

A1, Oblique, A2 Pulley Reconstruction with Ipsilateral

Palmaris Longus Autograft

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## **A1, Oblique, A2 Pulley Reconstruction with Ipsilateral Palmaris Longus Autograft**

The following case study was compiled in response to a class assignment. The objective was to analyze a given scenario and develop a comprehensive write-up that explained the orthopedic condition, detailed the occupational therapy assessment, described how the condition impacted the client's occupational performance, and defined an evidence-based and client-centered intervention protocol. To accomplish the objective of this assignment, the author infused aspects of the Occupational Therapy Practice Framework: Domain and Process II (2002) which outlines the language and constructs of the profession. This document "articulates occupational therapy's unique focus on occupation and daily life activities and the application of an intervention process that facilitates engagement in occupation to support participation in life" (American Occupational Therapy Association, 2002). The terminology used throughout this case study is sanctioned by the American Occupational Therapy Association.

Bayat, Shaaban, Giakas, & Lees (2002) suggested that the flexor pulley system of digits is equivalent to the flexor pulley system of the thumb. Due to this equivalency, details from the named researchers' discussion will be used to describe the function of the thumb throughout this case study. Pulleys are sectors of fibrous tissue located precisely along flexor tendon sheaths in the thumb. The flexor pulley system reinforces the fibrous wall of the flexor tendon sheath, acting to:

1. Facilitate accurate tracking of the flexor pollicis longus (FPL) tendon,
2. Prevent bowstringing of the FPL tendon, and
3. Provide a "fulcrum" that allows for flexion and extension of the thumb.

According to Hauger et al. (2013), the flexor pulley system converts the available linear translation and force in the muscle-tendon unit into rotation and torque at the thumb joints. Injury or “damage to part or all of the digital flexor pulley system can have substantial effects on the performance of the digit” (Bayat, Shaaban, Giakas, & Lees, 2002). As for the client in this case study, decreased flexion of the thumb interphalangeal (IP) joint and increased flexion of the thumb metacarpal phalangeal (MP) joint has been noted.

### **Surgical Protocol**

An A1, oblique, and A2 pulley reconstruction with ipsilateral palmaris longus autograft is best defined in segments of the structures involved.

**A1 pulley.** The A1 pulley spans the thumb MP joint, attaching to the volar plate and the base of the proximal phalanx (Seiler & Leversedge, 2000). The purpose of the A1 pulley is to prevent bowstringing of the FPL tendon and to maintain normal range of motion (ROM) of the thumb.

**Oblique pulley.** The oblique pulley is located over the diaphysis of the proximal phalanx, oriented in a distal and radial direction (Seiler & Leversedge, 2000). The purpose of the oblique pulley is to prevent bowstringing of the FPL tendon and, as hypothesized by Bayat, Shaaban, Giakas, and Lees (2002), works in combination with the volar plate to prevent hyperextension of the thumb IP joint, particularly evident in pulp-to-pulp pinch and key pinch exercises.

**A2 pulley.** The A2 pulley originates on the volar plate and is located at the most distal aspect of the proximal phalanx of the thumb, partially spanning the thumb IP joint. The purpose of this pulley is to provide further support to the FPL tendon, but alone it does not prevent bowstringing of the tendon (Seiler & Leversedge, 2000).

**Pulley reconstruction.** The process of reconstructing and reinforcing a damaged pulley by using a tendon harvested from a donor site. An effort is made to increase strength and protection of the FPL tendon, while providing adequate space for the FPL tendon to glide but not bowstring. A successful pulley reconstruction surgery and recovery produces normal ROM of the thumb, particularly to the thumb IP joint (Seiler & Leversedge, 2000).

**Ipsilateral.** Referring to a tendon graft occurring at a donor site located on the same side of the body as the injury, or in regard to this case study, on the same hand as the wound site (Cooper, 2007).

**Autograft.** The process of harvesting a tendon from a donor site located on the client for use in reconstructing the pulley. This is the most common method for digital pulley reconstruction (Seiler & Leversedge, 2000).

