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Duration of External Fixation in Subtubercle Osteotomy

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We read with great interest the study by Warner et. al. on subtubercle osteotomy. We compliment the authors for their results and the good alignment achieved. We are concerned, however, about the duration of external fixation in their series—an average of 6.4 months (range, 3.3 to 13.2).

Although we appreciate the caution that the authors express about not removing the frame too soon, we believe that the long fixator duration may be a consequence of the use of a transverse Gigli saw osteotomy. This osteotomy has a poor bony area of contact and hence takes longer to heal. In addition, the authors used two rings proximally to enhance fixation of the proximal fragment. As a result, the location of the osteotomy becomes more distal, more in the diaphysis than in the metaphysis, which further contributes to a delay in healing.

May we suggest that a focal dome osteotomy (1) performed just distal to the tuberosity—closer to the metaphysis than the diaphysis—could reduce fixator duration, as has been reported by Catagni (2) [mean, 85 days], Robinson (3) [mean, 12.9 weeks], and Arunodaya (4) [mean, 14 weeks]. The focal dome osteotomy, which is outlined by a semicircular array of drill holes with its center based on the center of rotation of angulation (CORA) (1), allows correction of a large deformity without loss of bony contact between the fragments. A transverse osteotomy has less bony contact and is bound to take longer to heal.

It is also possible to achieve stability of fixation of the proximal fragment with only one ring, with two half pins placed at right angles to each other. The osteotomy can then be made at a slightly higher level than those performed by Warner et al.

The oldest patient in the study by Warner et al. was 78 years of age. Older patients may not tolerate a fixator for an average duration of six months.

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Conflict of Interest: None Declared

Article Author Response

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Article Author(s) to Letter Writer(s)

We appreciate the thoughtful comments from Drs. Chaudhary and Lakhani regarding the external fixation and osteotomy technique we utilized in our clinical series. As they suggest, it is possible that a different osteotomy technique might offer potential advantages in certain applications. However, focal dome osteotomy would have disadvantages for the specific application presented in our study.

First, the limited soft-tissue envelope around the proximal tibia can be problematic for the larger exposure required for a dome osteotomy, compared to the percutaneous (3 to 5 mm) incision used with the Gigli saw. Second, the transverse exposure needed for a dome osteotomy would undoubtedly complicate any longitudinal exposure needed for a subsequent total knee arthroplasty.

Regarding the location of the transverse osteotomy used in our study, it is placed in the metaphysis immediately distal to the tibial tubercle to avoid altering the patellofemoral relationships. A different osteotomy technique or the use of a single ring on the proximal segment would not allow the osteotomy to be any more proximal yet remain distal to the tubercle. Stated more simply, our osteotomy is as proximal as anatomically possible while staying distal to the tubercle.

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Although a focal dome osteotomy can be powerful for correction of coronal plane deformities, 23% of the patients in our study also required correction of a sagittal plane deformity. Such correction would be problematic if a dome osteotomy was employed. In addition, in many instances we used both angulation and translation to correct mechanical axis deviation. This is easy to do with a transverse osteotomy technique but would be difficult to achieve with a dome osteotomy.

The duration of time in the external fixator is only one factor and, in our view, a small one when the purpose of the treatment is to delay total knee arthroplasty by years or decades. As we noted in the manuscript, the primary surgeon in our study is conservative regarding frame removal. It should be emphasized that no patient in the study lost correction following frame removal and no patient had early frame removal due to intolerance of the treatment. Complication rates were low; patient happiness and pain relief were high.

Finally, none of the studies cited by Drs. Chaudhary and Lakhani were true survival analyses, and they did not provide data to support better long-term results with a dome osteotomy. The technique we present should not be altered until superior long-term results with a different osteotomy technique have been published.