lengths and as 3.5 mm cortex screws from 28–50 mm lengths. They can be used as lateral mass and transpedicular screw.

The Transverse Bar eases construct assembly if the screws are not inserted in line due to anatomical requirements. It provides a lateral offset of up to 9 mm from the 3.5 mm rod to the screw. It eliminates the need for severe rod contouring.

The preassembled Transconnector to lock the assembly is placed after the Axon construct is in position. Bushings allow the clamps to be placed offset to each other.

The improved hooks for sublaminar insertion offer a wider hook opening. The offset between rod and hooks has been reduced.

The instruments of the CerviFix set has been redesigned featuring an Adjustable Drill Guide, Pedicle Preparation Set, Bone-Screwdriver with Holding Sleeve, Alignment Tool, Torque Limiting Handle for Locking Screw, Rod Pusher/Countertorque, and Distraction and Compression Forceps.



SynCage-LR 45°/90°

SynCage-LR 45°/90° is a radiolucent SynCage to facilitate fusion of two adjacent vertebrae in the lumbar spine. It is a line extension of the existing SynCage-LR family for anterolateral and lateral approaches. The intended use is not a stand alone application. An additional posterior fixation to improve the biomechanical stability.

The SynCage-LR features convex superior and inferior surfaces which mimic the natural endplate curvature. Its wedge-shaped body design helps to restore the natural lordotic curvature of the spine and to restore the disc height. Dedicated rails for distractor blades allow an anterolateral or true lateral insertion.

The SynCage-LR 45°/90° made of PEEK Optima LT3 is available in two footprints with sizes from 12–19 mm.

The existing instruments of the SynCage-LR family can be used.

New Trail Implants permit the precise selection of the implant size and can serve to open the disc space if an anterolateral or true lateral approach is chosen.

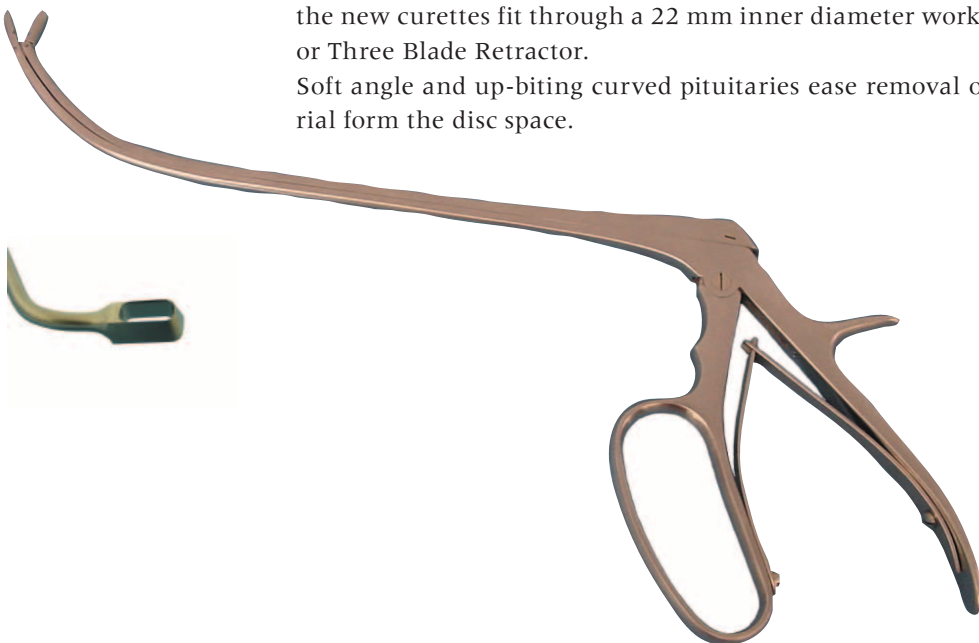
The Trail Implant Holder provides secure grasp of the trail implants in order to allow a safe manipulation in-situ in the anterolateral approach.

T-PLIF Minimally Invasive Instrument Set and T-PLIF Auxiliary Instrument Set

For the minimally invasive Tansforaminal Posterior Lumbar Interbody Fusion (T-PLIF) procedure, specific instruments have been designed to support discetomy and ease implant insertion by a unilateral posterior approach. Access to the intervertebral disc is more lateral from the mid-line and eliminates the need for dural retraction.

Decisive for the procedure are the different curettes with gentle angulation and small working ends for increased manoeuvrability. All of the new curettes fit through a 22 mm inner diameter working cannula or Three Blade Retractor.

Soft angle and up-biting curved pituitaries ease removal of disc material from the disc space.





Guide Rods for Cervical SynFrame (custom devices only)

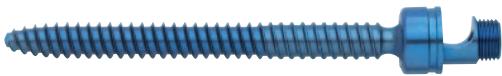
The Guide Rods increase the functionality of the SynFrame System when used in a cervical approach. They are designed for use with the radiolucent carbon fibre retractor blades from the CR/CD system.



Ti USS Variable Axis Screw, different lengths and diameters

The Variable Axis Screw (VAS) is a polyaxial side-opening pedicle screw used in conjunction with the Universal Spine System (USS). The screw/rod assembly adapts to the anatomy before being locked at a vien angle. The polyaxial flexible screw heads enable easy insertion of the pre-bent rods. The double thread with high thread pitch makes screw insertion quicker.

The existing Variable Axis Screws for the Universal Spine System (USS) are now available in additional diameters and lengths for varying body types and larger sizes: the 4.2 mm diameter VAS in lengths from 25–40 mm, the 5.2 and 6.2 mm VAS in 25 mm length, the 7.0 and 8.0 mm VAS in lengths from 25–100 mm, and the 9.0 mm VAS from 70–100 mm lengths.



USS Pedicle Screw and additional instruments

Recently, AO has introduced the USS II, offering a dual-side opening screw philosophy. For surgeons who like to stick to the single-side opening screw philosophy, the USS Low Profile features some substantial improvements to the well established, original USS. The new pedicle screws have an optimized thread design with a very low overall profile (11.5 mm). Its blunt tip and self-tapping thread provides a maximum of safety and quick screw insertion. The dual core design improves purchase of the screw in the pedicle. The screws are available in diameters 4.2, 5, 6, and 7 mm and in lengths 25–65 mm in 5 mm steps with color coding for easy differentiation. The USS Low Profile is fully compatible to the instrumentation of the original USS.

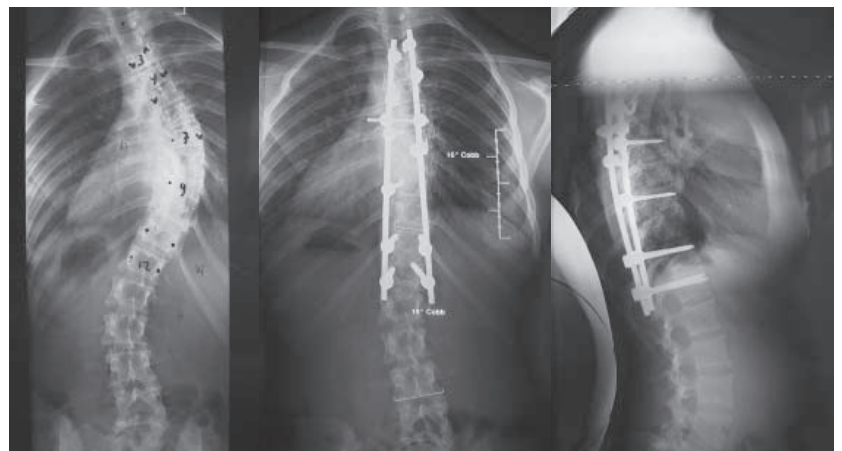


Fig 1 18-year-old woman with idiopathic scoliosis successfully reduced and fixed with USS Low Profile instrumentation.

USS II Washers and USS II Anterior Vertebral Body Screws

The Anterior Vertebral Body Screws and the Washers for the Universal Spine System II (USS II) are designed for anterior spinal deformity corrections and stabilization with anterior instrumentation.

The screws feature a cancellous thread, dual core, and have large thread flanks providing enhanced pull-out strength compared to normal pedicle screws. This provides a benefit in adolescent idiopathic scoliosis.

The washers reinforce the seating of the screws in an end vertebra for anterior stabilization and distribute the force exerted by the screw to the bone. The angled washers provide a fixed angle with the screw and prevent the screw from stripping.

The screws are made of titanium alloy (TAN) and available in outer diameters 6.2 mm and 8.0 mm and lengths from 20–60 mm.

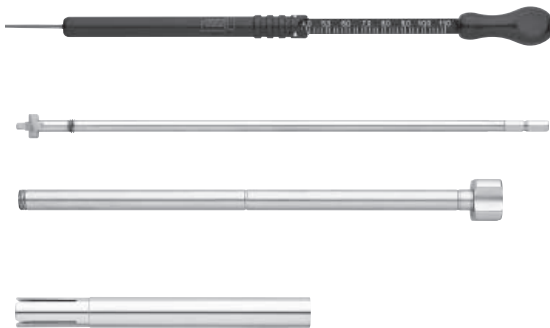
The washers are available in a flat and an angled version with diameters of 13–15 mm.



Click'X: additional instruments

Depth Gauge

The new Depth Gauge is designed to measure the depth especially for pedicle screw insertion. It measures length depths from 0–110 mm. It is advantageous compared to the existing depth gauge which was designed for use with plates.



Hexagonal Screwdriver Shaft, Holding Sleeve and Sleeve

The Click'X Preassembled Screwdriver has been redesigned for better handling and the prevention of tip breakage. The screwdriver pulls the Click'X preassembled screw onto the screwdriver by threading the holding sleeve onto the 3-D Click'X head, thereby reducing the screw toggle during insertion. The outer sleeve of the screwdriver can freely rotate to control the trajectory of the screw.

Ti Replacement Setscrew

The 5.0 mm Ti Replacement Setscrew prevents creating a burr when threaded into the transconnector body.