The purpose of an A1, oblique, and A2 pulley reconstruction surgery is to regain normal ROM and function of the thumb. Specifically, the surgery is meant to increase flexion of the thumb IP joint (and in some cases the MP joint) via reconstruction of the pulley mechanisms (Bayat, Shaaban, Giakas, & Lees, 2002). The client presented in this case study is also afforded an increased opportunity to strengthen the thumb IP joint. For her, the surgery aimed to establish functional use of the thumb in the form of a pincer grasp for writing tasks.

### **Biomechanical Assessment**

Given the brief amount of information regarding the diagnosis of A1, oblique, and A2 pulley reconstruction with ipsilateral palmaris longus autograft, the author will perform an initial evaluation of the client. Assessment areas include:

**Pain.** Pain is assessed in order to determine the client's perception of her own recovery and to address any underlying concerns she may have regarding the pain that is present. Pain

management is employed in the event that decreasing pain motivates the client to more fully engage in the therapy process. For instance, if the client understands the difference between good pain and bad pain, she can facilitate her own recovery while becoming mentally and emotionally prepared for the duration of the therapy process. Cooper (2007) suggested that when tissues are stimulated by pain-free movement, favorable clinical responses such as lubrication and circulation that promote healing ensue. Such responses enhance the healing process and lead to positive outcomes for the client.

**Edema.** Edema is assessed to ensure the client's injury/repair is healing appropriately and is not in any way compromised. The initial assessment of edema establishes a baseline measure for future observation of edema reduction as wound healing progresses. Managing edema decreases the likelihood that scarring will develop adhesions to the surrounding soft tissue (Cooper, 2007).

**Scar management.** Management of scars ensures clean healing of the incision site and provides an opportunity to note the color, temperature, and texture of the scar. Such observations are made in an effort to prevent and/or manage potential complications such as infection or hypertrophic scarring. Furthermore, scars are regularly monitored for signs of adhesion to the underlying soft tissue (Cooper, 2007). The development of adhesions typically results in limitations to the client's ROM and in turn to the client's overall function.

**Passive and Active ROM.** ROM is performed only in the direction of the repaired tendon, in order to determine the presence of adhesions; if adhesions are present, the therapist may decide to apply tension to the site in order to "break up" the scar tissue and to improve proximal gliding of the tendon (Cooper, 2007). ROM exercises are utilized to prevent advanced

stiffening of immobilized structures for better success in meeting therapy goals relative to increased or regained function.

**Precaution.** It is pertinent to note that resistance to a repaired flexor tendon is deferred for as long as possible, providing active motion of the tendon is present (Cooper, 2007). Active motion indicates the absence of adhesions and allows for deferred application of tension until the tendon is near or at full tensile strength. Early application of tension is indicated, however, when adhesions develop during the early, intermediate phase of tendon healing. Tension is used to achieve proper tendon gliding and to prevent permanent shortening of the tendon, loss of ROM, or decreased function; therefore, the client is encouraged to engage in grasp and/or pinch activities prior to the repaired tendon reaching full tensile strength. Caution should be taken when applying resistance/tension to a repaired tendon that is in the early, intermediate phase of the healing process, so as not to rupture the tendon repair.

**Function.** The Occupational Therapy School Skills Assessment was chosen by the therapist to assess the client's function within the school environment. Baseline measurements will be taken for school-based ADLs and IADLs (Instrumental Activities of Daily Living) that have been compromised due to the injury/repair, particularly in regard to the client's ability to perform writing tasks with use of a pincer grasp.

### **Functional Assessment**

The Occupational Therapy School Skills Assessment addresses multiple school occupations. In particular, it assesses pencil grasp, which is the main concern of the client's mother. This assessment also includes tasks such as copying shapes, cutting, in-hand manipulation, and handwriting. Self-care skills relevant to school-aged children are also addressed, including opening a backpack, zipping a coat, buttoning, snapping, turning door

knobs, and additional activities pertaining to lunch time, use of the bathroom, and use of classroom materials.

This assessment tool was chosen because it yields important information regarding the client's natural pencil grasp. This objective satisfies the main concern of the client's mother and has the potential to positively affect the client's emotional and social well-being, should therapy be effective. Beyond addressing the main concern, this assessment provides insight into the completion of school tasks. It also provides the therapist with an opportunity to develop different strategies or techniques that might assist the client to be more competent in all areas of school function, including social status with school peers.

