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Brandon Ryan  
*A. T. Still University*

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## Case Report: A Modified Early Passive Mobilization Protocol for a Zone II Flexor Pollicis Longus Repair

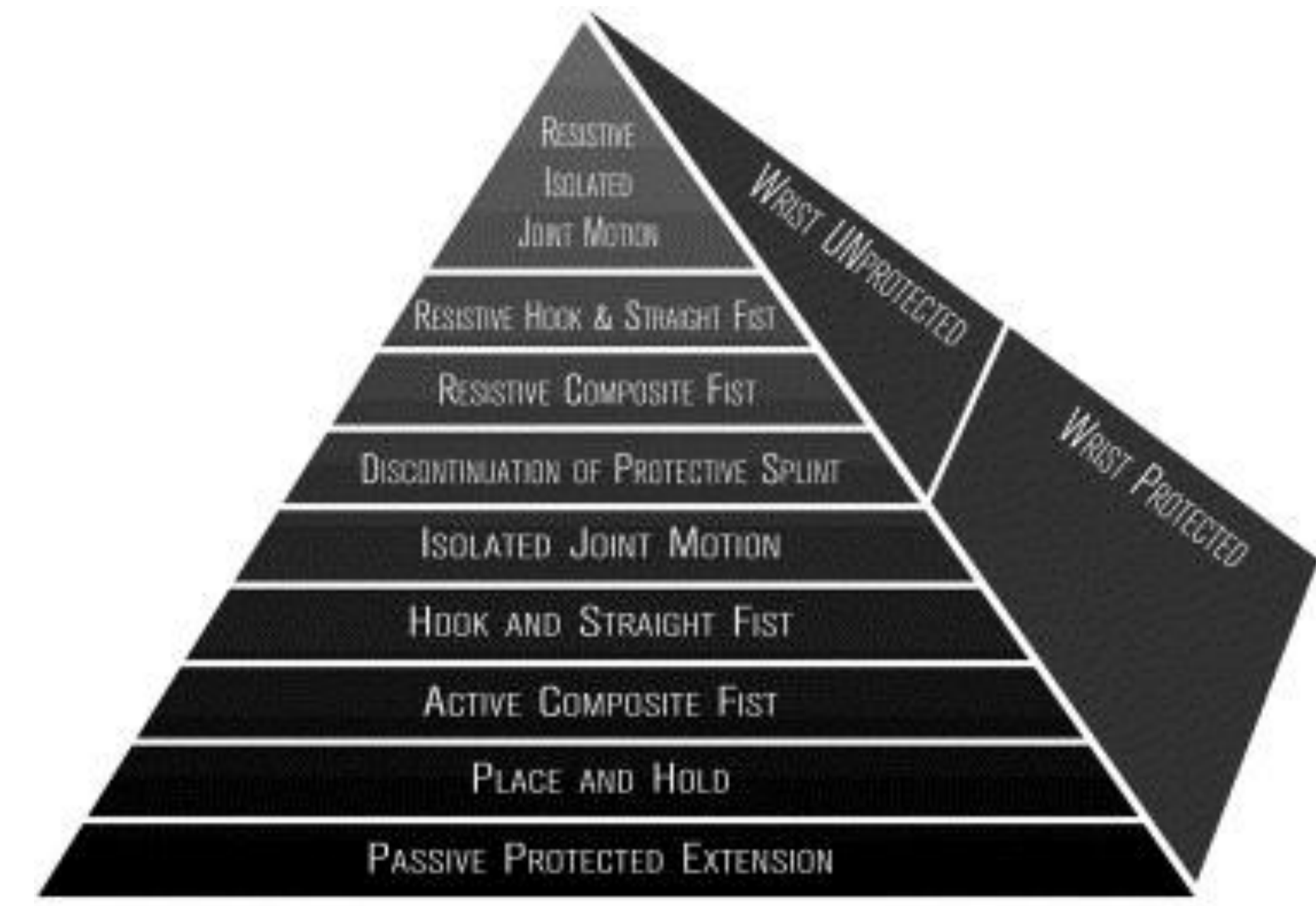
Brandon Ryan, OTD/S

Faculty Mentor: Dr. Michael J. Gerg, OTR/L, CHT, CEES, CWCE; Community Mentor: Steven Kremer, OT, CHT

Program Affiliation, A. T. Still University, Mesa, AZ

### Background

- Flexor tendon repairs can be one of the most challenging injuries to treat in hand therapy.
- Rates of ruptures and adhesions are as high as 17%.
- There are specific protocols that are used in practice, but there is a debate as to which one gives the best outcomes. (see Table 1)
- There is a relative sparsity of research specifically focusing on flexor pollicis longus (FPL) repairs.
- There are special considerations for FPL following tendon repair:
  - The FPL is the only extrinsic tendon in zone II and is responsible to IP and MP flexion.
  - The FPL tendon is likely to retract farther leading to a secondary incision at the wrist to retrieve the tendon.
  - Extra step during surgery leads to problems unique to the thumb:
    - Additional adhesions at second incision site.
    - Additional adhesion from pulling tendon into place.
    - Increased tension on the repair leads to increased possibility of rupture.
- Tendon Lag:
  - If there is good active motion, then therapy should be advanced more slowly to avoid a rupture.
  - If there is bad active motion, therapy should be advanced to reduce adhesions.