Rainer Schmelzeisen, Ralf Gutwald

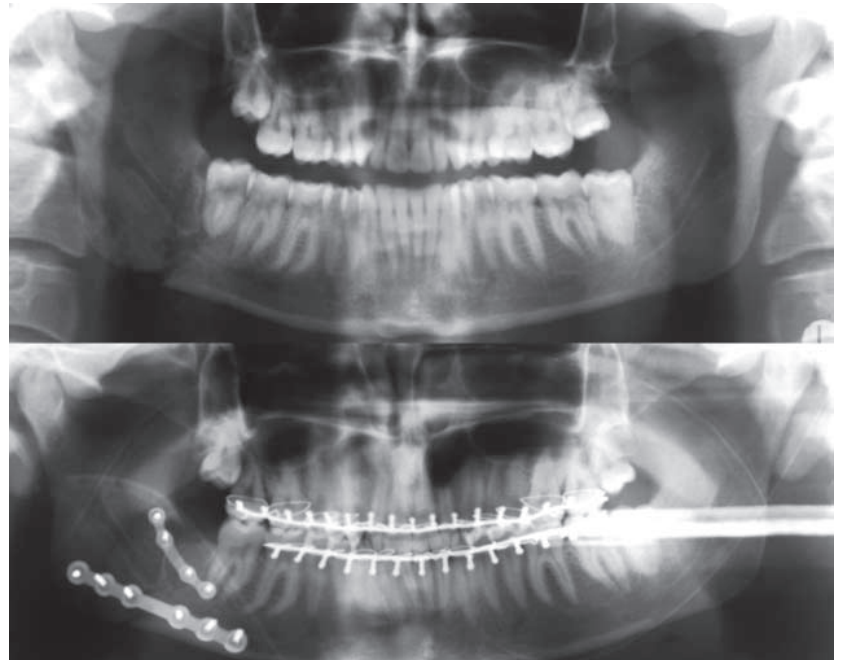
New craniomaxillofacial products



Fig 1 Pre- and postoperative x-rays of a right mandibular angle fracture treated with two 2.0 mm Mandible Locking Plates (mini and extra).

2.0 mm Mandible Locking Plate: line extension

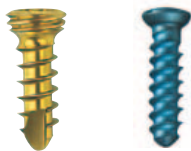
Since 1999 the 2.0 mm UniLOCK System offers a new fixation technique in mandible trauma (internal fixator principle). The advantages of reduced primary and secondary loss of reduction, reduced pull-out of screws, less periosteal compression and more stable fixation had lead to a high acceptance in osteosynthesis. The line extension is the consequence to the need of additional plates in regard to the complex anatomy of the craniomaxillofacial skeleton offering a wider range of indications.



2.0 mm UniLOCK Screw, TAV for Mandible Locking Plate and MAXPLATE

The 2.0 mm UniLOCK Screws and the 2.4 mm Emergency Screws for the Mandible Locking Plate System and the MAXPLATE have been available in TAN. Especially for Japan, these screws are now also offered in TAV without any change in design.

The 2.0 mm UniLOCK Screw, self-tapping, T6 Stardrive, TAV is made in lengths from 6–18 mm, the 2.4 mm Emergency Screw, self-tapping, w/T6 Stardrive Recess, TAV in lengths from 6–12 mm.





2.0 mm LOCK Zygomatic Plate, straight, with centre space, 4-hole

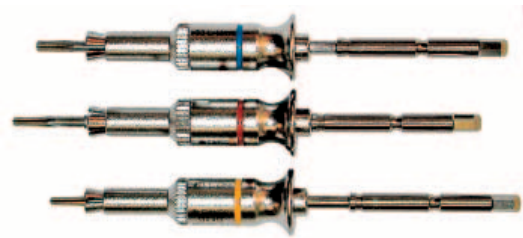
The 2.0 mm LOCK Zygomatic Plate is part of the power-inserted MAX-PLATE system with self-drilling, self-locking screws following the internal fixator principle.

The centre space adds additional plate strength over the fracture site.

Stardrive Screwdriver Shafts, dynamic

The design of the Stardrive blades has been improved and applied to the Stardrive dimensions T4 of the 1.3 mm screws, T5 of the 1.5 mm screws, T6 of the 2.0 mm screws, and the corresponding emergency screws.

The new “dynamic” design allows easy screw pick up without high axial pressure as well as self-holding capacity. The design allows an optimal torque transmission and centred insertion of the screw into the bone hole.



Stardrive Blades with Holding Sleeve

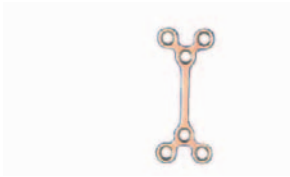
The 1.3, 1.5 and 2.0 mm stardrive blades with holding sleeves provide extra stability when introducing a screw through a small or remote incision. They also have a more secure grip on the screw in case of removal.

2.0 mm Ti Curved Sagittal Split Plate, 6-hole

The 2.0 mm Sagittal Split Plates are used in orthognathic procedures that advance the mandible for the correction of malocclusion or sleep apnea. Additional to the existing plates in 4, 6, and 12 mm lengths, longer versions are now offered in 14 mm and 16 mm bar lengths.