### **Goals for Therapy**

Please see the attached evaluation form for the problem list, short term goals, and long term goals.

### **Client Scenario**

At the age of 2, the client lacerated the flexor surface of her thumb while pulling a television off of a stand. Since then, she has undergone two failed surgeries. The purpose of each surgery was to reconstruct the pulley mechanism to allow for active flexion of the thumb IP joint. The client's mother states that her daughter's peers are making fun of the way that the daughter uses her thumb to hold writing utensils. The client recently underwent a third surgery to reconstruct the pulley mechanism and is currently 4 weeks post-operative.

**Motor development.** Throughout her development, the client learned how to play, perform ADLs, and accomplish school tasks. As with the majority of typically developing children, she explored her environment and when objects attracted her interest she physically manipulated them, learning through trial-and-error what tasks the objects could be used for

(Case-Smith & O'Brien, 2009). As the client repeatedly interacted with the same objects, she became increasingly precise and efficient in accomplishing the tasks that the objects were intended for.

According to Earley (2003), the central nervous system (CNS) and purposeful movement function interdependently. Acknowledging this notion, it is evident that engagement in play activities challenged the client's CNS, which in turn facilitated the establishment of higher level functions. In much the same way that the client learned to use her thumb in an adapted manner, therapy will focus on retraining areas of the CNS to facilitate active thumb IP joint flexion and extension. CNS rehabilitation will be discussed in greater depth in a subsequent section.

### **Occupational Therapy Domains**

Per mother report, the client actively engages in play and accomplishes self-care (ADLs) and school tasks independently. Although the thumb of the client's dominant hand is structurally deficient from a biomechanical standpoint (lacking active flexion and extension of the thumb IP joint), she advanced through 4 prime motor development years learning to successfully accomplish fine motor tasks. While the adapted movements have allowed the client to complete tasks independently, it has recently become the focus of peer ridicule for the client at school. As a result, the client's focus has shifted from her academia to concerns about her body image.

**Areas of occupation.** Per mother report, the client experiences difficulty using her thumb for fine motor tasks that require grasping and pinching. Instead, the client utilizes her index and long finger to manipulate tools, such as a pencil, to write. Using tools in this manner has become the source of peer ridicule toward the client and the reason for her perceived exclusion from social participation with peers. As a result, the client has become preoccupied with her body image. At her young age, the client may continue to lose interest in school as she

attempts to rectify the confusion surrounding her body image. Support from individuals who understand the psychological impact of peer ridicule is vital in altering the negative perception of self that the client currently exhibits.

**Client factors.** The client's adapted grasp resulted from neuromusculoskeletal and movement-related dysfunction of her thumb. Due to the early age at which the structural components were damaged, neural connections pertaining to movement of the distal thumb during hand use were never created (Rothgangel, Braun, Beurskens, Seitz, & Wade, 2011). Although structures of the distal thumb have been restored, the lack of neural connections has created a barrier to voluntary and automatic movement of the distal thumb.

The client values her body image and the dedication of her mother. She also values play, social participation, and school. Given her enrollment in surgery and therapy, reassurance from her mother, and trust in the surgeon and the occupational therapist, it is apparent that the client (and/or the client's mother) believes regained use of her thumb is possible.

**Activity demands.** Participation in therapy requires little space. The therapy desk resembles a school desk and can be used to complete homework as the client practices a new pencil grasp. A chair, a pencil, and assigned homework are also required objects for therapy simulation. In order to enhance the client's motivation, the activities used to elicit active thumb IP joint flexion and extension should be enjoyable and entertaining for the client. Crayons and a coloring book or valued toys, such as Barbie, may also be utilized.

The therapist will encourage the client to sit where she is most comfortable while coloring or playing. The client may bring a floor blanket or a bean bag to therapy. The therapist will encourage the client to determine the course and rate of play while providing positive feedback for the client's choices. In doing so, the client is given the lead in play participation

and the reassurance of successful social participation (Case-Smith & O'Brien, 2009). These goals are secondary to achieving active movement of the thumb IP joint.

