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Theme: Extensile approaches for revision knee arthroplasty

Abbas AMI, Williams RLL, Khan WS, Ghandour A, Morgan-Jones RL. Tibial crest osteotomy in extensile knee exposure - a modified, low-energy, suture technique. *J Arthroplasty* 2016; 31:383-88.

Importance

Exposure for revision total knee arthroplasty can be a challenge requiring an approach that is different to primary arthroplasty. It is important that the revision surgeon has an understanding of appropriate releases that may aid exposure and help to prevent complications.

Tibial crest osteotomy (TCO) is a technique that allows the surgeon to mobilise the extensor mechanism and gain access to the proximal tibia to aid implant removal. Other valid options include a quadriceps turn-down or snip.

Previous reports, commonly using a smaller tibial tubercle osteotomy (TTO) secured with screws or wires, have been associated with problems related to the fixation. Additional issues have been noted with nonunion of the osteotomy and fracture of the osteotomy fragment.

Summary

- This single-centre consecutive case series from Cardiff reports the use of TCO with an average follow-up of 22 months.
- 181 osteotomies (159 patients) were followed up with radiological and clinical assessment.
- All osteotomies went on to unite with a mean average time to union of 11 weeks.
- Despite proximal migration of the fragment in six cases (3%) no extensor lag was found in any of the group. This was despite unrestricted rehabilitation.

- The authors' technique is described in detail with tips from their practice about how to maximise results of this technique.
- The authors attribute their improved results to a number of factors:
 1. A longer osteotomy (TCO) than previous reports (TTO).
 2. A low energy technique using osteotomes to create the osteotomy and careful preservation of the lateral soft-tissue envelope.
 3. Use of sutures (5 Ethibond) to secure the osteotomy rather than screws or a wire.

REVIEW

Purpose of this paper

This paper has a clearly-defined intention of promoting this technique and encouraging the use of the modified method, which the authors have found to be successful.

The primary outcomes were targeted at complications of previous techniques - nonunion and proximal migration of the fragment.

Methods

- All consecutive patients underwent this procedure unless it was contraindicated by the anatomy present or was felt to be unnecessary (< 20%)
- Radiological review was performed with plain films. Union was judged by presence of bridging trabeculae on two views.
- Clinical review was included but outcomes were limited to evidence of delayed healing of wounds and extensor lag.
- Patient demographics, reason for revision and exclusions were clearly recorded.
- The methodology of the osteotomy was explained in detail with very informative schematic diagrams.

Results

- Radiological union in 100% at mean 11 weeks (range 6-20 weeks).
- Proximal migration in six cases (mean 11.5 mm) but no cases of extensor lag.
- Fragmentation of osteotomy in 11 knees (6%) with no change to post-operative management required.
- No delayed wound healing.

Outcomes

- Complications are infrequent and minor, resulting in uneventful healing in all patients
- TCO can be recommended for its safety and efficacy when an extensile approach is necessary

CRITIQUE

This paper gives a very thorough description of a modified osteotomy method that has successfully reduced the complications previously seen with this technique. The authors used this technique for 75% of revision cases performed without any radiological or clinical complications. The suture technique appears to provide sufficient stability to allow early mobilisation and even cases with proximal migration seem to have gone on to a successful outcome.

The schematics make interpretation of the technique used understandable and are well-described throughout with clear justifications made for each modification.

The methods seem both reproducible and achievable, although consideration must be given to the frequency with which this technique is used within the unit. Whether this technique was necessary for all of the patients is difficult to interpret. Clinical follow-up failed to include any measure of pain scoring or functional outcome and a comparison group may have allowed better evaluation against alternative extensile techniques. The validity of standard outcome measures in a heterogeneous revision arthroplasty group can be debated but may be of use in comparing these techniques directly.

Radiological follow-up is complete but time to union is likely dependent on the follow-up interval and subjective interpretation of images. The authors felt that computer tomography scanning was not necessary to further define this although our experience is that plain films are difficult to interpret in this patient group.

The subgroups of proximal migration and time to union greater than 3 months are not examined. Therefore potential risk factors for these findings (such as infection, age and implant design) are not able to be assessed.

Strengths of the study

- Single unit series with majority of cases performed using this technique.
- Outcomes targeted at areas of previous complications with similar techniques.
- Well written description of technique with informative illustrations.

Methodological concerns

- Lack of clinical scoring with purely objective outcomes.
- Union judged on imaging that may be compromised by presence of implant and views limited by obliquity of the osteotomy.

- No direct comparison with either group that did not require an osteotomy for exposure or other alternative extensile approaches.

CONCLUSIONS

This paper gives a well-written report of a useful revision surgery technique. The reported results are encouraging and give a rationale for improvements in these results compared to previous series. Therefore this may encourage increased use of this technique without the concerns regarding additional complications. However our experience is that many revision procedures can be safely performed without an extensile approach. Therefore it is unlikely that the routine use of this technique is to be advocated and the proximal migration of the fragment (even in small numbers without complication in this series) is of concern along with unreported problems of pain and stiffness.

Confidence in the use of two-dimensional imaging to define union in these cases may be questioned and the correlation between the method used and CT imaging may have been a worthwhile addition to this paper.

The specific indications for TCO remain incompletely defined. Therefore further work in selected patients is indicated. A randomised comparative study, with subjective outcome measures, is indicated to evaluate the utility of this technique and further study may target the groups in which this technique has most benefit. However it seems logical that, when contemplating the need for such an extensile approach, one would be wise to adhere to the principles described to limit the specific complications associated with previous TCO reports and fixation methods used.