The plates use 2.0 mm Cortex Screws and 2.4 mm Emergency Screws.





Craniofacial Plates: line extension

The existing Craniofacial Set has been extended to include the following plates:

1.3 mm Double Y-Plate, 6-hole, 22 mm

1.3 mm Maxillary T-Plates, 8–14 mm

The 1.3 mm Maxillary T-Plate is available in straight, left, and right versions.

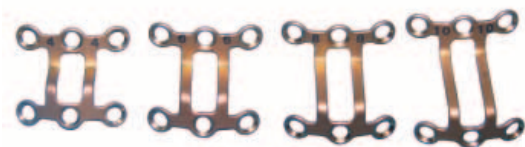


1.5 mm pre-bent Maxillary Plates, 0 mm advancement

The 1.5 mm pre-bent Maxillary Plate is available in right and left versions.



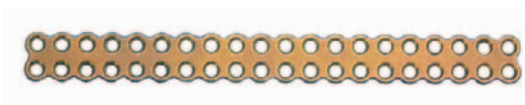
1.5 mm Chin Plates, Double Bend, 4–10 mm



2.0 mm Y-Plate, 110°



2.0 mm Double Adaption Plate, 40-hole



1.5 mm Resorbable Tap, self-drilling: line extension

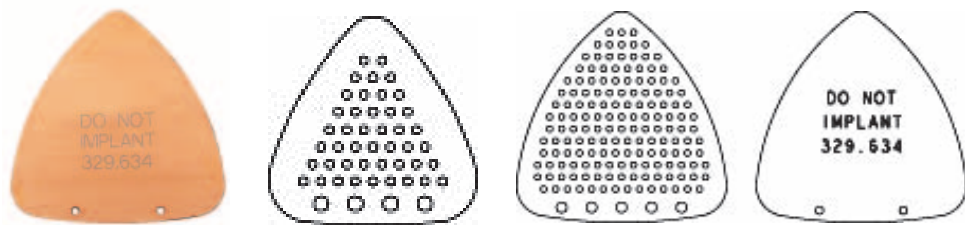
Specific self-drilling, resorbable taps have been developed for the implantation of the 1.5 mm Resorbable Cortex Screws, self-drilling of the Resorbable Plate Fixation System. These taps are specifically designed for the use with 5 mm and 8 mm screws.

The self-drilling, resorbable taps are available with mini-quick coupling and hex coupling.



1.5 mm Resorbable Orbital Floor Plate: line extension

The Resorbable Plate Fixation System now includes a 1.5 mm Resorbable Orbital Floor Plate, sterile, in lengths of 24, 30, and 35 mm. This line extension also features the appropriate Bending Templates.



1.3 mm Drill Bits with Stop (3 mm)

For the 3 mm self-tapping screws, ie, for the Low Profile Neuro System, specific 1.3 mm Drill Bits with self-stop were developed. The Drill Bits are available with a Stryker J-Latch in 45 mm length and a hex coupling in 52 mm length.



Laurent Audigé

Development and validation of AO fracture classifications

Following in the footsteps of Prof M Müller and as a continuation of a long history of fracture classification at the AO Foundation, the AO Classification Supervisory Committee and AOCID are implementing projects aimed at the development and validation of fracture classification systems. Three projects are being conducted regarding pediatric long bone fractures, craniomaxillofacial fractures, and foot fractures. A fourth project about scapula fractures will be initiated in 2005 in collaboration with the OTA. Each project follows a sequential path of research and development (Fig 1) with three phases, so that classification systems are “validated” before being promoted by the AO for use in practice.

The first phase of development requires clear definition of the proposed classification system and clear definition of the process used to allow reliable and accurate diagnosis. This is a long and difficult exercise that often requires a series of pilot agreement studies to test the understanding and adequacy of the definitions. For instance, the pediatric long bone classification required 4 pilot agreement studies over two years to complete this phase in 2003. This classification is based on the principles of the Müller AO Classification of Fractures of the Long Bones with some adaptations for children. A distinction between E (epiphyseal), M (metaphyseal) and D (diaphyseal) fractures was introduced, whereby surgeons should apply a transparency with pre-drawn squares on ante-posterior radiographs to ensure reliable and accurate diagnosis (Fig 2). The fourth agreement study conducted by 5 surgeons on 270 cases showed excellent reliability (Kappa values above 0.90) and accuracy (above 95% by most surgeons and for almost all fracture categories).

