INTRODUCTION:

High tibial osteotomy (HTO) is a well-established treatment option for varus gonarthrosis in young, active patients. The goal of treatment is to relieve medial compartmental knee pain and slow the progression of arthritis by partially unloading the medial compartment with an overcorrection of the mechanical axis. Many techniques have been described including dome, en chevron, medial opening wedge and lateral closing wedge. The medial opening wedge HTO offers many advantages over the lateral closing wedge osteotomy, including maintenance of bone stock and lack of requirement for fibular osteotomy that otherwise carries a risk of peroneal nerve damage. Many different fixation plates have been described for opening wedge HTO, but the one developed by Puddu et al is commonly used which has a small spacer tooth to provide additional stability and prevent deformity recurrence. Whilst some authors report excellent medium and long-term clinical and radiological results with this plate and technique, others report high failure rates of up to 45%.[2,3] Some studies have also shown significantly more complications in patients who have higher degrees of correction (i.e. wider wedge sizes).[4]

The aim of our study was to analyse the postoperative complications of HTO with Puddu plate fixation and to assess if there was any correlation between the wedge size and the incidence of complications.

METHODS:

Between December 2002 and July 2009, 131 consecutive medial opening wedge HTO were performed for unicompartmental varus gonarthrosis (123 patients; 99 males; 24 females). Mean age at time of surgery was 41.4 years (range 18-61). Four experienced orthopedic surgeons at a tertiary referral centre performed all operations. Patients were followed up for an average of 52 months (range 12-115 months). The standard surgical approach was used to perform a high tibial osteotomy; the tibia was wedged to the point of desired correction using long limb alignment rods to confirm deformity correction. A Puddu I (Arthrex, USA) spacer plate, was fixed with two cancellous screws proximally and two cortical screws distally. The osteotomy gap was filled with synthetic bone graft in 110 cases, autogenous iliac crest bone graft in 13 cases and a mixture of the two in 8 cases. The mean wedge size was 9.93mm (range 5 to 15mm). Average preoperative and postoperative alignments were 5.3° varus and 7.8° valgus respectively. Patients were kept non-weight bearing for 6 weeks postoperatively with a further partial weight bearing status for 6 weeks. Partial weight bearing was continued until radiological evidence of progressive osteotomy healing was seen.

Data was retrieved retrospectively via patient case notes and patient interview to obtain accurate information about complications within the first postoperative year and to assess the long-term failure rate. The effect of the wedge size on the complication rates within the first year was assessed using two defined groups, the first group with a wedge less than or equal to 10mm and the second group with a wedge of more than 10mm. A chi-square test was used to analyse the results of the two groups. The null hypothesis stated that there was no significant difference between general or specific complication rates in the larger wedge group compared to the smaller wedge group.

RESULTS SECTION:

The overall complication rate in this series was 31%. The rate of specific complications, including fracture, non union, delayed union, broken screws and deformity recurrence was 16.8%. General complications including infection, haematoma, chronic regional pain syndrome and deep venous thrombosis were evident in 14.2%. There was no significant difference between overall complication rate in the larger or smaller wedge group (chi-square = 0.322, 1 d.f, p=0.57). Similarly, there was no significant difference between specific complication rates in the larger or smaller wedge group (chi-square = 1.877, 1 d.f, p=0.39). Eight out of 131 cases (6.1%) were revised after an average of 6.9 months (range 5-9 months). All these patients had specific complications (2 cases of loss of correction associated with broken metalwork, 1 lateral cortex fracture and 5 non or delayed unions.

Twelve out of 131 cases (9.2%) went on to have knee arthroplasty after an average of 37.6 months post HTO (Range 5-75 months), with a further 6 conversions anticipated in the near future. In 45 out of 131 cases, patients had removal of metalwork. This was due to pain or discomfort from a superficial plate but for the purposes of this study was not considered to be a complication.

DISCUSSION:

In our study, we aimed to evaluate complication rates after high tibial osteotomy and elucidate if they corresponded with larger wedge sizes. Previous studies have provided conflicting information with large variations in complication rates quoted. However, detailed review of the literature suggests varied interpretation of the definition of a complication with some authors including painful metalwork or valgus alignment less than 8 degrees as a recognized complication[2]. In this series we identified an overall complication rate of 31% including for infections, non/mal unions, fractures, broken screws, loss of a previously good correction, deep venous thrombosis and compartment syndrome. There was no significant correlation between these complications and larger degrees of correction (wedge sizes).

Similarly, looking at mechanical complications alone (non or malunions, fractures, broken metalwork, loss of correction), there was also no correlation between these and larger wedge sizes. These findings contradict other groups who have cited more complications with higher corrections and suggested that osteotomy be performed earlier when the varus deformation is still minimal.[1]

It is interesting that other authors have reported particularly high incidences of complications with the first-generation Puddu plate.[2] However, the aetiology of complications is likely to be multifactorial and must not be attributed to device alone. Further investigation into different stabilization devices is therefore warranted.

While this series has a high number of patients followed up over a long period of time by an independent observer, there are certain weaknesses in this series. The retrospective nature of the study meant that information was retrieved from case notes and patient interviews thus relying on documentation and memory. In addition to looking at wedge sizes, it would also have been interesting to study the effect of autogenous and synthetic bone graft on complication and failure rates. It is well known that autograft harvesting involves longer operative time and donor site morbidity but has excellent osteoconductive and osteoinductive potential.[3] Most cases in our study involved the use of synthetic bone graft so the numbers required for comparison were lacking, but this could well form the basis of any future studies on this topic.

REFERENCES:


