

**Wei LC, Lei GH, et al. Efficacy of platelet-rich plasma [PRP] combined with allograft bone in the management of displaced intra-articular calcaneal fractures: a prospective cohort study. J Orthop Res. 2012;30(10):1570-6.**

Design: Randomized clinical trial

Purpose of study: to evaluate the effect of PRP when used in conjunction with bone allograft for displaced intra-articular calcaneal fractures in terms of allograft incorporation, bone healing, and functional outcome

Population/sample size/setting:

- 254 patients with 276 fractures (148 men, 106 women, mean age 46) treated for Sanders III calcaneal fractures at the department of orthopedics at XiangYa University in Hunan, China
- Inclusion criteria were a Sanders type III fracture with no evidence of nerve or blood vessel injury

Interventions:

- Fractures were randomized by drawing lots to one of three interventions at the time of surgical repair by open reduction: A=autograft (n=101), B=allograft combined with PRP (n=85), and C=allograft without PRP(n=90)
  - o Autograft was taken from the posterior superior iliac crest
  - o Allograft was freeze-dried bone from a biological material firm in China
  - o PRP was prepared during the operation from 100 ml of venous blood which was first centrifuged at 200 G for 10 minutes, following by separation of the supernatant, which was centrifuged a second time for 10 min at 200 G, yielding 3 ml of PRP for a platelet concentration of about 420% of the patient's platelet count, about 780,000 platelets per microliter; this was activated by a solution of 10% calcium chloride
  - o At 12 months, all patients were seen again for confirmation that union had occurred and for removal of the Kirschner wires and non-locking plates which were placed during the fracture reduction

Outcomes:

- Followup was done at 24 months and again at 72 months after surgery
- Radiographic assessment was done with lateral x-ray and 3D CT reconstructions to assess the architecture of the calcaneus: the length, the width, and the height, Bohler's angle, and Gissane's angle

- Functional assessment was done with The AOFAS ankle-hindfoot 100-point scoring system
- In the immediate postoperative period, 6 patients who had allograft without PRP had an infection which were treated with antibiotics and one week of sustained negative pressure suction
- Five autograft patients complained of pain at the donor site and two had sensory impairment at the donor site
- At 24 and at 72 months there were statistical differences in the radiographic assessment between the allograft only group and the allograft plus PRP group; there were no differences between the allograft plus PRP group and the autograft group
  - o For example, the mean Bohler's angle was 27.17 degrees for the allograft group, 28.44 degrees in the PRP group, and 28.30 degrees in the autograft group
- There were no differences in the AOFAS scores at 24 or at 72 months, all of which were more than 90 points at both followup times

Authors' conclusions:

- Autograft involves some donor site morbidity which means that the violation of the iliac crest is not worth any advantages over allograft
- There are significant differences between the allograft only group and the allograft plus PRP group with respect to the radiographic anatomy of the healed calcaneus
- PRP therefore enhances the results of bone allograft which is done at the time of open fixation of Sanders III calcaneal fractures
- The patients in this study were mostly factory workers engaged in heavy manual labor, and most were able to resume their activities after the removal of the Kirschner wires and plates at the end of 12 months
- Allograft plus PRP is as effective as autograft in the management of intra-articular calcaneal fractures
- Since autograft involves the disadvantages associated with bone harvesting, autograft plus PRP should be preferred over autograft in treating these fractures

Comments:

- The description of the randomization ("drawing lots") is not very clear but serious bias is not likely
- The differences in calcaneal anatomy as assessed by radiography are statistically significant, but a difference in Bohler's angle of only 1.27 degrees between allograft and allograft plus PRP is probably of no functional consequence, and the statistical significance appears to arise from large sample sizes and small standard deviations as reported in Table 2

- The addition of PRP to allograft is therefore not shown to produce a result superior to allograft alone, but there is satisfactory evidence that autograft can be avoided in place of allograft
- Donor site morbidity is a common occurrence with spinal fusion, and it is likely that it can be avoided without loss of efficacy in the setting of calcaneal fractures

Assessment: Adequate for some evidence that in the open reduction of intra-articular calcaneal fractures, allograft yields anatomic and functional outcomes equal to those achieved with iliac crest autograft, and that donor site morbidity can be avoided if this is done. Inadequate for evidence that PRP enhances the outcomes of fracture reduction in a clinically relevant manner (study is overpowered to find small and unimportant differences in radiologic outcomes)