

## Author's Reply

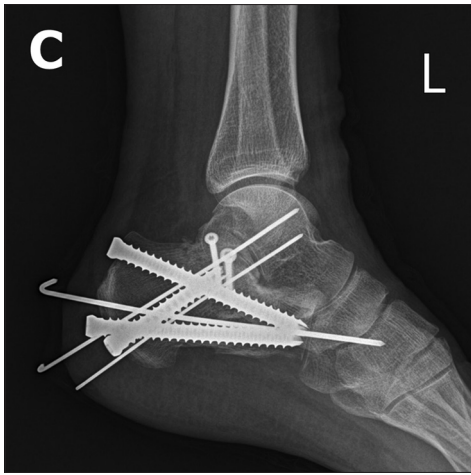
Sir,

We appreciate the authors<sup>1</sup> for showing a keen interest in our article titled, "Surgical Treatment of Sanders Type 2 Calcaneal Fractures Using a Sinus Tarsi Approach."<sup>2</sup> The response to your comments is as follows:

As you mentioned, age is one of the important factors that affect clinical results.<sup>3-5</sup> In calcaneal fractures, some authors suggested that patients who are older than 50 years may represent a relative contraindication due to poor reported outcomes.<sup>6,7</sup> However, Gaskill *et al.* in their study reported that outcomes of older patients were at least equivalent to those of younger patients who underwent internal fixation for an intraarticular calcaneal fracture.<sup>3</sup> Another study showed that patients who are other than 50 years reveal better clinical scores than other age groups although no statistical comparison was conducted.<sup>8</sup> In this study, the clinical outcome when using the American Orthopaedic Foot and Ankle Society (AOFAS) score was much superior than those reported in previously published studies.<sup>2</sup> We think that the following reasons can explain the better clinical results in our study: first, as persons get older, they become less active. Therefore, older patients could have less pain and discomfort that are caused by activity. In this study, six patients were older than 60 years, with a mean age of 52 years. Second, the followup periods were relative short in our study. Followup periods could also affect the clinical outcome after treatment of calcaneal fractures because calcaneal fractures can have long term consequences in terms of pain and disability.<sup>8</sup> Finally, as we described in the discussion section, visual analogue scale and AOFAS scores were only used to evaluate clinical results and quality of life was not evaluated.

As most orthopedic surgeons feel alike, one of the weak points in using the sinus tarsi approach is a limited viewing of the surgical field. To increase exposure of the posterior facet, we excised the calcaneofibular ligament (CFL). After the release of the CFL, we could obtain a better view of the surgical field. In the beginning, we repaired the CFL using a suture anchor; recently, we just repair CFL by using absorbable sutures and check stress radiographs in all cases at 1 year after surgery. Although we did not describe the results of the instability after using this technique in our article, we have not experienced significant instabilities of the ankle and subtalar joints on stress radiographs and patients' interview. In addition, when using the extensile lateral approach in calcaneal fractures, most surgeons did not concern about the ankle and subtalar joint instability despite the total detachment of the CFL. After surgery, the ankle and subtalar joints become stiff due to the surgical scar and protection using a cast or splint. Therefore, we believe that our technique could be a good surgical tip to obtain better surgical field without complications.

As you mentioned, restoration of Böhler's angle is important in the treatment of calcaneal fractures.<sup>9,10</sup> The generally accepted criteria for anatomical reconstruction of the calcaneus are the restoration of Böhler's and Gissane's angles, axial realignment, and calcaneal width. However, some studies highlighted that Böhler's angles are incapable of reflecting the degree of facet reduction and are irrelevant to clinical results in studies that compare plain radiographs with computed tomography to evaluate the degree of calcaneus fracture reduction.<sup>11,12</sup> We also agree with this through our experiences and



**Figure 1:** A case of a 50-year-old female patient. Immediately postoperative radiograph showing a well-reduced calcaneal fracture using 7.0-mm cannulated screws and transfixing Kirschner wires<sup>2</sup>

think that anatomical restoration of the posterior facet is more important than restoration of Böhler's angle, although this is controversial. In addition, as we know, Böhler's angle varies tremendously among individuals. In our study, the absolute value of Böhler's angle at the past followup is comparable with those in previously reported studies.<sup>3</sup> We believe that these are the reasons why the functional outcomes did not decrease contrary to our expectation in spite of the significant decrease in Böhler's angle.

As mentioned earlier, this is a controversial topic. Some authors, including ourselves, emphasize anatomical reduction of posterior facet,<sup>2,11,12</sup> and some authors emphasize the restoration of the calcaneal structure including Böhler's angle.<sup>13,14</sup> We think that further verifiable study is needed to prove this issue.

We agree with your comment that the sinus tarsi limited approach has become an acceptable option of management can no longer be disputed. Among the intraarticular fractures, Sanders type 2 fractures are the largest portion and the most ideal indication for a sinus tarsi approach theoretically. However, no reports have evaluated the effectiveness of the sinus tarsi approach in Sanders type 2 calcaneal fractures. We have a question about this and performed this study. In addition, we are preparing for a comparative, randomized, and prospective study to compare the sinus tarsi and extensile approaches for the treatment of Sanders type 2 calcaneal fractures.

In the beginning of using the sinus tarsi approach, we sometimes used transfixing Kirschner wire (K-wire) inserted through the calcaneocuboid and subtalar joints in patients with low bone quality. Although no evidence supports the effectiveness of transfixing K-wires, this technique could have more stability theoretically. Several surgeons have used transfixing K-wires for short terms

in small joint surgeries, including the foot, hand, and wrist in case of osteoporotic patients. In this study, we used transfixing K-wires in three cases, including the case presented in Figure 1<sup>2</sup>, and removed the K-wires at 4–6 weeks after surgery. We think that this technique does not have a negative effect on the clinical and radiographic results.

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#### Conflicts of interest

There are no conflicts of interest.

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