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AN OCCUPATION-BASED INTERVENTION PROTOCOL FOR
CARPOMETACARPAL JOINT ARTHROPLASTY

by

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Submitted to the Occupational Therapy Department

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This Scholarly Project Paper, submitted by Joshua A. Gilbertson and Christopher G. Johnson in partial fulfillment of the requirement for the Degree of Master's of Occupational Therapy from the University of North Dakota, has been read by the Faculty Advisor under whom the work has been done and is hereby approved.

Faculty Advisor

Date

PERMISSION

Title An Occupation-Based Intervention Protocol for Carpometacarpal (CMC)
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ABSTRACT

The carpometacarpal (CMC) joint is located at the base of thumb and, functionally, is the most important joint within the hand due to its extensive mobility and the importance it has on the dexterity of human prehension. Due to the hypermobility and high degrees of utilization of the CMC joint, it is a common area for increased pain, joint disease, and the development of arthritis. Arthritis can be a debilitating condition as it is associated with instability, deformities, and limited range of motion, which all impact engagement in activities of daily living and meaningful occupations. When conservative treatments and non-surgical interventions have been exhausted, in efforts to increase joint function and decrease pain, surgical intervention is often implemented, followed by rehabilitation. Presently, there is a lack of a research regarding the implementation of occupation-based treatment as the typical approach to treatment has been biomechanically based. Despite the general research of the benefits utilizing occupation in the treatment process, there is limited evidence regarding the use of occupation-based activities following a CMC joint arthroplasty.

The purpose of this scholarly project was to develop an intervention protocol that utilized “occupation” as a medium in the therapy process for clients who have undergone a CMC joint arthroplasty. Traditionally, the biomechanical approach used intervention methods focused on improving range of motion, strength, and endurance. However, research regarding the use of occupation has provided support that inclusion of

occupation can improve physical impairments (similar to the biomechanical approach), in addition to enhancing self-efficacy, self-esteem, motivation and role engagement. Three biomechanical approaches were identified through research which were used, analyzed, and integrated to form one universal approach to intervention. Occupation-based activities selected for the purpose of this protocol were carefully assessed and analyzed to correlate with the established biomechanical approach.

Following a thorough review of literature to assess current rehabilitation protocols and approaches utilized in practice, it was determined that there was minimal focus on occupation and occupation-based interventions. The Model of Human Occupation (MOHO) and Occupational Adaptation (OA) Model were utilized to assist in the development of this protocol as both emphasize the importance of occupation, in addition to motivation, contexts, habits and routines, roles, and adaptation. This protocol was developed to be a clinical guide that is easy to use in practice that can be implemented in conjunction with current biomechanical approaches for the rehabilitation of clients' who have undergone a CMC joint arthroplasty.

CHAPTER I

INTRODUCTION

Musculoskeletal impairments (MI) are found in individuals of all ages, and these impairments can significantly affect an individual's engagement and level of performance in ones activities of daily living and meaningful occupations. Common MI's include both osteoarthritis (OA) and rheumatoid arthritis (RA). Varying reports of OA prevalence exist in literature. Harra et al. (2004) stated that the prevalence of carpometacarpal (CMC) OA has been reported to vary between 8-12 % of the population, while Lubahn, Wolfe, and Feldscher (2011) reported as 40% of the adult population may be affected by OA. In terms of RA, the prevalence in the adult population ranges between 0.3-1% with RA occurring 2.5 times more often in women and between the ages of 40-50 years (Gornisiewicz, & Moreland, 2001; Goronzy, & Weyand, 2001).

The impact of these MI conditions can be significant as they can lead to a decrease in productivity in people's lives that reduce one's overall ability to work and perform his or her daily living activities. Both OA and RA can impede a person's ability to complete meaningful occupations due to increased pain, mobility limitations, and decreased function related to the disruption of the joints involved. The hand is an area of the body that may show increased pain, joint disease, and the development of either rheumatoid arthritis (RA) or osteoarthritis (OA) (Stukstette et al., 2011).