Pyramid of Progressive Force Application

### Purpose

- Review the progression of a client with a zone II FPL laceration using a modified early passive mobilization technique.
- Outline the clinical reasoning behind the selected treatment approach and its components for managing an FPL tendon repair.

### Case Description

- 33-year-old male who lacerated his FPL tendon in zone II while attempting to cut a frozen English muffin.
- Working as a bartender prior to injury. Not working due to injury but planned to return to same job when appropriate.
- Two incisions made: one at thumb for tendon repair and another at the wrist to retrieve the retracted tendon.
- Type of suture repair unknown.
- Placed in forearm-based thumb immobilization until start of therapy.
- Surgery performed 11 days after injury. Therapy started 6 days after surgery.

### Outcomes

- Patient reported no difficulty with functional tasks at home and in community.
  - Still had some hypersensitivity at scar on thumb when washing dishes.
- Excellent outcome according to Buck-Gramcko's Assessment of FPL Tendon Repairs.
- Grip strength with normal limits for his age.
- See Table 2.

Table 1. Comparison of Flexor Pollicis Longus Protocols

Week	Immobilization (Ahlschwede, 1991)	Duran & Houser (Formby, 2006)	Kleinert (Formby, 2006)	This Case	EAM #1 (Elliot, Moimen, Flemming, Harris, & Foster, 1994)	EAM #2 (Farzad et al., 2014)
1	o Immobilization in cast – moderate flexion	o Dorsal block splint – wrist 20°, MP 45°, IP relaxed, Passive ROM to affected digit o Composite flexion of thumb joints o Passive flexion/extension of IP and MCP joints separately. o Passively flex wrist while extending thumb to neutral (in therapy only)	o Dorsal block splint with dynamic traction – wrist 45°, MCP joint fixed, IP relaxed. o active extension of thumb against with passive flexion performed with assist from unaffected hand	o Thumb placed in forearm-based thumb immobilization splint fabricated during surgery until therapy started at beginning of week 2	o Two types of dorsal static splints • One only blocked thumb • One blocked thumb and fingers o Active extension to dorsal blocking splint/25% of full active flexion	o Dorsal static splint. Wrist between 0 and 30 degrees flexion, MP joints in 70 to 90 degrees flexion o Therapy initiated 3-days post-surgery. o Place and Holds with active hold for 3-5 seconds
2	--	--	--	o Thumb immobilization splint o Passive Flexion/Active Extension ROM	Full extension into splint/active flexion to 50% of full flexion	--
3	o Discontinue cast, begin active ROM	--	--	o Continue Same o Pt stopped wearing splint (against therapist direction)	Progression to full active flexion and extension	Active flexion exercises
4	o Continue active flexion and extension	o Begin Active ROM in Splint	o Begin AROM flexion/extension without resistance	o Physician Follow-up o Thumb IP Active flexion/extend with MP and wrist blocked in flexion o Light Active Exercise o Continue Same	--	--
5	o Passive extension as tolerate, no splint	--	o Discontinue splint	o Continue Same	o Splint only worn at night	--
6	o Dynamic splint for more extension, if needed	o Discontinue Splint	--	o Continue Same	Full range of movements in wrist and fingers	o Blocking exercises o Strengthening initiated
7	--	--	--	o Active Exercise o Light Strengthening	--	--
8	--	o Strengthening (gradually progress)	o Begin gentle resistive flexion exercises o Splint for flexion contractures, if necessary	o Strengthening	o Splint discarded o Return to work (no heavy manual labor) o Strengthening initiated	--
9	--	--	--	o Continue Same	o Passive extension exercise o Dynamic splinting, if needed	--
10	--	--	o Begin blocking and progressive resistance exercises	o Continue Same	o Heavy lifting initiated	--
12	--	--	--	o Discharge from therapy o HEP: No heavy lifting at gym till week 12	--	--
	o Full, normal activity	o Full, normal activity	o Full, normal activity	o --	o Full, normal activity	o Full, normal activity

