

Journal Club: 15 January 2009
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Introduction

The focus of the evening was to review papers from the *Journal of Bone and Joint Surgery – British Volume*, all of which had been published in the preceeding year. Three papers were chosen by the organising consultant and two trainees were allocated to review each paper. One was detailed to elicit the positive attributes of the paper and the other to be critical. In addition to this we were encouraged to research around the subject matter of our allocated paper and to read some of the references.

We were lucky enough to have Mr James Scott, the Editor of the journal present, who was able to supply us with the reviewers comments and the justifications for publishing the papers.

The effect of Closed and open-wedge high tibial osteotomy on tibial slope. A Retrospective radiological review of 120 cases.

H El-Azab, A Halawa, H Anetzberger, A. B Imhoff, S Hinterwimmer.
J Bone Joint Surg [Br] 2008;90-B:1193-7.

Review

Methods

Study design and subject recruitment

This was a simple study design looking at two groups of patients and one outcome measure. As stated in the title it was a retrospective case series and thus showed level 4 evidence. It clearly stated the aims of the study, how the subjects were recruited and the groups identified.

Although the two groups were equally distributed with 60 patients, the opening wedge group was subsequently further split giving an additional group. This left two opening wedge groups treated with different fixation methods and so actually meant the study had three analysis groups with uneven numbers of patients. It was felt that this may have an impact on the data analysis and statistical significance of any findings, particularly as the authors do not appear to have performed a power analysis to identify the minimal number of patients needed to show a statistical difference between groups. Were these groups large enough?

Hypotheses

The authors posed four hypotheses only two of which were looking at issues not previously addressed by other papers.

The first hypotheses, relating to change in tibial slope according to whether the osteotomy was opening wedge or closing wedge had been demonstrated previously by Brouwer et al, Hohman et al and Giffin et al. Marti et al also demonstrated this phenomenon as well as the lack of correlation between correction in the frontal plane and change in tibial slope (hypothesis d).

Previous authors including Lobenhoffer and Agneskirchner have reported loss of correction of the deformity when using spacer plates. Spahn showed that spacer plates resulted in more patients needing additional correction than if an angle stable implant was used. Both these studies were looking at frontal plane correction; however one would assume that this loss of correction would also occur in the sagittal plane i.e change the tibial slope. Therefore it has to be questioned whether hypotheses c and d are in fact original concepts.

Results

Results, graphs and statistical analysis

It appears that all the patients in the groups were accounted for, with no missing results. This would be expected from this type of retrospective series. The results of the paper including statistical differences were clearly stated and the graph used was clear and easy to understand. The data are assumed to be normally distributed and mean values and standard deviations are quoted. Changes in tibial slope between post operative values and those prior to removal of hardware are not statistically significant and the mean values small; however the standard deviation values are much larger suggesting that some of the osteotomies had changed quite markedly, has this data simply been swallowed up by the data analysis? Do these bigger values represent failure of fixation and stability of the osteotomy?

Outcome measures

Outcome measures were uncomplicated allowing for simple statistical analysis using a paired t test between the two groups and regression analysis for hypothesis d.

Tibial slope measurements were made from standardised lateral radiographs whereas frontal plane correction was measured using digital X-ray software. Standardising radiographs will eliminate some but not all inaccuracies and the authors do acknowledge that ideally the angles should be recorded from CT images.

There was no change in tibial slope before and after metalwork removal suggesting that all these osteotomies had united or that the fixation used in all groups was sufficient to prevent recurrence of deformity even with full weight bearing.

Complications

The authors of this paper do not discuss any complications and we therefore do not know if there were any non unions. Staubli quotes a 2% delayed union rate in opening wedge osteotomies stabilised with a locking plate.

Completeness of follow up

Staubli assessed union of opening wedge osteotomies with CT analysis and found only 75% of the gap had filled at six months, with healing being over estimated at six months from plain radiographs. At one year after operation they found full healing in 90% of patients. Based on this work the recommendation from the recent review article (December 2008) is to not remove the metalwork before eighteen months. Clearly the union rate in closed wedge osteotomies without the gap will be quicker and less prone to nonunion.

Metalwork was removed at a mean of eight months and this is where the study ceases. An additional useful measurement would be the tibial slope angle at a period of time following metalwork removal, and thus give information on delayed or non unions and a real idea of the stability of the change in tibial slope.

Conclusions and Discussion

Hypotheses answered

The discussion is well written and the authors acknowledge that they have found hypothesis c to be incorrect. They suggest explanations for their findings highlighting the relevance of the anatomy and geometry of the proximal tibia to positioning of the osteotomy and its effect on tibial slope.

In summary the hypotheses a and d were proven to be true and thus confirms what is already known.

Shortcomings of Study

The study is too short and incomplete to conclude that the change in tibial slope over time in closing wedge osteotomies and opening wedge osteotomies with interlocking fixation is stable.

Relevance of results

There is further discussion on the relevance in alteration of tibial slope with regards to ligament intact and ligament deficient knees and the effect the slope has on joint loading and subsequent development of degenerative changes. They also discuss the relationship of increased tibial slope with decreased knee extension.

Relationship with existing knowledge

Although this paper has failed to demonstrate any new knowledge it has demonstrated extremely well the complex nature of osteotomy surgery and the need for meticulous pre-operative planning to avoid submitting the ligament deficient knee to abnormal loading or the stiff knee to further limitation of movement.