When considering the hand, one of the most important structures is the thumb, as it is largely responsible for the characteristic dexterity of human prehension (Neumann, & Bielefeld, 2003). Within the thumb itself, when the occupational therapist assesses the motion provided by each joint of the thumb, the CMC joint is considered the most important due to its extensive mobility and the level of importance for efficient and effective hand function. Osteoarthritis of the CMC joint is a common troubling problem and can cause major functional hand disabilities that are associated with instability, deformities, and limited range of motion (ROM) due to pain and swelling over the base of the thumb (Ataker et al., 2012; Beatus, & Beatus, 2008; Harra et al., 2004). Rheumatoid arthritis is another cause of pain, mobility limitations, and decreased function related to a disruption in the biomechanics of the CMC joint.

When conservative treatment and all possible non-surgical options have been exhausted and determined to be ineffective, in the rehabilitation of CMC joint arthritis, a surgical intervention is the next option to relieve the pain and increase function of the joint. Notably, hand therapy rehabilitation following surgical intervention, is dominated by the Biomechanical Frame of Reference (FOR). Limited research is available in regards to the implementation of occupation-based interventions within occupational therapy and/or hand therapy settings. Though there is a limited amount of research regarding the inclusion of occupation-based interventions within hand therapy rehabilitation, a small number of studies have provided evidence identifying the benefit of including occupation in treatment of the hand and upper extremity as a whole (Early, & Shannon, 2006; Guzelkucuk, Duman, Taskaynatan, & Dincer, 2007; King, 1992; Toth-Fejel, Toth-Fejel, & Hendricks, 1998).

As the current focus of hand therapy intervention is guided largely by the Biomechanical FOR, most interventions lack the key element of occupation and fail to address the role it has within the therapy process. The benefit of using occupation in therapy is that it allows therapists to have a client-centered approach while incorporating meaningful tasks and occupations to enhance client success.

In order to develop a more occupation-based protocol for clients' who undergo a CMC joint arthroplasty, occupational behavioural models (OBM) are vital. The OBM's used in this scholarly project were the Model of Human Occupation (MOHO) and Occupational Adaptation Model as they focus on occupation, motivation, environments/contexts, roles, habits, routines, and performance within meaningful occupations (Cole, & Tufano, 2008c; Cole, & Tufano, 2008d). With the use of the OBM's and current protocols from Ataker et al., (2012), Cannon (2001), and Saunders (2006), we created an occupation-based guide to be used in conjunction with the current biomechanical approach to intervention to facilitate a client-centered approach and to engage the client in meaningful occupations throughout the therapy process.

In this scholarly project, we described the occupational therapists (OT) approach to the post-operative treatment of clients with CMC joint arthroplasty. Interventions included in this protocol are broken down on a weekly basis to promote a successful recovery and re-engagement in their meaningful occupations. The treatment protocol was based on the review of literature and designed to guide and assist therapists in utilizing more occupation-based interventions during in-clinic treatment and in the development of home exercise programs for clients who have undergone a CMC joint arthroplasty.

This scholarly project is comprised of an overview of reviewed literature, the rationale for the development of this intervention protocol, the methodology in which we implemented, the developed product (occupation-based intervention protocol), and a conclusion with recommendations regarding the utilization of the developed protocol.

Chapter I consists of an introduction to the literature and an overview of the developed occupation-based protocol following a CMC joint arthroplasty. Chapter II provides a more detailed review of the literature introduced in Chapter I with an emphasis of the following areas: musculoskeletal impairments, the etiology of OA and RA, the CMC joint, role of occupational therapy in the treatment process. Additionally, Chapter II will highlight occupational behavioural models, current therapeutic and surgical interventions, and assessments utilized in clinical practice.