### Timeline/Interventions/Discharge Evaluation

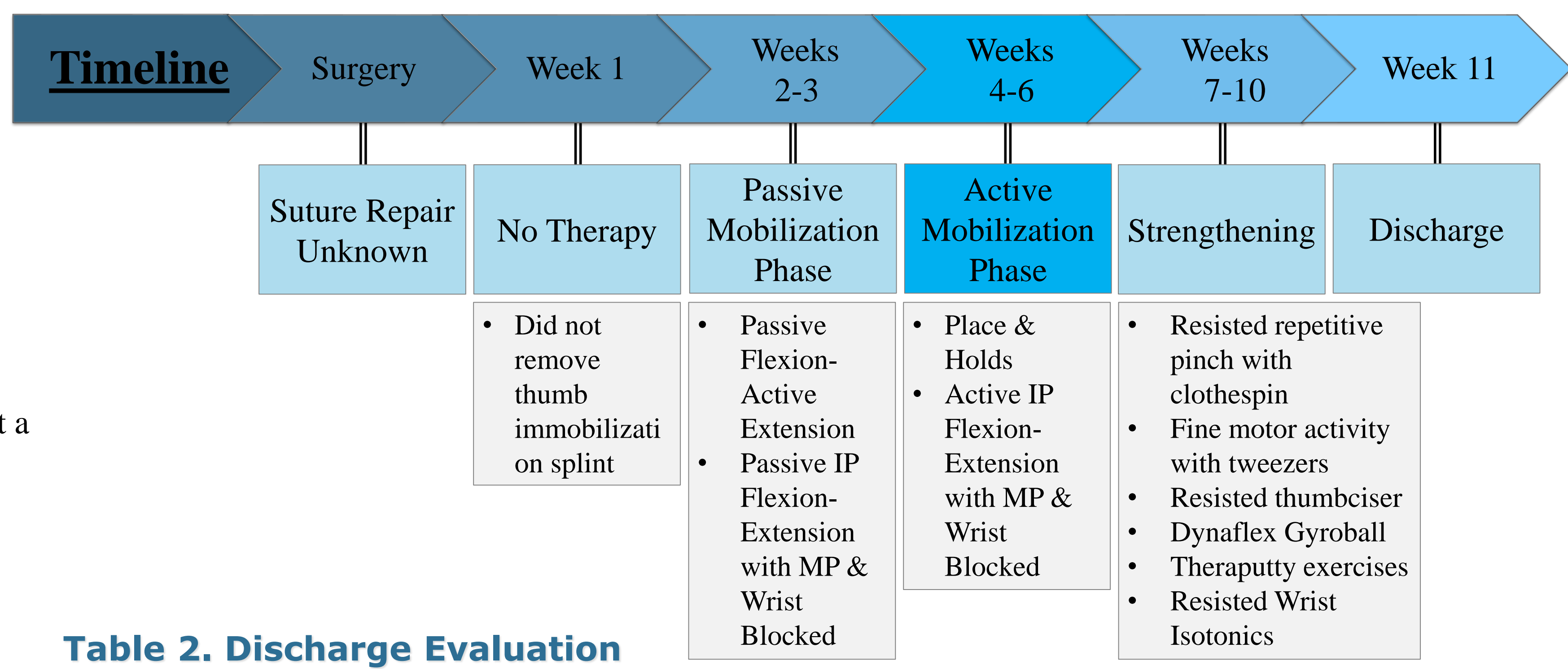


Table 2. Discharge Evaluation

Strength Testing	Active Range of Motion	Semmes-Weinstein (volar distal phalanx)
<b>Left Hand:</b> o Grip: 91 lbs o Lateral Pinch: 19 lbs o 3-Jaw Pinch: 20 lbs o 2-point Pinch: 10 lbs <b>Right Hand:</b> o Grip: 119 lbs o Lateral Pinch: 25 lbs o 3-Jaw Pinch: 25 lbs o 2-point Pinch: 14 lbs	<b>Left Hand/Thumb:</b> o Wrist: 69/77° o Thumb IP: 0/46° o Thumb MP: 0/67°  <b>Right Hand/Thumb:</b> o Wrist: 67/79° o Thumb IP: +55/54° o Thumb MP: 0/71°	<b>Left Thumb:</b> o 3.84 (diminished protective sense)  <b>Right Thumb:</b> o 2.73 (normal)

### Discussion

- The lack of evidence for FPL repair protocols made it difficult to know which protocol would be best for the client.
- This was more of a pseudo modified Early Passive Mobilization protocol based on presence of tendon lag.
  - In this case, tendon lag was used as an indicator to initiate active mobilization exercises (i.e. Place and Holds) earlier than anticipated which helped lead to an excellent outcome.
  - Place and Holds were selected as an initial active mobilization exercise due to the support in the literature that they are relatively safe and effective during treatment of flexor tendon repairs.
- More literature focused on the aspects of clinical decision making surrounding advancing or scaling back exercises, instead of temporal based protocols, would be nice for creating individualized treatment plans based on client's specific needs and progress during therapy.

### Limitations

- A custom splint was not fabricated for the client during the initial evaluation in the clinic which is always recommended as part of flexor tendon protocols.
- The protocol was not followed as intended due to client non-compliance.
- A functional outcomes measure was not used (i.e. QuickDASH) which would have been a great way to assess patient progress throughout therapy.

### References/Literature cited

References available upon request.

### Acknowledgments

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