Osteotomy around the knee: state of the art and new challenges

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In line with the SICOT policy of universality, the Editorial Board has opted to deal with the subject of osteotomy around the knee (OAK) for this special issue because this surgery is being performed today in most parts of the world. Our objective is to provide a comprehensive overview of the major indications and results of OAK.

General orthopaedic surgeons worldwide have all been trained to practice at least high tibial osteotomy (HTO). Indeed, it is one of the most frequent procedures in knee osteoarthritis and does not need any sophisticated instruments or implants. It is also convenient in some countries for socio-economic reasons. Concerning OA of the medial or lateral compartment, the goal of osteotomy is to transfer the weight load from the damaged area to an undamaged compartment, thus delaying a joint arthroplasty. HTO remains a viable option for selected patients.

To address some major aspects of OAK, we have selected and invited eminent authors from 11 countries in four continents. Among them, Tomihisa Koshino from Japan who is famous for his outstanding experience. If the international orthopaedic community were to give an OAK recognition award, it would be given to Tomihisa Koshino of Yokohama both for his pioneering work and for the number of impressive articles and excellent results.

The state of the art is mainly concerned with biomechanics, which are being revisited, preoperative planning, precision of surgical techniques and calculation of angles sufficiently accurately to optimise axes correction and enhance cartilage regeneration. New challenges are born with navigation and with new implants, allowing greater

surgical indications in addition to better OAK stability and knee mobility. Modern reviews are reporting slightly longer satisfactory results.

Regarding our 21 articles, three good reviews are from the United States. First, Wolcott et al. [1] have stated that “Correction of malalignment in young patients with unicompartmental disease has shown promising results, but more long-term, prospective studies are needed to determine functional results”. The review of Sherman and Cabanela (Mayo Clinic) [2] concerns closing osteotomy in femur and tibia. Their “principal indications include unicompartmental medial and, to a lesser extent, varus knee gonarthrosis and unicompartmental lateral or valgus knee gonarthrosis with a well-maintained range of motion in patients who are physiologically young”. Based on the findings of Amendola and Bonasia [3], “the ideal candidate for a HTO is a young patient (<60 years of age), with isolated medial osteoarthritis, a good range of motion and without ligamentous instability”.

To fix or not to fix an osteotomy rigidly is a question answered by Staubli and Jacob (Switzerland) [4] when they advocate “promoting osteogenesis through an angular-stable fixation device with just the correct amount of elasticity”. After the previous proposals of closing and opening, Saragaglia [5] (France) intervenes in the debate by asking “which osteotomy for which genu varus?”, and by recommending as tool of selection, “the computer assisted osteotomies for genu varum deformity”. Hernigou et al. [6], accustomed to large varus angle procedures, are still at ease with the open wedge technique armed with resorbable beta tricalcium phosphate. In a one-year randomised controlled study Gaasbeek et al. [7] discuss correction accuracy and collateral laxity in open versus closed wedge high tibial osteotomy. Both techniques led to good and comparable clinical results.

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With a five- to 26-year follow-up, Benzakour et al. (Morocco) [8] report on their experience of opening and closing HTO for medial osteoarthritis of the knee. “The average of 5° mechanical valgus at the time of osteotomy seems to be quite effective at follow-up for at least ten years”. Another Dutch team gives different views on stability of medial opening wedge HTO.

A failure analysis made by Nelissen et al. [9] concludes that “Surgical technique and implant stability are important factors for successful outcome”.

Many surgeons persist in thinking that one must graft opening wedge osteotomy, and Santic et al. [10] from Croatia have stressed this need with their study stating: Bone allograft provides bone healing in the medial opening HTO. Abdel Megied et al. [11] from Egypt clearly describe “the new dual osteotomy” combining open wedge and tibial tuberosity anteriorisation osteotomies. From Italy, Puddu et al. [12] have a didactic answer to a difficult question “Which osteotomy for a valgus knee?” From Canada, Kosashvili et al. [13] recommend distal femoral varus osteotomy for lateral osteoarthritis of the knee as a viable treatment alternative for lateral compartment gonarthrosis. In the matter of “complications of closing wedge high tibial osteotomy”, Tunggal et al. (Canada) [14] examine current thoughts on aetiology, avoidance techniques, and methods of treatment of these complications.

Koshino [15] reports on his exceptional 38-year super-long-term follow-up to detect osteoarthritis after osteotomy around young deformed knees. At the final follow-up in all of them, the deformities were satisfactorily corrected to be aligned, with no symptoms apart from nine knees. Chan et al. (USA) [16] analysed the literature on knee nonunions. These are amenable to many surgical methods including external fixation, intramedullary nailing, arthroplasty, and fixed angle plating. For failures or poorly maintained good results, we have two papers on knee replacement. Bae et al. [17] (South Korea) discuss “Total knee arthroplasty following closed wedge high tibial osteotomy”. They conclude that a meticulous surgical technique can produce satisfactory results (with respect to deformity, height, and bone resection). Amendola et al. [18] report from Italy on their 96.5% satisfactory results in knee joint arthroplasty after tibial osteotomy.

The patello-femoral issues are addressed in three articles. Pecina et al. [19] from Croatia has documented in depth the “Sagittal osteotomy of the patella after Morscher”. The postoperative redistribution of the stresses throughout the patella was shown thanks to photo-elasticimetric models. Excellent and good results were obtained in 90% of cases. “This technique is an enrichment of the spectrum of the secondary-causal and preventive procedures for the treatment of patello-femoral disorders”.

In their article, “Osteotomies of the tibial tubercle in patellofemoral instability and in vertical patellar height

abnormalities”, Caton [20] (France) states that a precise preoperative plan is needed on CT scan in order to obtain satisfactory results. Dejour and Saggin [21] end this special issue series by the ingenious and demanding Lyon’s procedure. The sulcus deepening trochleoplasty aims at treating patellar instability (trochlear dysplasia).

This special issue on OAK has assembled experts from around the world to draw an overview of the main aspects, indications and results, aiming to provide up-to-date information on a hot topic always in continuous development. Finally, I am grateful to all my invited authors for their kind contribution to this international special issue. I hope that knee surgeons in addition to general orthopaedic surgeons will enjoy it. I would like also to express my special thanks to the I.O. Editorial Board members and mainly to Marko Pecina, Jean Pierre Courpied and Tony Hall for their constant help on the matter.

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