CHAPTER II

REVIEW OF THE LITERATURE

When one stops to analyze how much a person uses his or her hands in a given day to complete daily occupations, one may be surprised with how valuable and vital it is to have well-functioning hands. For the purpose of this literature review, “occupations” are defined as the activities of everyday life which are named, organized and given value and meaning by individuals and a culture (American Occupational Therapy Association [AOTA], 2008). Human beings use their hands in the majority of activities in which they engage, such as getting dressed, preparing a meal, eating, engaging in a leisure activity, opening a jar, and typing on a computer. With the amount of value that is placed upon having proper hand function, a musculoskeletal disease can be debilitating as it can hinder one’s ability to engage in meaningful occupations and decrease one’s level of functional independence.

Musculoskeletal conditions are found among all age groups, with the greatest proportion of persons reporting these conditions increasing with age (American Academy of Orthopaedic Surgeons, 2008a). Taking into account for all costs for persons with a musculoskeletal disease, including other comorbid conditions, the burden of treating these individuals in addition to the cost to society in the form of decreased wages, is estimated to be nearly \$950 billion dollars per year (American Academy of Orthopaedic Surgeons, 2008a). As the United States population rapidly ages in the next 25 years,

musculoskeletal impairments will increase because they are most prevalent in the older segments of the population (American Academy of Orthopaedic Surgeons, 2008a). The impact of a musculoskeletal disease includes the loss of productivity for persons who live with a musculoskeletal condition that reduces their ability to work and perform activities of daily living (American Academy of Orthopaedic Surgeons, 2008a). Nearly 32.6 million adults aged 18 years and over, or 14% of the population, reported that, due to medical conditions, they have difficulty performing routine daily activities of life without assistance (American Academy of Orthopaedic Surgeons, 2008a).

Occupational therapists are valuable team members who work with clients in the rehabilitation process to restore one's hand function, manage pain, and improve kinematics. Occupational therapy is a form of rehabilitation that focuses on assisting individuals in achieving their highest level of functional independence in all areas of their daily lives through the utilization of daily occupations as intervention tools and activities.

The profession of occupational therapy was developed around the notion of the healing power of occupation, thus forming a link between medical practice and occupational therapy (Cole, & Tufano, 2008e). However, over time, the profession transitioned into a more client centered approach to therapy through following the principles of the Client-Centered Model (CCM). The focus of the CCM includes ensuring the client is the center of the treatment process by collaborating with him or her to identify occupational problems, set goals, increase motivation, and enable occupational participation through skilled development (Cole, & Tufano, 2008c). Occupational therapists believe that client-motivation is a key element in the rehabilitation process as the drive to reach self-actualization (which is the motivation to realize one's maximal

potential and the process of developing one's abilities to achieve their full potential to facilitate self-fulfillment), is believed to be the motivating factor that inspires individuals to change (Cole, & Tufano, 2008a).

In the evaluation and intervention process, occupational therapists usually address various areas of occupation in which a person engages in such as activities of daily living (ADL), instrumental activities of daily living (IADL), education, work, play, leisure, and social participation. Areas of occupation are further defined in Table 1. Occupational therapists not only address areas of occupation, but also performance skills (motor skills and process skills), performance patterns (habits, routines, and roles), the context (cultural, spiritual, physical, social, personal, temporal and virtual), activity demands, and client factors that all facilitate and/or inhibit occupational participation (AOTA, 2008). The role of occupational therapists in hand rehabilitation is to evaluate each of the above mentioned areas and develop a client-centered treatment plan to be implemented to facilitate improvements in clients' level of occupational engagement. Through increasing range of motion (ROM), strength and endurance, making activity modifications, educating the client, and decreasing pain, each of these addressed areas will collaborate to increase the level of occupational engagement in areas of occupation.

