Metacarpal Stress Fractures in Athletes: A Systematic Review

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INTRODUCTION: Stress fractures are common injuries; however, there is limited cohesive literature on cases of metacarpal stress fractures in athletes. Our objective is to contribute the first systematic review of metacarpal stress fractures in athletes, with a particular focus on epidemiology, presentation, and outcomes. We hypothesized that most injuries would occur in racquet sport players and that treatment would primarily be nonoperative.

METHODS:.A systematic review regarding metacarpal stress fractures in athletes was performed of the following databases: PubMed, EMBASE, MedLine, Cochrane, and Web of Science. A search string was developed using the following terms: “metacarpal stress fracture”, “athlete” “sport”, “tennis”, “basketball” “racquetball”, “football”, “pickleball”, “wrestling”, “softball”, “baseball”, “skiing”. 3 independent reviewers screened each title, abstract, and full-text article. Inclusion criteria consisted of case reports of metacarpal stress fractures in athletes. Exclusion criteria consisted of studies unrelated to metacarpal stress fractures, animal studies, articles not including athletes, biomechanical studies, review articles, and studies that did not report sufficient patient data. Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines were followed.

RESULTS SECTION: 140 articles were initially identified. After exclusion of duplicates and applying inclusion criteria, 11 studies (27 cases) were included. The mean age of patients was 17.04 years old, with 12 males and 15 females (p=0.5637). The most common sports were tennis, badminton, soft tennis, and boxing. The most common presentation was pain in the dorsal region related to activity, with no pain at rest. Initial MRI and bone scans frequently had positive findings. All patients underwent successful non-operative management, with mean return to play of 9 weeks.

DISCUSSION: Metacarpal stress fractures are uncommon conditions yet can present with significant pain and impact performance in athletes who perform sports involving repetitive movements of the hand and wrist, such as tennis and badminton. They most often present in teenagers. No significant gender difference was identified in our review. Patients typically presented with pain related to activity, and no pain at rest. MRI is considered the gold standard for imaging. Non-operative treatment consisting of halting the sport until the patient was pain free combined with gradual return to play, was successful for all patients and resulted in average full return to play of approximately 9 weeks. Metacarpal stress fractures should be considered in the differential in young athletes who present with hand pain that is worse during sport. The study is limited due to its retrospective nature and small sample size.

SIGNIFICANCE/CLINICAL RELEVANCE: For patients who present with hand pain especially related to exercise, metacarpal stress fractures are a “can’t miss” differential diagnosis associated with significant functional impairment and limited mobility and is more common in young athletes who play racquet sports. Nonoperative management was the most common management strategy, and our results suggest that the addition of proper technique and training load can result in satisfactory return to play.

IMAGES AND TABLES:

Table 1. Studies Meeting Criteria for Systematic Review

First Author	Year	Study Design	Number of Cases
Evans [11]	2018	Case Report	1
Balius [14]	2010	Case Series	7
Busche [25]	2008	Case Report	1
Rolison [26]	2017	Case Report	1
Bespalchuk [8]	2004	Case Report	1
Fukuda [12]	2008	Case Report	1
Muramatsu [10]	2005	Case Report	1
Murakami [9]	1988	Case Report	1
Parsons [13]	2005	Case Report	1
Duarte [7]	2017	Case Report	1
Nishikawa [31]	2020	Case Series	13

Figure 1: PRISMA-flowchart of the identified, included, and excluded studies.

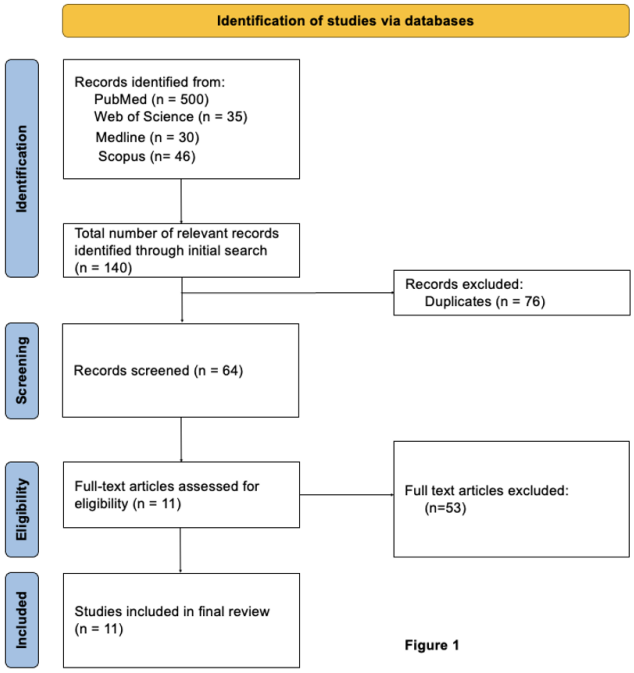

Figure 1