**Performance skills.** In addition to using the index and long finger to write and color, the client uses an adapted lateral pinch to maintain a secure hold on objects. Specifically, the client maintains full extension of the dominant thumb IP joint and of the joints of the index finger, which is different from the pincer grasp that her peers use. On the contrary, the client will actively flex and extend the thumb IP joint when manipulating objects with her non-dominant hand. While each method accomplishes the task, the adapted method is eliciting peer ridicule and is causing emotional deregulation as well as a hindrance to the client's self-perception.

**Performance patterns.** As a daughter, sibling, peer, and student, the client successfully accomplishes fine motor tasks that require pinch and/or grip functions. She consistently manipulates small items by using a pincer grasp and opposition of the thumb to the index finger when using the non-dominant hand. Conversely, she habitually obtains items with her dominant hand through abduction and adduction of the index to the long finger or with use of a lateral pinch. To accomplish the adapted techniques, the client relies on the addition of wrist movement in order to position her fingers for object obtainment.

The wrist is used differently with the adapted techniques in comparison to the standard techniques. During use of the standard pincer grasp, the wrist acts mainly as a stabilizer; proximal stability facilitates distal mobility (Skirven, Osterman, Fedorczyk, & Amadio, 2012). Lateral pinch and abduction/adduction of the index finger to the long finger, however, requires movements such as wrist flexion, extension, ulnar and radial deviation, and forearm supination/pronation to position the fingers appropriately during object manipulation. The

additional movement of the wrist limits its stabilizing quality and creates less coordinated, imprecise, and ineffective movement of the digits.

**Contexts and environments.** At age 6, the client's emotional distress created by peer ridicule is beginning to breed a preoccupation with body image. Within the school environment, it is vital to the client's academic growth that she perceives herself as being accepted and included by her peers. In doing so, her focus can rest primarily on academic achievements instead of on body image (Case-Smith & O'Brien, 2009). The therapist will work with the client to develop a pincer grasp for use in school-based fine motor activities, such as writing, in order to eliminate the source of peer ridicule.

### **Occupational Therapy Process**

There are 3 main processes that guide occupational therapy practice; Evaluation, Intervention, and Outcomes. The term "process" refers to the sequence that an occupational therapist follows to achieve desired outcomes for every client (American Occupational Therapy Association, 2002). The above 6 occupational domains comprise an occupational profile and an analysis of the client's occupational performance, which completes the initial evaluation process. The therapist can now develop an intervention plan specific to the client's needs.

**Establish and restore.** Results of the evaluation indicate that the client would benefit from neural retraining aimed at restoring active thumb IP joint flexion and extension. Therefore, the theory and principles of mirror therapy will be incorporated into the intervention plan and will be guided by the biomechanical, neuro-occupation, and biopsychosocial frames of reference. Play therapy will be utilized to select client-centered activities that motivate the 6 year-old client to cooperate with and more fully engage in therapy.

***Mirror Therapy.*** Mirror therapy is a neurologically based intervention. It is designed to reorganize neural connections within the brain (Lamont, Chin, & Mikhail, 2011). Cortical reorganization occurs when mirror neurons in the premotor cortex and the somatosensory cortices of the brain are activated. The mirror neurons are associated with observation and imitation of movement and observation of touch; therefore, they are activated through movement of the body. In regard to the client, repeated and accurate use of the newly restored thumb IP joint establishes neural connections within the brain (Earley, 2003). Over time and with repeated use of this structure, refinement of the neural connections will occur.

Repetitious use of a structure refines the neural connections associated with the movement to a level of efficiency that allows for anticipation of the movement in the future. Through cortical activation, the client's self-awareness and spatial attention is enhanced allowing her increasingly efficient and automatic use of the thumb IP joint while performing functional tasks (Lamont, Chin, & Mikhail, 2011). This process will be further referred to as neural retraining.

***Mirror box.*** In consideration of the theory and principles of mirror therapy, it may be advantageous to the neural retraining process to have the client utilize a mirror box in therapy. The client's non-dominant hand would face the mirror while her dominant hand would be placed inside the box. The client would be encouraged to flex and extend the non-dominant thumb IP joint as she watches its reflection in the mirror. Theory associated with mirror therapy suggests that her brain would interpret the reflection as the dominant hand moving (Lamont, Chin, & Mikhail, 2011). Visualizing the "dominant" hand performing desired actions can facilitate reorganization of neural connections, working toward actual active movement of the dominant thumb IP joint (Butler, 2004).