In occupational therapy, the principles of movement (including ROM, strength, endurance, ergonomics, and the effects or avoidance of pain), must all be considered within the context of occupation (Cole, & Tufano, 2008b). The premise of the Biomechanical Frame of Reference (FOR) is on the physics of human movement and posture, with respect to forces of gravity, in providing treatment. This frame of reference

Table 1		
Areas of Occupation		
Area of Occupation	Definition	Examples
ADL	Activities that are orientated towards taking care of one's body (self-cares) (AOTA, 2008).	Bathing, dressing, eating, feeding, functional mobility, personal hygiene/grooming, sexual activity, sleep/rest (AOTA, 2008).
IADL	Activities that are oriented toward interacting with the environment that are often complex (AOTA, 2008).	Care of others, communication device use, community mobility, financial management, health management/maintenance, meal preparation, shopping, home management (AOTA, 2008).
Education	"Includes activities needed for being a student and participating in a learning environment" (AOTA, 2008, p. 632).	Formal and informal education participation (AOTA, 2008).
Work	"Includes activities needed for engaging in remunerative employment or volunteer activities" (AOTA, 2008, p. 632).	Employment interests, employment seeking, job performance, retirement preparation, volunteer exploration and participation (AOTA, 2008).
Play	Any spontaneous or organized activity that provides enjoyment, entertainment or amusement (AOTA, 2008).	Play exploration and play participation (AOTA, 2008).
Leisure	A non-obligatory activity that is intrinsically motivated and engaged in during discretionary time, that is time not committed to obligatory occupations (AOTA, 2008).	Leisure exploration and leisure participation (AOTA, 2008).
Social Participation	"Activities associated with organized patterns of behavior that are characteristic and expected of an individual or an individual interacting with others within a given social system" (AOTA, 2008, p. 633).	Community, family, peer, friend (AOTA, 2008).

is commonly used by many healthcare professionals (Cole, & Tufano, 2008b).

Occupational therapists are trained to apply the Biomechanical FOR in conjunction with the principles of various occupational therapy models in order to facilitate engagement in meaningful occupations when working with client who have broad array of injuries or impairments. Within hand rehabilitation settings, the Biomechanical FOR is the dominant treatment model utilized by therapists in treating clients with hand injuries, musculoskeletal disorders, and cumulative trauma injuries.

As occupational therapists, it is important to understand the complex anatomical structures, components, and kinematics of the human hand.

The anatomy of the hand is efficiently organized to carry out a variety of complex tasks. These tasks require a combination of intricate movements and finely controlled force production. The shape of the bony anatomy in conjunction with the arrangement of soft tissues contributes to the complex kinesiology of the hand. Injury of any of these structures can alter the overall function of the hand and therefore complicate the therapeutic management. (Moran, 1989, p. 1007)

One of the most important structures of the hand is the thumb, as it is largely responsible for the characteristic dexterity of human prehension (Neumann, & Bielefeld, 2003). The thumb has three planes of motion, which elicits one's ability to manipulate objects of various size, strengths, and weights (Pratt, 2011). Within the thumb, there are three joints which allow for its dynamic function which include: 1) the interphalangeal (IP) joint 2) the metacarpophalangeal (MP) joint and 3) the carpometacarpal (CMC) joint (Pratt, 2011). When assessing the motion provided by each joint of the thumb, functionally, the most important joint of the thumb is the CMC joint (Neumann, & Bielefeld, 2003).

The CMC joint of the thumb is located at the base of the thumb and is known as a saddle joint, which allows for its wide range of motion (Lemoine et al., 2008). As mentioned, the CMC joint is the most important joint in the thumb due to its extensive

mobility, which includes: palmar abduction and adduction, extension, flexion, and axial rotation (Badia, & Sambandam, 2006).

The CMC joint of the thumb is the articulation between the base of the first metacarpal and the distal side of the trapezium (Pratt, 2011). In addition to the thumb CMC joint, there are three adjacent articulations related to the CMC joint which are the joints between: 1) the trapezium and the scaphoid, 2) the trapezium and the trapezoid, and 3) the base of the first metacarpal and the radial side of the second metacarpal (Neumann, & Bielefeld, 2003). Occupational therapists must always consider adjacent joints when working with clients who have CMC joint injury or dysfunction.