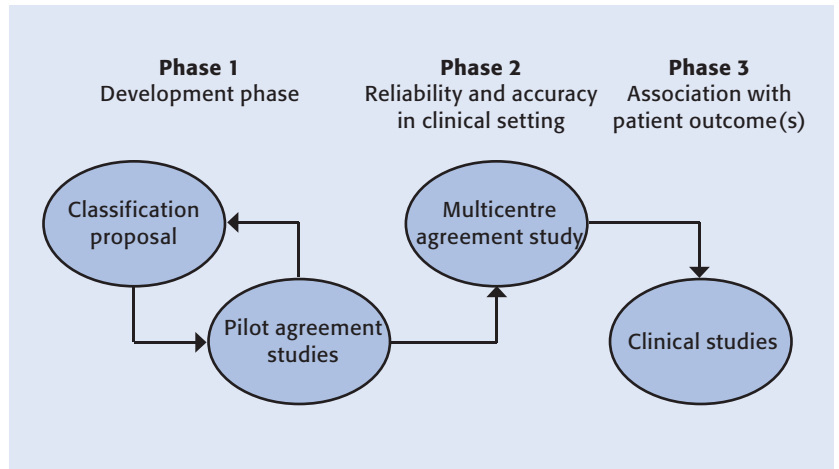


Fig 1 Research and development phases for the validation of fracture classification systems.

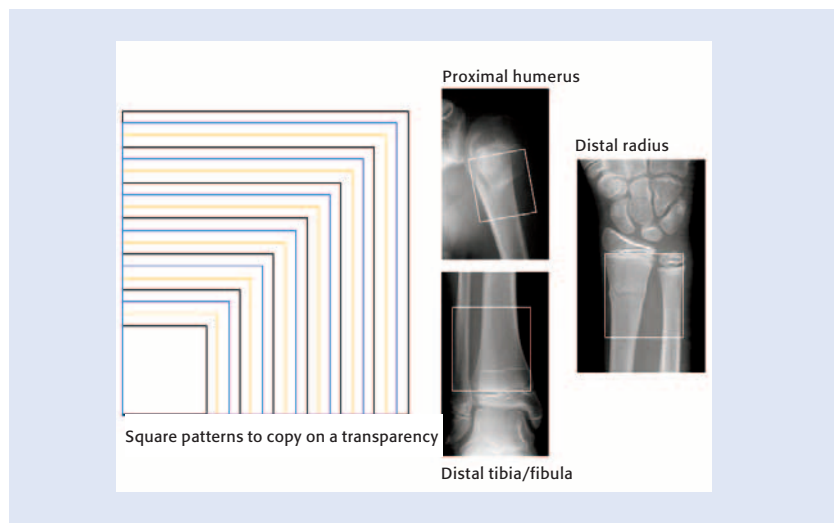


Fig 2 Application of the square pattern for distinction between E (epiphyseal), M (metaphyseal) and D (diaphyseal) pediatric fractures.

The CMF classification project is currently in its first phase of development and two pilot studies were conducted in 2004. CT-scans are used for craniomaxillofacial and condylar fractures, while radiographs are used for other mandibular fractures. To assist the diagnosis and classification of complex fractures, a specific software is being developed

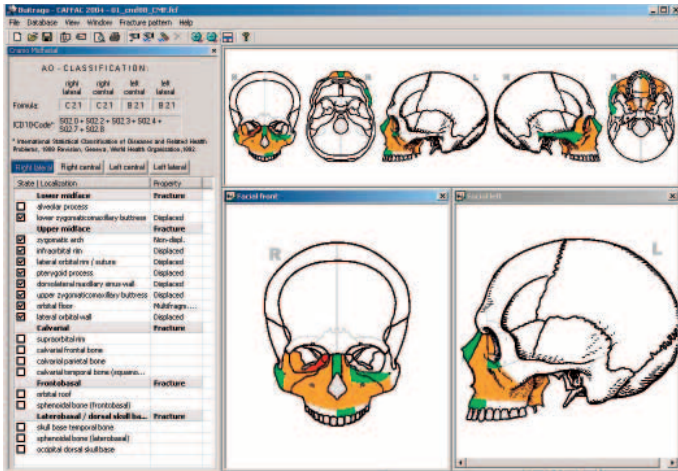


Fig 3: Software developed to assist surgeons in classifying cranio-midface fractures.



Fig 4: Web-based multi-center classification agreement study for the validation of the pediatric long bone classification system.

(Fig 3). This tool seems to be very helpful and necessary, and an extension with modules for other parts of the body is foreseen in the near future.

Once pilot agreement studies have provided acceptable results to the clinical experts, the classification process is then tested on a larger group of surgeons with different levels of training. The pediatric long bone classification entered that second phase of validation in 2004. This is a critical step since reliability and accuracy results should be duplicated in the clinical setting. We developed a web-based tool and selected 15 clinics in 5 countries, where about 80 surgeons are currently classifying the cases online (Fig 4).

The last phase of validation is conducted via a prospective clinical study where all fractures are classified according to the proposed system and diagnostic process. Patients are followed to assess their treatment and outcomes so that the prognostic value of tested classification systems can be documented. We expect that the pediatric long bone classification will enter that third phase next year, with data collection starting in the year 2006.

The time and resources needed to accomplish these projects are important, and a close and active multidisciplinary collaboration between

clinicians and methodologists/statisticians is required to meet the challenges. As shown by the successful progress made by the AO classification projects, a systematic methodological approach allows the development of useful tools and diagnostic processes for valid documentation of bone injuries.

The AO Classification Supervisory Committee recommends that a classification system be promoted as a “preliminary” AO classification once the first two phases are completed. This should allow consultation among surgeons world-wide as well as initial use in clinical settings. After completion of the third phase, this classification would be officially “validated”. It is however recommended that its value be monitored over time and that it be adapted to any significant clinical changes such as change in diagnostic imaging or treatment options.