**Play Therapy.** The primary job of children is play; therefore, play as intervention tends to gain the attention and motivation of a child during therapy (Case-Smith & O'Brien, 2009). Play therapy will be used to select client-centered activities that evoke the client's participation, yet facilitate thumb IP joint involvement. The use of play therapy aims to interest the client, enhance her compliance in using her thumb IP joint, and to meet outcomes (or goals) of therapy.

### **Intervention**

Early in the intervention process, the therapist should determine if the client's mother lacks confidence in the therapist's ability to meet desired outcomes. Understandably, therapy geared around play could be misleading to a parent. Realizing that a child's perceptions are oftentimes impacted by their parents' perceptions, it is critical for the mother to believe in the therapist's selected methods and abilities so that the client participates in therapy.

**Education.** Since the therapist and client will be playing during therapy, it is important that the client's mother be aware of the theory behind play therapy. The therapist will utilize education as part of the intervention process in order to impart knowledge regarding play as motivation. The mother will be encouraged to ask questions regarding any concerning or confusing points.

**Consultation and therapeutic use of occupation and activities.** The therapist will consult with the client and her mother to determine play activities that hold meaning for the client. Those tasks will be utilized as purposeful and/or occupation-based activities. When combined with preparatory methods, these activities facilitate the client's engagement in therapy. For example, use of a splint that blocks full flexion of the thumb MP joint (a preparatory method) assists in facilitating active movement of the thumb IP joint during manipulation of therapy putty (purposeful activity) and completion of homework (occupation-based activity).

*Use of orthotic.* A fabricated splint is used to stabilize and protect structures involved in a repair through immobilization (Cooper, 2007). In addition, the splint facilitates specific and safe active movement of structures that are not at risk of endangering or damaging the repair site. Treatment protocol for A1, oblique, and A2 pulley reconstruction suggests the use of a splint as a preparatory method. The splint is fabricated to block flexion of the thumb MP joint while allowing and encouraging active flexion of the thumb IP joint. In doing so, the splint facilitates neural retraining of the later structure. As stated earlier, neural connections and engagement in occupation are interrelated, each influencing the other (Earley, 2003). Work done by Butler (2004) with guided motor imagery and neuro-orthopedics suggested that by thinking about movement, seeing movement, and engaging in movement, facilitation of the neural retraining process occurs. In light of these studies, neural connections are initially developed and are continually refined as the client continues to actively use the thumb IP joint to accomplish ADLs. ADL examples include writing, tying shoelaces, and playing.

Researchers Videler, Eijffinger, Nollet, & Beelen (2012) studied persons with Charcot-Marie-Tooth (CMT) disease to determine the effect of a thumb opposition splint on manual dexterity and overall function. The thumb opposition splint positioned the thumb in a relaxed position and increased opposition to the fingers. This position enabled the patient to form a better pinch grip between digit I (thumb) and digit 2 (index finger) and increased thumb stability. The results of this study showed that use of a thumb opposition splint (custom made for the patient) improved manual dexterity and increased overall function during daily activities. Videler et al. (2012) noted that the subjects had an easier time performing activities that require fine motor skills, such as buttoning and unscrewing a lid from a jar.

*Neural retraining and strengthening activities.* Active thumb IP joint flexion and extension will be facilitated through client-centered purposeful and occupation-based activities. The following activities were selected because they are meaningful and motivating to the client; this is not an exhaustive list.