The hand is an area of the body for increased pain, joint disease, and the development of either rheumatoid arthritis (RA) or osteoarthritis (OA) (Stukstette et al., 2012). The estimated annual cost for medical care of arthritis and joint pain for patients with any diagnosis in 2004 was 281.5 billion, an average of \$7,500 for each of the 37.6 million people who were reported having either arthritis and joint pain (American Academy of Orthopaedic Surgeons, 2008b). The CMC joint is an especially common site for the development of OA in the hand (Poole et al., 2011). Yasuda (2008) described OA is the gradual loss of articular cartilage of a joint in combinations with the thickening of the subchondral bone, bony outgrowths at the joint margins, and mild to chronic nonspecific synovial inflammation. Pain and disability at the base of the thumb are often caused due to thumb CMC osteoarthritis (Haara et al., 2004). Egan and Brousseau (2007) asserted that one of the primary factors in CMC joint osteoarthritis is the inherent laxity of the volar oblique ligament. When this joint is repeatedly stressed (e.g., as in activities causing heavy loading on the joint), subluxation occurs resulting in incongruity of

opposing surface, inflammation, and eventual degeneration (Egan, & Brousseau, 2007). These joints change causing stiffness, which often is increased by the formation of osteophytes at the trapezium or metacarpal base (Egan, & Brousseau, 2007). Movement can be further limited if the CMC joint becomes fixed in a dorsally subluxed position, limiting radial adduction (Egan, & Brousseau, 2007).

Osteoarthritis of the CMC joint is a common troubling problem and can cause major functional hand disabilities that are associated with instability, deformities, and limited range of motion (ROM) due to pain and swelling over the base of the thumb (Ataker et al., 2012; Beatus, & Beatus, 2008; Harra et al., 2004). Varying reports of OA prevalence exist. Harra et al. (2004) stated that the prevalence of CMC OA has been reported to vary between 8% to 12% of the population while Lubahn, Wolfe and Feldscher (2011) reported as 40% of the adult population may be affected by OA. Of this 40%, Lubahn, Wolfe, and Feldscher (2011) indicated that only 10 % seek medical attention and 1% are disabled by arthritis. CMC OA also causes and results in pain and loss of manipulative function essential to carrying out ADLs (Poole et al., 2011). When examining the specifics to the osteoarthritis in the CMC joint, the etiology is unknown, although one's genetics, gender, physiological and environmental factors all appear to play a role in developing the condition (Egan, & Brousseau, 2007). The prevalence of CMC osteoarthritis increases with age and is especially present among post-menopausal women (Beatus, & Beatus, 2008; Egan, & Brousseau, 2007).

Rheumatoid arthritis (RA) is another cause of pain, mobility limitations, and decreased function related to a disruption in the biomechanics of the CMC joint. Rheumatoid arthritis is a chronic autoimmune disease that attacks the body's own tissues,

which in turn causes the formation of fluid build-up within the joints (Arthritis Foundation, 2013). The prevalence of RA in the adult population ranges between 0.3-1%, with RA occurring 2.5 times more often in women and between the ages of 40-50 years (Gornisiewicz, & Moreland, 2001; Goronzy, & Weyand, 2001). Pain, systematic inflammation, and deformities are a common result in individuals diagnosed with RA (Arthritis Foundation, 2013), which in turn inhibits engagement in daily occupations. In persons with RA, synovial hypertrophy within the individual joints of the thumb (including the CMC joint) not only can lead to destruction of the articular cartilage, but also may stretch the supporting collateral ligaments and joint capsules (Terrono, Nalebuff, & Philips, 2011).

