

Relative motion flexion splinting for the rehabilitation of flexor tendon repairs: A systematic review

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Objectives

This systematic review aims to identify articles reporting on the clinical outcomes of patients who were treated with relative motion flexion splinting (RMFS) following flexor tendon repair and examine indications for use.

Methods

Eligibility criteria were pre-specified (studies detailing the use of RMFS following flexor tendon repair), and seven medical databases, four trials registries and three grey literature sources were systematically searched and screened. The first and third author independently screened, extracted the data and appraised the articles.



Figure 1: Protected early active motion splint (formerly RMFS) described by O'Connell Et al



Figure 2: Relative motion flexion splint (RMFS) described by Henry and Howell

The use of RMFS for management of repairs in flexor tendon zones I-III is supported by limited data. Splint design varied across studies, as such the authors advise the RMFS design in future studies follow the three principles of relative motion²⁷

1. RMFS must deliver early active motion
2. The metacarpophalangeal joint (MCPJ) of the repaired finger(s) must be held in relatively greater flexion than the other MCPJs
3. This differential must be maintained throughout the range of motion.

Results

Three out of a total of 12 studies identified were eligible for the systematic review: one cadaveric proof of concept study; one retrospective case series; and one ongoing prospective case series. Henry and Howell documented that the repairs were predominantly 4-strand core suture with a peripheral suture and pulley venting at the discretion of the surgeon, where as Chung et al. repaired the tendons with one single simple interrupted nylon 6-0 suture. O'Connell did not report surgical details in preliminary data. Differences were noted in all three studies regarding splint type and relative joint position; exercises prescribed and zone of injury. Clinical outcomes of active range of motion and grip strength were deemed acceptable for both case series, with the table showing one rupture in O'Connell et al study.

Clinical and patient reported outcomes for relative motion flexion splinting (RMFS) following flexor tendon repair

Author Year	Median outcome time point (range)	Range of movement	Median days from surgery to return to work (range)	Median* grip strength in pounds (range)	Number of tendon ruptures	Other complications reported	Function
Henry, 2020, USA	10.5 months (5-72)	TAM ^b Excellent = 4 Good = 1 Fair = 3	80 (7-112) N=5	% of uninjured side 100 (63-107) [n=6/8]	None	None (no secondary surgeries or PIPJ flexion contractures)	Not reported
Chung 2019	Immediate	Not applicable	Not applicable	Not applicable	None, gapping <2mm	Not applicable	Not applicable
O'Connell 2020	12 weeks (12-16)	TAM ^{a,b} Good = 4 Fair = 2 Poor = 3 ^c	Not reported	51 (40-90) [n=7/9] (measure for affected hand)	1 [n=1/10]	2 tenolysis 1 infection [n=3/10]	Quick DASH ^c Median ^d 6.25, range 0-30

PIPJ – proximal interphalangeal joint

a. Calculated by the review authors

b. TAM – Total active motion percentage = [(PIP flexion + DIP flexion) - degrees (PIP + DIP extension loss)/175]*100. Excellent 85-100, Good 70-84, Fair 50-69, Poor <50 (25)

c. Quick DASH – Disabilities of the Arm, Shoulder and Hand, abbreviated version (26)

d. Two poor outcomes related to two digits on the same hand

Conclusion

This systematic review found limited data for the use of RMFS after zones I-III flexor tendon repair. Prospective research will need to follow the principle of relative motion in splint design, include larger cohorts, clinical and patient-reported outcomes with comparison to other postoperative management approaches encouraged.

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