Hansrudi Noser

Database of Human CT Data

Did you ever worry about the shape of your distal radius plate? It is the goal of ADI's project "Database of Human CT Data" to provide correct morphological bone data as a basis for improved implant design. To make this idea become a useful development tool a number of problems need to be solved.

Diagnostic CT-scans are commonly performed in the clinical routine. Based on such data you get 3-D visualisations from your radiologist. As these datasets are acquired with different scanning protocols to answer clinical questions they do not show a complete bone but only parts of it. For our purpose we need high quality CT-scans of complete bones. To achieve this goal specific bone scans need to be performed in a standardized manner.

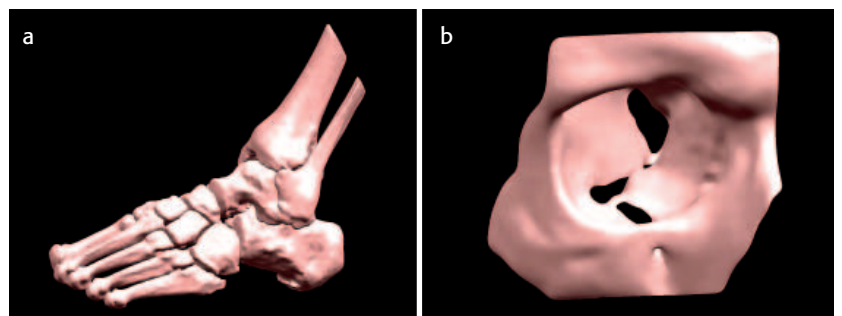
The CT data can not be directly used for implant design. Raw CT data need conversion into three dimensional CAD (Computer Aided Design) data that can be manipulated with modern CAD-software tools. Only the first step of data conversion can be done automatically. The segmentation of complex structures such as the bone's metaphysis or articular surface need to be refined manually slice by slice. This is the most time consuming task of our project!

The project was started in December 2002 and is worked on in close collaboration with Synthes. Our datasets are now utilized for implant design or to create more realistic plastic bone models. The more data we have included in our database the more different applications can be addressed—we are looking forward to discuss your project proposals!

Contact: hansrudi.noser@aofoundation.org

Available CT data	Available 3D CAD data
50 Tibiae	10 Tibiae
30 Humeri	30 Humeri
46 Femora	46 Femora
14 Hands	1 Hand
10 Radi/Ulna	3 Radi/Ulna
14 Feet	1 Foot

Currently available CT data and converted 3-D CAD data.



Such CAD datasets may become useful for the developing of foot (a) or orbita (b) implants.



Fitting the implant to the bone.



The team behind the "Database of Human CT data".

Shew-Ping Chow

Portrait of Frankie Leung, MD, FRCS



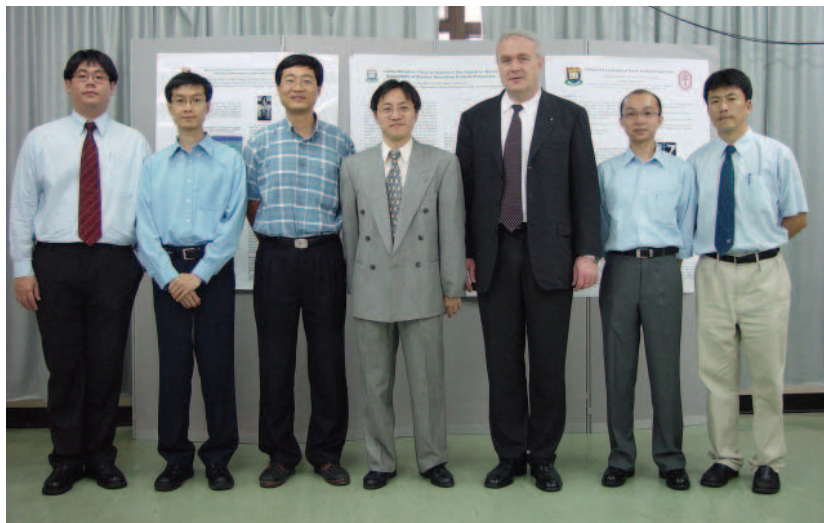
Frankie Leung graduated from the Faculty of Medicine at The University of Hong Kong in 1989. After completing one year of a rotating internship, he joined in the 6-year orthopedic residency training program, during which he spent one year in general surgery and also obtained the Fellowship of the Royal College of Surgeons of Edinburgh. When he completed his residency training, he successfully passed the specialist orthopedic examination in Hong Kong and was elected as the Fellow of the Hong Kong College of Orthopedic Surgeons and a Fellow of the Hong Kong Academy of Medicine (Orthopedics and Traumatology) in 1996. He was immediately sent overseas for a period of further training at the Harborview Medical Centre in Seattle and the Massachusetts General Hospital in Boston. Upon his return to Hong Kong in 1997, he dedicated himself totally to orthopedic trauma.