Occupational therapy intervention to resolve pain and dysfunction in the CMC joint caused by OA or RA depends on the stage of severity. Whether in an early or late stage of arthritis, conservative treatment (non-surgical intervention) is utilized with all patients prior to and to prevent any unnecessary surgeries (Ataker et al., 2012; Badia, & Sambandam, 2006; Beatus, & Beatus, 2008; Matullo, Ilyas, & Thoder 2007; Poole et al., 2011). Common conservative interventions include activity modification, muscle strengthening, non-steroidal anti-inflammatory drugs (NSAID) usage, splinting, corticosteroid injections, pain control/management, and joint protection (Matullo, Ilyas, & Thoder, 2007; Neumann, & Bielefeld, 2003; Saunders, 2006). After conservative treatment has been completed and all possible non-surgical options have been exhausted, a surgical intervention is the next option to relieve pain and increase function.

Surgical interventions for the CMC joint began in the early 2000's, thus multiple surgical techniques are utilized and range from simple partial or complete trapeziectomy

to various implants and ligament interposition and reconstructions (Matullo, Ilysa, & Thoder, 2007). Commonly used surgical interventions for completing a CMC joint arthroplasty include but are not limited to: ligament reconstruction, ligament reconstruction with tendon interposition (LRTI), suspensionplasty, metacarpal osteotomy, open trapeziectomy (with ligament reconstruction, interposition of allograft, or tendon interposition), arthrodeses, and hematoma distraction arthroplasty (Ataker et al., 2012; Brunton, & Wilgis, 2010; Ghavami, & Oishi, 2006; Kriegs, Petje, Fojti, Ganger, & Zachs, 2004; Matullo, Ilysa, & Thoder, 2007; Neumann, & Bielefeld, 2003; Park et al., 2008). The LRTI surgical technique has been found to be the preferred technique used by surgeons and provides the greatest opportunity to preserve and restore motion at the base of the thumb and relieves significantly the severity of pain (Ataker et al., 2012; Brunton, & Wilgis, 2010; Koff et al., 2007; Matullo, Ilysa, & Thoder, 2007; Neumann, & Bielefeld, 2003).

Following the surgical intervention, the clients are often referred to either an occupational or certified hand therapist (an occupational therapist or physical therapist with certification in hand therapy) for a post-operative rehabilitation program. The occupational therapy process begins with the evaluation of the occupational profile of the client and the analysis of the occupational performance (AOTA, 2008). Following the evaluation, the occupational therapist develops an intervention plan which focuses on objectives and measureable goals that are based on the evaluation, in addition to occupational therapy theory and evidence (AOTA, 2008). After the development of the intervention plan, the occupational therapist implements the therapeutic interventions (preparatory, purposeful, or occupation-based) while monitoring the client's response to

the intervention strategies being utilized through ongoing assessment (AOTA, 2008). The important part of any intervention process is the assessment of outcomes achieved through engagement in therapy. During the outcomes aspect of the therapy process, the occupational therapist focuses on relating the engagement in occupation to support participation (AOTA, 2008).

In regards to the assessments and evaluations utilized in the clinic to assess and monitor a client's progression through treatment, a wide arrangement of tools have been identified through literature review. Evaluations that have been identified include the Disability of the Arm, Shoulder, and Hand (DASH), the Canadian Occupational Performance Measure (COPM), the Jebsen Hand Function Test (JHFT), the Arthritis Hand Function Test (AHFT), goniometer, dynamometer, the Arthritis Impact Measurements Scale (AIMS) 2, and the Visual Analog Scale (VAS) (Ataker et al., 2012; Badia, & Sambandam, 2006; Beatus, & Beatus, 2008; Jack, & Estes, 2010; Johnsson et al., 2012; Kaszap, Daecke, & Jung, 2012; Matullo, Ilysa, & Thoder, 2007; Poole et al., 2011; Stukstette et al., 2011). Any combination of the aforementioned assessments can be used in treatment and selection of the assessments are dependent on the clinician's personal preference and understanding of the assessment.