*Preparatory methods.*

- Bulky Dressing
- Fingersock
- Pulley Ring
- Splint
- Edema Measurements
- Goniometric Measurements
- Pinch Strength Measurements
- Grip Strength Measurements

*Purposeful activities.*

- Therapy Putty
- Hand Exerciser
- Stress Ball
- Clips
- Pegs

*Occupation-based activities.*

- Buttoning
- Zipping
- Tossing a Frisbee
- Throwing a ball
- Play-Doh
- Dressing Barbie
- Pencil Grip to Complete Homework
- Crayons and Coloring Book
- Board Game
- Tying shoes
- Painting Toe Nails
- Holding a Cup

### **Frames of Reference**

Several frames of reference guide the proposed therapy process. From a biomechanical standpoint, therapy will have an effect on the structure and function of the thumb. Given the diagnosis and the surgical intervention, initial and follow-up assessments of ROM, pinch strength, and grip strength will be observed (Skirven, Osterman, Fedorczyk, & Amadio, 2012). Such quantitative data serves as evidence to the success of therapy interventions. Additionally, edema management, scar management, and wound management will be addressed.

The neuro-occupation framework also guides treatment for pulley reconstruction rehabilitation. Guiding mirror therapy, the neuro-occupation framework suggests that structured movements facilitate the development of neural connections, which further refine over time (Butler, 2004). In regard to the client, repeated and accurate use of the newly restored thumb IP joint establishes neural connections within the brain (Early, 2003). Over time and with repeated use of this structure, refinement of the neural connections will occur. The neural connections are able to reach a level of efficiency that allows for anticipated movement in the future.

The biopsychosocial frame of reference guides a secondary goal of therapy; addressing the difficulty the client experiences with body image. The therapist will observe which self-attributes the client most admires and will then create opportunities that expose these attributes. In doing so, the therapist hopes the client will develop a positive sense-of-self and perceived confidence in her abilities. A positive self-perception redirects the client's focus from body image concerns to engagement in occupation, and provides motivation to participate in therapy (Kramer & Hinojosa, 2010). Active and honest participation in therapy allows for increased active use of the thumb IP joint during fine motor tasks, such as writing, which meets the client's (and the mother's) goal for therapy.

**Therapeutic use of self.** The therapist's use of self is also an integral aspect of intervention. Allowing the client to influence the selection of play activities and to determine the course of play encourages the client to befriend the therapist and gains the therapist access into the client's world of play (Case-Smith & O'Brien, 2009). During play, the therapist is able to watch closely how the client manipulates objects with her thumb. As play evolves and the client's trust is gained, the therapist will utilize verbal cuing to facilitate consistent use of the thumb IP joint during object manipulation.

**Advocacy.** Finally, the therapist can advocate for the client by involving the school counselor and the client's teacher in the rehabilitative process. It is vital to the client's success in school to have the support of professionals who can assist with both her social school needs, as well as the impact that yet another surgery might have on her psychological well-being.

### **Outcomes**

Ultimately, an increase in the client's perceived quality of life is the desired outcome of therapy. Specifically, the goal is to establish efficient neural connections that restore active thumb IP joint movement and increase performance of fine motor activities. Secondly, the client's health and wellness is impacted through the establishment of a pincer grasp for writing, which should dampen (and potentially eliminate) the source of peer ridicule and positively influence the client's perception of body image. Client feedback and results of quantitative follow-up measures (ROM, pinch strength, and grip strength) gives the therapist insight into the effectiveness of the intervention. If progress is not evident, the intervention plan can be altered to better achieve the client's outcomes.

