

Comparison of Clinical and Radiographic Outcomes between Headless and Headed Screws in the Treatment of Zone II and III Fifth Metatarsal Fractures in Elite Athletes

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INTRODUCTION: Zones II and III fifth metatarsal (5th MT) fractures are common foot injuries among athletes that are typically managed with percutaneous fixation following anatomic reduction. For competitive athletes, screw head discomfort and refracture after bone union can occur due to the loads placed on the foot during physical activity. Several hardware systems which utilize a smaller screw head compared to traditional hardware systems have been developed to minimize the rate of postoperative hardware complications. This study compares clinical and radiographic outcomes of 5th MT fractures in elite athletes treated with a headless screw versus a traditional headed screw hardware system. We hypothesized that the headless screw would be associated with faster union rates, faster clearance times, and lower incidence of symptomatic hardware compared to the headed screw.

METHODS:

Athletes competing at a collegiate or professional level treated for a zone II or III 5th MT fracture between 2016 and 2022 by two surgeons fellowship-trained in foot and ankle orthopaedics were screened for. Operative notes were reviewed to determine the hardware system used. Subjects were divided based on the hardware system used during operation: headed screw and headless screw. Chart reviews were conducted to collect patient demographic information. Time to radiographic union was determined via radiographic confirmation. Time to return to sport and return to sport were determined via online search. Postoperative complications, including nonunions, need for revision, need for hardware removal, and refractures were also noted.

RESULTS:

Forty patients (44 fractures) were eligible for inclusion. Twenty patients (21 fractures) received the headed screw, while twenty patients (23 fractures) received the headless screw. Average time to clinical follow up was 19.9 (range, 10.2 to 31.4) months. Average age at time of surgery was 22.09 (range, 18 to 30) years for the headed screw group and 21.30 (range, 17 to 29) years for headless screw group. Twenty males (100%) were represented in the headed screw group, and 18 males (90%) and 2 females (10%) were represented in the headless screw group. Average body mass index (BMI) was 25.9 (range, 21.3 to 32.4) kg/m² for headed screw group and 25.3 (range, 20.8 to 27.7) kg/m² for the headless screw group. The average time to union for the headed screw group was 11.78 (range, 5.86-19.00) weeks, while average time to union for the headless screw group was 11.65 (range, 6.00-22.57) weeks (p=0.93). Nineteen out of twenty (95%) patients were able to return to sport in both groups. The average time to return to sport for the headed screw group was 23.36 (range, 10.00-47.86) weeks, while average time for the headless screw group was 21.2 (range, 6.86-55.00) weeks (p=0.55). The overall complication rate for the headed screw was 33.33%, and overall complication rate for the headless screw was 13.04% (p=0.10). Three patients in the headed screw group experienced nonunion at an average of 5.2 postoperative months, while none were observed in the headless screw group (p=0.06). Three patients in the headed screw groups and one patient in the headless screw group experienced a refracture at an average of 12.2 months (p=0.25). One patient in the headed screw group and two patients in the headless screw group experienced symptomatic hardware postoperatively and underwent removal of hardware at an average of 8.0 months (p=0.61).

DISCUSSION AND CONCLUSION: For elite athletes undergoing surgical fixation of a 5th MT fracture, fixation using either a headless or headed screw system produced good outcomes in regard to times to union and return to sport. However, the headless screw system was found to have fewer complications than the headed screw system, suggesting that the headless screw system may be more suited to treat elite athletes who have experienced a 5th MT fracture.

Figure 1. Postoperative radiograph comparison between headed (A) and headless (B) screws.



Figure 2. Comparison of Time to Union and Return to Sport Between Groups.



Table 1. Demographic Comparison Between Groups.

	Headed/Headless		P Value
	Headed Screw	Headless Screw	
Age (year)	22.09	21.3	0.49
Sex	20 male/0 female	18 male/2 female	0.10
BMI	25.9	25.3	0.15
Height (cm)	184	182	0.18
Weight (kg)	115.5	111.1	0.18

Table 2. Time to Union and Return to Sport Comparison Between Groups.

	Headed/Headless		P Value
	Headed Screw	Headless Screw	
Time to Union (Weeks)	11.78	11.65	0.93
Return to Sport (Weeks)	23.36	21.2	0.55

Table 3. Complication Comparison Between Groups.

	Headed/Headless		P Value
	Headed Screw	Headless Screw	
Complication Rate	3/21 (14.3%)	3/23 (13%)	0.10
Nonunion	3/21 (14.3%)	0/23 (0%)	0.06
Refracture	3/21 (14.3%)	1/23 (4.3%)	0.25
Postoperative Hardware Removal	1/21 (4.8%)	2/23 (8.7%)	0.61