The JHFT is an assessment that is utilized during evaluations to assess the level of hand function of a client through completing various tasks (Jebsen, Taylor, Trieschmann, Trotter, & Howard, 1969). The AHFT is an assessment that is utilized to assess both hand dexterity and strength in patients diagnosed with arthritis (Backman, Mackie, & Harris, 1991). The DASH and AIMS 2 are client-centered self-report questionnaires utilized to measure a client's physical function, symptoms, and overall quality of life (MacDermid,

2011; MacIntyre, & Wessel, 2009). The VAS is a pain measurement evaluation that is scaled from 0-10, 0 being no pain and 10 representing severe pain (Ataker et al., 2012). Measurements are taken to assess the client's level of pain at rest and at maximal loading (Kaszap, Daecke, & Jung, 2012). The COPM is a semi-structured interview that is used to assess the level of occupational performance and identifying activities in the areas of self-care, productivity, and leisure (Johnsson et al., 2012). The COPM requires the client to report important activities and rate them according to his or her ability to perform the activity and satisfaction with his or her performance (Johnsson et al., 2012). Goniometer and dynamometer assessments are used to assess the performance skills required to complete occupational tasks. Specifically, the goniometer is used to evaluate ROM and the dynamometer is used to evaluate hand strength (Flinn, Trombly-Latham, & Robinson-Podolski, 2008). Once the initial evaluation has been initiated or completed, the client begins the intervention (or rehabilitative) phase of occupational therapy.

The rehabilitation program may consist of several interventions which include splinting, edema and pain management, joint protection, range of motion, strengthening, a home exercise program, and occupation adaptation (Ataker et al., 2012; Beatus, & Beatus, 2008; Poole et al., 2011; Saunders, 2006; Stukstette et al., 2011). Saunders (2006) identified the primary goals of post-operative treatment as edema control, pain control, and promotion of a stable, pain-free and mobile joint, followed by range of motion, strength and increasing functional use of the hand. Common splints that are issued to clients by therapists following a CMC joint arthroplasty include either a short or long opponens splint, a thumb spica splint or C-bar splint (Ataker et al., 2012; Badia, & Sambandam, 2006; Egan, & Brousseau, 2007; Poole et al., 2011). The splint utilized will

depend on a therapist's clinical judgement and the post-surgical protocol provided by the surgeon. The post-operative rehabilitation program appears to follow a 12-week timeline that progresses from the initial evaluation to splinting, scar massage, range of motion (Passive range of motion [PROM], active-assisted range of motion [AAROM], active range of motion [AROM]), grip and pinch strength, sensation, and finally to improving the overall level of function (Ataker et al., 2012; Beatus, & Beatus, 2008; Saunders, 2006). The degree and rate in which a person will progress through the intervention program is dependent on the individual client and his or her adherence to the rehabilitation process.

Based on the Biomechanical FOR, which focusing on the utilization of therapeutic exercise and splinting, rehabilitation outcomes focus on increasing range of motion and strength following a CMC joint arthroplasty. Evidence supports that clients experience an increase in grip strength, pinch strength, and AROM (Ataker et al., 2012; Beatus, & Beatus, 2008; Roberts, Jabaley, & Nick, 2001). Client's self-reported increases within their participation in ADL functioning has also been reported (Beatus, & Beatus, 2008; Roberts, Jabaley, & Nick, 2001). Despite the reported outcome benefits of the Biomechanical FOR in terms of improving a client's strength and AROM following surgical intervention, there is little noted emphasis on occupational functioning in a client's meaningful and daily occupations. Additionally in literary evidence reviews for this project, occupational engagement within occupational tasks was not measured or evaluated using observation or objective assessments; rather, data was solely collected through client self-reports. In addition, there was no evidence regarding the use of occupation-based interventions in the post-operative interventions implemented.

Occupational therapy was developed upon the premise that with occupation as a therapeutic method in the intervention process, individuals could improve in their biomechanical measures (i.e. range of motion, strength, endurance, and coordination), cognitive measures, and their overall functional independence. Occupational therapy is a unique form of rehabilitation as the profession, also, is developed around the notion of client-centeredness and assessing clients holistically. Evidence regarding the use of “occupation as means” in therapy has been well documented during the profession’s existence. Such research that supports the notion that use of occupation as a medium can improve physical impairments in addition to clients’ self-efficacy, self-esteem, and role engagement (O’Brien, & Hussey, 2012). However, there is a lack of evidence in regards to the utilization of occupation in upper extremity orthopaedic rehabilitation.