**Treatment Plan: A1, Oblique, A2 Pulley Reconstruction**

<b>Post-Operative Timeframe</b>	<b>Treatment Objectives (Operative Techniques in Orthopaedics; Brigham &amp; Women's Hospital; Bayat et. al., 2002)</b>
Day 5 – Week 6	<ul style="list-style-type: none"> <li>- Prior to suture removal <ul style="list-style-type: none"> <li>o wound care and bulky dressing changes</li> </ul> </li> <li>- Subsequent to suture removal <ul style="list-style-type: none"> <li>o scar assessment and management <ul style="list-style-type: none"> <li>▪ timeline, color, appearance, adhesion status</li> </ul> </li> <li>o scar massage: circular and transverse, as indicated</li> </ul> </li> <li>- Initial measurements of proximal and distal phalanx edema</li> <li>- Edema control to be initiated with fingersock or 1" Coban <ul style="list-style-type: none"> <li>o quiet pain; achieve active flexion and extension</li> </ul> </li> <li>- Thumb opposition splint; Thumb spica splint (must serve as a thumb MP joint blocking splint and assist with healing of PL) <ul style="list-style-type: none"> <li>o quiet inflammation and protect surgical repair</li> <li>o <u>neural retraining of isolated IP joint flexion and extension</u></li> <li>o to be worn between exercise sessions and at night</li> </ul> </li> <li>- Educate client on splint use, don/doff, and hygiene</li> <li>- Pulley ring 3/8" width prescribed <ul style="list-style-type: none"> <li>o external support for reconstructed pulley to prevent attenuation or disruption of pulley repair as active place and hold is performed</li> </ul> </li> <li>- Initial measurements of thumb MP and IP joint PROM and AROM</li> <li>- HEP prescribed and taught to client and client's mother <ul style="list-style-type: none"> <li>o PROM 6-8x/day for 10 min sessions; compliment with active place and hold exercises as edema subsides</li> <li>o Refer to handout</li> </ul> </li> <li>- NMES may be initiated with place and hold exercises <ul style="list-style-type: none"> <li>o ensure FPB and FPL excursion</li> </ul> </li> </ul>
Week 6 – Week 8	<ul style="list-style-type: none"> <li>- Follow-up measurements of MP &amp; IP joint PROM and AROM</li> <li>- Follow-up measurements of edema, as indicated</li> <li>- <u>Neural retraining of active IP joint flexion and extension</u></li> <li>- Unrestricted active and passive ROM exercises initiated 6-8x/day for 10 min sessions <ul style="list-style-type: none"> <li>o Refer to handout &amp; below</li> </ul> </li> </ul>
Week 8 – Week 12	<ul style="list-style-type: none"> <li>- <u>Neural retraining continued to include greater variety of tasks</u> <ul style="list-style-type: none"> <li>o See below</li> </ul> </li> <li>- Strengthening exercises initiated (Measure pinch strength) <ul style="list-style-type: none"> <li>o Play-Doh / Putty (See handout)</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>- May discontinue pulley ring at 3-4 weeks after initiation of strengthening (typically at timeframe of 10-12 weeks post-op)</li> <li>- May discontinue splint</li> <li>- Initiate gentle blocking exercises: isolated FPB and FPL excursion</li> </ul>
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### **Treatment Plan: Palmaris Longus Autograft**

<b>Post-Operative Time Frame</b>	<b>Treatment Objectives (Oh, M.D.)</b>
Week 1	<ul style="list-style-type: none"> <li>- Compression dressing to graft site for 7-10 days PRN</li> <li>- Cryotherapy to graft site PRN</li> </ul>
Week 2	<ul style="list-style-type: none"> <li>- Initiate light scar mobilization over graft incision site</li> <li>- Continue cryotherapy PRN</li> </ul>
Week 3	<ul style="list-style-type: none"> <li>- Continue scar mobilization over graft incision site</li> <li>- Continue cryotherapy PRN</li> </ul>
Week 4-7	<ul style="list-style-type: none"> <li>- Restore full function of graft site</li> </ul>

### **Indicators for treatment of Palmaris Longus (DeLany, 2009)**

- Signs of Dupuytren's contracture (Hand deformity in which the palmar fascia contracts and thickens over time)
  - Characteristics of Dupuytren's contracture include:
    - Stage 1: A nodule of the palmar fascia that does not include the skin, with no change in the fascia.
    - Stage 2: A nodule in the fascia with involvement of the skin.
    - Stage 3: Same as stage 2 but with a flexion contracture of one or more fingers.
    - Stage 4: Same as stage 3, plus tendon and joint contractures.
- Prickling sensation to the palm and anterior forearm (from trigger points)
- Tenderness in the palm

The above case study addressed the rehabilitation process for A1, oblique, and A2 pulley reconstruction. The author developed an occupational profile and assessed the occupational

performance of the client, which included a compilation of information pertaining to the domains that are included in the framework of occupational therapy. In response to the occupational profile and assessment of the client's occupational performance, the author developed a thorough intervention protocol supported by theory and evidence. In order to depict the rehabilitation process, the author used the Occupational Therapy Practice Framework: Domain and Process II (American Occupational Therapy Association, 2002). This document guides the profession of occupational therapy and is essential for the development of a thorough intervention plan.

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