I S A K O S 9th BIENNIAL CONGRESS TORONTO/CANADA

SYMPOSIUM: KNEE OSTEOTOMY 5/15/2013 11:00 – 12:OO

Current & Future Application of Knee Osteotomy: Primary Osteotomy for Osteoarthritis

and Concomitant Osteotomy in Joint Reconstruction

High Tibial open-wedge Osteotomy with TomoFix®

Alex E. Staubli, Lucerne, Switzerland

Website: www.alexstaubli.com

Introduction

After many years of closed wedge high tibial osteotomy, open wedge valgization has become popular because of the advantages of open-wedge HTO with new surgical concepts and new implants, but in many countries closed-wedge HTO is still a standard procedure.

A group of orthopaedic surgeons joined forces as a Knee Preservation Expert Group with the support of the AO-Foundation® with the aim of closely examining the advantages and disadvantages of the open-wedge technique and to further develop this procedure, as required. The TomoFix angular stable internal fixator plate and the biplane surgical technique are a well-established method since the year 2000 for open wedge HTO. Our studies show both promising clinical and functional short-term and midterm results.

Significant improvements in the last 2 decades on four fronts:

- **Indication and Patient Selection**
- **Imaging and preoperative planning: including long standing full leg x-rays**
- **Use of a more appropriate Surgical Technique and**
- **Promoting osteogenesis through angular stable fixation devices**

12 Steps of the Surgical Technique

Landmarks, Exposure

Staged medial release

Intraoperative precision with K-wires or computed navigation

Biplanar osteotomy: Osteotomy level, direction and configuration

Gradual opening and the plastic deformation of the lateral hinge

A "functioning" lateral hinge

The fissures and fractures, depending on the opening, should be exactly where the epiphysis line cracks laterally, approximately 3-5 mm away from the lateral corticalis, proximally to the tibio-fibular joint**.**

In the case of multidirectional corrections, the lateral cortex should be cut.

This situation provokes secondary bone healing with all the associated consequences and needs for an implant and an operation method that has a salvage potential with best possible reposition and interfragmentary compression, providing re-stabilisation of the lateral hinge and correction as planned.To date, we have not had to perform any additional osteosyntheses in our patients provided with the TomoFix plate.Large metaphyseal bone areas and contact zones help to promote and secure the consolidation process of open-wedge high tibial osteotomies.

In case of hinge-disruption, indirect reposition and interfragmentary compression of the lateral hinge with a lag-screw through the 1st combi-hole distally to the osteotomy improves the interfragmentary stability dramatically.

Primary and secondary stability with an angular stable plate:

The implant TomoFix MPT (pure Titanium)

The by far most often used medial tibial Open-wedge plate was completely redesigned and, like all TomoFix-implants, subjected to the necessary biomechanical tests.

Depending on the anatomical topography, spacers and locking screws provide a more-or-less narrow gap which enables a largely unhindered periosteal blood supply and freedom of movement of soft tissues, like periosteum, capsule, tendons, e.g. the pes anserinus, MCL. The transmission of the forces, medially, is effected solely by the 4.5/5.0 angle-stable screws.

The MPT TomoFix plate with LCP- conical and combi-holes is positioned equidistant to the osteotomy gap so that 4 screws each, can be inserted in the two main fragments (for tibia of all dimensions). The LCP self-tapping screws in the proximal fragment have to be as long as possible and at least the 1st screw distally to the osteotomy-gap has to be inserted bicortically.

Fast rehabilitation:Early full ROM and weight bearing up to pain limit within the next days and weeks postoperatively

Optimal bone-healing in open-wedge biplanar HTO with TomoFix:

This construct has a high potential of bone healing without interpositional grafting.
Up until now we do not recommend bone substitutes except in rare cases.

Our Recommendations:

- New saw blades – single use, slow sawing, permanent water cooling
- STANDARD SURGICAL TECHNIQUE

- While opening no suction of the osteotomy gap, leaving the clot in the gap (drainage without suction, haemostatic fleece or periosteal flap)
- Immediate weight bearing up to pain limit.

To do`s...in case of bone healing delay: Recommendations of AO - JPEG 2013

Wait ... in most cases no gap filling is necessary – there is delayed progress to union without intervention. In cases with huge gap or known bad bone healing conditions, primary autologous cancellous bone from the iliac crest should be used. In few cases of painful delayed unions, do a CT scan to verifie - use of cancellous bone in secondary surgery.

Results of the AO Study: "Outcome after high tibial open wedge osteotomy: a retrospective evaluation of 533 patients".

A multicenter case series (AO study from 3 European clinics: Hanover, Tuebingen and Lucerne) involving retrospective capture of baseline data and prospective outcome assessment of patients with l medial unicompartmental knee osteoarthritis who underwent an osteotomy using TomoFix plate was conducted.

- Functional outcome was assessed using Oxford 12-item Knee Score (OKS). OKS is a patient self-reported questionnaire that is easy to understand (12 questions regarding pain and function).
- Before surgery, the majority of patients had grade III (52%) and grade IV (33%) lesions according to Outerbridge classification.
- The mean Oxford Knee Scores was 43 points (maximum 48 points).
- The most important finding of the present study was the good- to excellent patient-reported functional outcome with a mean OKS of 43 even in older patients and patients with higher degree of cartilage damage. Therefore, existing international guidelines containing age or cartilage lesion (up to grade IV - i.e. "bone-on-bone") limitations for HTO may need to be re-evaluated due to our results.
- By using the OKS, the current study is the first study in which a comparison between the outcome after HTO (open-wedge here) and knee hemi-arthroplasty can be made. The study data showed similar and even better clinical results compared to medial UKA.
- In this study, in only 8 cases out of 533 was a delayed bone union observed and support the results of a similar TomoFix study with one case of delayed bone healing in 92 open-wedge osteotomies with TomoFix and biplane osteotomy technique.

Conclusion of the AO - Study : Being male, being operated by an experienced surgeon, having no intake of pain medication at follow-up and having no postoperative complication are positive predictors of the Oxford Knee Score up to 5 years after surgery.

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