His association with AO activities started when he was a resident as all of them would go through the AO basic course. Subsequently he attended the advanced course and became a table instructor for AO courses in Hong Kong. Since 1999, he also helped as table in-

structor and faculty member in various courses held in AOEA, and in Davos. He helped and eventually took over the organization of AO courses in Hong Kong in the past few years. He also participated as the Education Committee member and subsequently the Steering Committee member of AOEA, and starting 2004, was elected the Editor of Newsletter and Assistant Secretary-General of AOEA. He initiated and eventually established the Hong Kong AO Alumni Association and became its founding Chairman. Eventually in June 2004, he was elected an AO Foundation Trustee.

Frankie is keen on academic activities and research in orthopedic trauma and made his first presentation on “The epidemiology of hip fractures in Hong Kong Chinese” at the 1995 Western Pacific Orthopedic Association meeting when he was a resident. Subsequently, he has published more than ten papers in international referred journals, coordinated multi-centre clinical trials, helped to design implants, and supervised biomechanical studies. Many of his publications have won awards at various congresses.

Frankie is an unassuming person, yet has a great sense of humor. Many have been surprised by his talent in Karaoke singing which is approaching professional level. He is reliable both as a person, and professionally. During his leisure time, he likes to read, swim, and travel. All these activities are supported by his wife Peony Wong, who works as a nurse, and their two children.



Norbert Haas

TK Prize 2003



The AO Foundation does not pay financial compensation to the surgeons who are engaged in development, education, or clinical research. This is one of the principles making the AO such a unique organization. The AO

Technical Commission gives recognition through its annual TK Prize, publicly awarded during the opening ceremony of the english course week in Davos.

The TK Prize 2003 was awarded to Brigitte von Rechenberg, Zurich, for her outstanding contribution to the development and implementation of the new biotechnology organization of the AO.

The scientific goal of this group is to expand the AO know-how into novel biotechnology solutions focusing on cartilage, disc and bone regeneration.

Brigitte von Rechenberg set up an independent structure with external experts. This will enable the AO to implement innovative research results in the area of biotechnology into new products in trauma and orthopedic surgery.

Since the AOTK feels that the next quantum leap will come from this area, her tremendous efforts were worthwhile to be honored.

AO Courses

For registration and further information visit: www.aofoundation.org/aoi/courses

Date	Event	Place	Country	Language
General Trauma				
February				
01.02–05.02	Symposium on Advanced Intramedullary Nailing	Davos	Switzerland	Spanish, English
01.02–31.03	Pelvic Course	Singapore	Singapore	English
03.02–06.02	3. Homburger Beckenkurs	Homburg	Germany	German
07.02–12.02	Central American Course on Avances in Fracture Management	Guatemala City	Guatemala	Spanish
08.02–11.02	Principles of Operative Fracture Treatment	Stockholm	Sweden	Swedish
09.02–11.02	Principles of Operative Fracture Treatment	Szeged	Hungary	English
09.02–11.02	Advances in Fracture Management	Leon, Guanajuato	Mexico	Spanish
16.02–19.02	AO Advanced Course	Bormio	Italy	Italian, English
16.02–19.02	Principles of Operative Fracture Treatment	Campo Grande	Brazil	Portuguese
17.02–20.02	Principles of Operative Fracture Treatment	Yokohama	Japan	English, Japanese
17.02–20.02	Advances in Fracture Management	Yokohama	Japan	English, Japanese
17.02–19.02	Fortgeschrittenen Kurs	Salzburg	Austria	German
25.02–28.02	Minimally Invasive Plate Osteosynthesis (MISS) for Surgeons	Hong Kong	Hong Kong	English
March				
01.03–31.03	Shaft Fractures - Intramedullary Nailing	Guangdong, Hubei	China	English
10.03–12.03	Seminar on Minimally Invasive Osteosynthesis - MISS	Sao Paulo	Brazil	Portuguese

