V. Gurkan, M. Dursun, H. Orhun, F. Sari, M. Bulbul, and M. Aydogan **Long-term results of conservative treatment of Sanders type 4 fractures of the calcaneum: A SERIES OF 64 CASES** J Bone Joint Surg Br 2011; 93-B: 975-979

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**Long-term results of conservative treatment of Sanders type 4 fractures of the calcaneum**

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**Long-term results of conservative treatment of Sanders type 4 fractures of the calcaneum** Tim Schepers, Trauma Surgeon *Erasmus MC Rotterdam*, Lucas M.M. Vogels, Dennis den Hartog

We read this paper with interest and would like to express some concerns regarding this technique and the paper itself. Send letter to journal: The title of the study might be somewhat misleading, because actually the closed Re: Long-term reduction technique by Omoto was applied instead of true conservative management. results of This method applies the concept of capsuloligamentotaxis to manually reduce displaced conservative intra-articular calcaneal fractures in the operating room under sedatives. 1 In 2001 treatment of Omoto et al presented the results of 102 fractures, in which they claimed 89% Sanders type 4 successful reductions and 87% good to excellent outcome on the Maxfield score. 1 fractures of the calcaneum It is very difficult to anatomically grasp the concept of manually reducing displaced fragments of the posterior talocalcaneal joint (PTCJ) by capsuloligamentotaxis, Email Tim Schepers, especially in severely comminuted (i.e. Sanders type-4) fractures where the two central et al. PTCJ fragments are not attached to any ligaments. 2 In theory it might be possible to restore width and correct varus, but height and PTC alignment are virtually impossible to correct with manual reduction alone, which is illustrated well by the pre- and post-reduction images (Figures 1 and 3) in the paper, showing no difference in height and Böhler angle (-10° pre-reduction and -12° post-reduction).

Omoto et al infrequently applied a removable cast and advocated an early start of active exercises, which might explain their good results. 1 It is therefore surprising that the authors of the current paper apply a non-weight bearing cast for 12 weeks, of which four weeks are in a long-leg cast. Older studies on capsuloligamentotaxis, e.g. Böhler's technique, using long periods of plaster immobilisation have frequently shown irreproducible results, poor outcome and stiff joints. 3 Also in open reduction and internal fixation, plaster immobilisation has been shown to decrease outcome. 4 In studies on severely comminuted fractures (Crosby-Fitzgibbons type-3 and Sanders type-4) all fractures treated truly conservatively had a poor outcome 5 and 91% treated by ORIF had a fair or poor outcome. 6 Secondary arthrodesis rates for Sanders type-4 fractures have

been reported to be 5.5 times higher (up to 72%) compared with less severe fractures, 6,7 which is in contrast with 0% subtalar arthrodesis in the current study. 8

Perhaps the concerns we have with this technique are biased by our satisfactory outcome obtained with open and percutaneous reduction and internal fixation (depending on patient and fracture characteristics). However, our main criticism of this paper is the fact that the images shown do not represent a severely comminuted, Sanders type-4, displaced intra-articular calcaneal fracture. The conventional images show an Essex-Lopresti tongue-type fracture, which is usually a Sanders type-2 fracture, and the CT scan shows an upside-down Sanders type-2C fracture, with most of the joint surface intact. In the Sanders classification, the number of fracture-fragments with more than 2mm displacement at the widest portion of the PTCJ, including the sustentaculum tali, dictates the severity of the fracture. The bulging lateral wall portion and additional fractures in the sustentaculum are not to be counted. 6 Sanders type-4 (with three or more displaced fracture-lines and four or more fracture-fragments at the level of the PTCJ) only account for 4% to 28% of all displaced intra-articular calcaneal fractures. 8 Looking at the supporting studies gathered in table I (Studies reporting good results for the treatment of Sanders type 4 fractures), two of those were published prior to the publication and wide acceptance of the Sanders classification, only 7% of the conservatively treated patients in the study by Buckley et al were Sanders type-4 (which actually had the poorest outcome), and 0% in the study by Ibrahim et al.

The authors may not have classified some of the fractures correctly (at least in the presented case), which makes interpretation of the presented results quite difficult; therefore, we cannot recommend this technique based on this study.

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