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INTRODUCTION:

The fifth metatarsal is the most frequently injured metatarsal with the majority of fractures occurring at the proximal aspect.^[1] Specifically, Jones fractures represent nearly 14% of proximal fifth metatarsal fractures.^[2,3] For surgical consideration, these fractures are further categorized into acute, delayed union, and non-union, Torg types 1-3 respectively.^[4]

Several methods of fixation have been described for Jones fractures, including intramedullary screw fixation, plating, tension band wiring, intramedullary nailing, and external-fixation.^[4-9] Contemporary literature appears to favor IM screw fixation given its minimally invasive approach, increased union rates, decreased time to union, and early return to activity.^[5,10-11] Despite the favorable outcomes, IM screw fixation is reported to have elevated rates of refracture.^[12]

To the authors knowledge, there are no published systematic reviews that observe the outcomes and complications associated with the aforementioned fixation techniques. Thus, this systematic review examines the outcomes and complications rates associated with various fixation techniques for treating fifth metatarsal metaphyseal-diaphyseal junction fractures. The primary goal is to quantitatively analyze the available literature to provide an objective comparison of the fixation methods.

METHODS:

A systematic review of electronic databases was performed and data such as: general patient demographics, outcomes, complications, & surgical technique were collected from retrospective and prospective patient studies. Articles that were cadaveric or anatomic studies, review articles, written in a non-English language, or technique paper, case reports or a sample size of six or less, and studies in which inadequate data was able to be extracted, were excluded. Statistical analysis of the pooled data included the weighted mean. Complication was defined as surgical wound complications, infection, neuritis, refracture, delayed union and nonunion. Guidelines from PRISMA were used to design the review of literature.^[13,14]

RESULTS:

Table 1: Outcomes & Complication Rates

Fixation Method	Radiologic Time to Union (wks)	Time to Return to Sport/Activity (wks)	Union Rate	Hardware Removal Rate	Refracture	Delayed Union	Nonunion
IM Screw	9.12 (4 to 28)	10.2 (4 to 25)	96.00%	7.20%	4.00%	2.20%	2.00%
Plating	7.3 (4.2 to 13.1)	12.3 (10.1 to 16.3)	95.20%	19.00%	0.00%	0.00%	0.00%
TB Wiring	11.8 (5.7 to 21.4)	14.7 (8 to 20)	92.20%	54.30%	3.40%	3.40%	0.90%
IM Nail	N/A	N/A	100.00%	68.80%	0.00%	0.00%	0.00%
Ex - Fix	6.2 (5.4 to 6.4)	7.9 (6.4 to 6.9)	87.50%	N/A	6.30%	0.00%	6.30%

Figure 1: Radiographic Films of the Various Fixation Techniques



RESULTS CONT.

- 758 feet in 757 patients included with the weighted mean age of 27.3 years and weighted mean follow-up of 31.7 months
- Ex-fix with earliest radiologic time to union and time to return to sport/activity, while TBW with longest (Table 1)
- All methods had acceptable union rates, 87.5% or greater (Table 1)
- More than half of the TBW or IM nail required hardware removal (Table 1)
- No reported refracture, delayed unions, or nonunions with plating and IM nail (Table 1)

DISCUSSION:

The various fixation methods appear to be safe and effective in the treatment of Jones fractures with acceptable outcomes including high rates of union and low incidences of refracture, delayed union, nonunion, wound healing complications, infections, and sural neuritis. IM screw fixation with a solid stainless steel 4.5mm screw was the predominant surgical technique. Advantages include minimally invasive approach, inexpensive cost, and decreased operating room time. Limitations of the review were that only English language articles were included, a publication bias existed, and there was heterogeneity of reported outcome measures. Strengths of the review were the large sample size, the use of PRISMA, and this review is the first to address outcomes and complication rates on multiple fixation methods for surgically treating Jones fractures. Prospective, controlled clinical trials are warranted.

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