Date	Event	Place	Country	Language
11.03	The Upper Limb	Bruxelles	Belgium	English
11.03	AO Seminar Fractures in Childhood	Tehran	Iran	English
12.03	5.Celler AO- Seminar	Celle	Germany	German
13.03–18.03	Advances in Fracture Management	Are	Sweden	Swedish
14.03–17.03	Principles of Operative Fracture Treatment	Edinburgh	United Kingdom	English
14.03–17.03	38. AO Kurs Trauma I – Prinzipien Kurs	Freiburg	Germany	German
15.03–18.03	Principles of Operative Fracture Treatment	Sydney	Australia	English
16.03–26.03	Principles of Operative Fracture Treatment	Moscow	Russian Federation	English, Russian
17.03–20.03	Advanced Course	Bangalore	India	English
20.03–24.03	Cours de base AO pour jeunes chirurgiens	?	France	French
21.03–24.03	Principles of Operative Fracture Treatment	Dublin	Ireland	English
April				
01.04–30.04	Principles Seminar (LCP)	Chengdu, Chongqing	China	English
06.04–08.04	Advances in Fracture Management	Plzen	Czech Republic	Czech, English
08.04	AO Seminar on Periprosthetic Fractures after Knee Arthroplasty + Pediatric Fractures (Upper Extremity)	Plzen	Czech Republic	English, Czech
08.04–09.04	Seminar on Intramedullary Fixation	Santiago	Chile	Spanish
11.04–16.04	Advances in Fracture Management	Punta del Este	Uruguay	Spanish
12.04–15.04	Advances in Fracture Management	Kuala Lumpur	Malaysia	English
13.04–17.04	Principles of Operative Fracture Treatment	San Juan	Spain	Spanish
15.04–16.04	Seminar of Complex Trauma on Upper Limb	Sao Paulo	Brazil	Portuguese
24.04–29.04	Lecture Tour on LPHP, PLT Metaphyseal Plate, Distal femur	Delhi, Mumbai, Chennai	India	English
29.04–01.05	Principles of Operative Fracture Management	Kaohsiung	Taiwan, R.O.C.	English
Hand				
March				
10.03–12.03	Handkurs Trauma II	Münster	Germany	German
CMF				
February				
07.02 - 09.02	Maxillofacial Course	Bangkok	Thailand	English
March				
09.03–11.03	Cranio-maxillofacial Endoscopic Course—New Technologies	Cadiz	Spain	English
12.03–14.03	Advanced Cranio-Maxillofacial Course	Hong Kong	Hong Kong	English
31.03–02.04	Central European CMF Course	Prague	Czech Republic	English
April				
22.04	Cranio Maxillofacial Seminar	Bruxelles	Belgium	English
Spine				
February				
01.02–31.03	AOSpine Comprehensive Course	Singapore	Singapore	
17.02–18.02	AOSpine Course for Residents of Universitys of Milan and Turin	Galeazzi Institute, Milan	Italy	
21.02–23.02	AOSpine Masterclass	Innsbruck	Austria	
March				
01.03–31.03	AOSpine Comprehensive Course	Qingdao	China	
01.03–01.12	AOSpine Comprehensive Course	Lille	Belgium	
04.03–05.03	Kurzstreckige und Langstreckige Fusionen	Düsseldorf	Germany	

Date	Event	Place	Country	Language
10.03–13.03	AOSpine European Comprehensive Course	Davos	Switzerland	
17.03–19.03	AOSpine Interactive Course		Brazil	
17.03–19.03	AOSpine Interactive Course	San José	Costa Rica	
25.03–28.03	AOSpine Regional Advance Course	International Reference Center, Pokfulam		Hong Kong
April				
01.04–30.04	AOSpine Seminar	Wuhan	China	
01.04–30.04	AOSpine Course	open	Netherlands	
07.04–08.04	AOSpine Forum	Leeds	United Kingdom	
11.04–23.04	AOSpine Latin American Course	San José	Costa Rica	
CMF				
January				
10.01–11.01	AO Craniomaxillofacial Course for ORP	Oberdorf	Switzerland	German
15.01	Trauma Workshop for ORP	Regensburg	Germany	German
February				
03.02	AO Workshop für OP-Personal	Wien	Austria	German
07.02–09.02	AO Course on Principles of Operative Fracture Treatment for ORP	Stockholm	Sweden	Swedish
09.02–11.02	AO Course on Principles of Operative Fracture Treatment for ORP	Szeged	Hungary	English
17.02–20.02	AO Course on Principles of Operative Fracture Treatment for ORP	Yokohama	Japan	English, Japanese
25.02–28.02	AO Course of Operative Fracture Treatment for ORP	Pokfulam	Hong Kong	English
28.02–01.03	ORP and TOA Schools Course, French	Oberdorf	Switzerland	French
March				
01.03–02.03	AO Tips for Trainers	Warwickshire	United Kingdom	English
02.03–03.03	ORP and TOA Schools Course, German	Oberdorf	Switzerland	German
15.03–17.03	AO Course on Principles of Operative Fracture Treatment for ORP	Sydney	Australia	English
20.03–24.03	AO Course on Principles of Operative Fracture Treatment for ORP	Sainte Maxime	France	French
April				
06.04–08.04	AO Course on Advances in Fracture Management for ORP	Plzen	Czech Republic	English, Czech
12.04–15.04	AO Course on Advances in Fracture Management for ORP	Kuala Lumpur	Malaysia	English
18.04–19.04	AO Course on Principles of Operative Fracture Treatment for ORP	Andalucia	Spain	Spanisch
18.04–19.04	AOSpine Introductory Course for ORP	Oxford	United Kingdom	English
18.04–20.04	AO Kurs für OP-Personal Prinzipien der op. Frakturbehandlung	Tübingen	Germany	German
20.04–21.04	AOSpine Deformity Course for ORP	Oxford	United Kingdom	English
20.04–22.04	AO Kurs für OP-Personal Prinzipien der op. Frakturbehandlung	Tübingen	Germany	German
21.04–22.04	AO Course on Principles of Operative Fracture Treatment for ORP	Basque Country	Spain	Spanish
29.04–01.05	AO Course on Principles of Operative Fracture Treatment for ORP	Kaohsiung	Taiwan, R.O.C.	English, Chinese

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