Through literature review, it is evident that hand therapy rehabilitation is dominated by the Biomechanical FOR. Limited research is available in regards to the implementation of occupation-based interventions within the hand therapy setting. However, with limited amount of research with the utilization of occupation-based interventions within hand therapy rehabilitation, a small number of studies have provided evidence to the benefit of including occupation in treatment of the hand and upper extremity as a whole (Early, & Shannon, 2006; Guzelkucuk, Duman, Taskaynatan, & Dincer, 2007; King, 1992; Toth-Fejel, Toth-Fejel, & Hendricks, 1998). Benefits of utilizing occupation-based interventions have been included in facilitating greater improvements of strength and ROM compared to utilizing only therapeutic exercise, increasing the client’s willingness to participate and increase repetitions on exercise, and improving a client’s functional performance and his or her satisfaction within his or her

performance of his or her daily occupations (Early, & Shannon, 2006; Colaianni, & Provident, 2010; Guzelkucuk, Duman, Taskaynatan, & Dincer, 2007; Jack, & Estes, 2010; Toth-Fejel, Toth-Fejel, & Hendricks, 1998).

Treatment of the client whom underwent a CMC joint arthroplasty, the majority of intervention protocols have been developed based on the Biomechanical FOR. In order to develop a more occupation-based protocol to be utilized in the treatment of a CMC joint arthroplasty, key occupational behavior models that would be vital to its development would include the Model of Human Occupation (MOHO), Occupational Adaptation Model, and the Canadian Model of Occupation Performance and Enablement (CMOP-E). The focus of MOHO is based around assessing clients holistically and systematically where their motivation (volition), habituation, and performance capacity, in combination with the environment, are key aspects that contribute to their level of independence (Cole, & Tufano, 2008c). The Occupational Adaptation Model may also be useful in the development of an occupation-based protocol as the focus of the Occupational Adaptation Model is on utilizing a holistic approach to treatment and facilitating occupational adaptation through the process of following the three main constructs of this process, which include the person, the environment, and the interaction between the two (Cole, & Tufano, 2008d). There is limited published research regarding the use of the Occupational Adaptation Model in hand rehabilitation. However, Jack and Estes (2010) asserted, that use of Occupational Adaptation Model individually or use of the Occupational Adaptation Model in conjunction with Biomechanical FOR can facilitate an increase in a client's occupational engagement satisfaction, functional independence, and occupational engagement. Another model that may be useful in the

development of an occupation-based treatment protocol is the CMOP-E. The CMOP-E assumptions include maintaining a client-centered approach to therapy with consideration for the three central elements of this model, which are the person, the environment, and the occupation (Polatajko et al., 2007). Within the CMOP-E, all three elements (person, environment, and occupation) must function harmoniously to achieve function (Polatajko et al., 2007).

This literature review has included information regarding the anatomical structure of the CMC joint, different diagnoses related to the CMC joint, a variety of treatment options, and the interventions and protocols utilized post-operative to assist in understanding existing evidence regarding persons who have undergone a CMC joint arthroplasty and subsequent occupational therapy evaluation and intervention. Additionally, this literature review also included a review of the utilization and implementation of occupation-based treatments with persons with hand injuries, specifically focusing on the CMC joint. What has been identified through our review of the literature is that intervention protocols are developed primarily through the utilization of the concepts within the Biomechanical FOR. There is no evidence that provides a guide or manual for the inclusion of occupation-based interventions to assist in the rehabilitation process for persons after a CMC joint arthroplasty, despite the benefits of the utilization of occupation in treatment.

The purpose of this scholarly project was to develop an occupation-based treatment protocol for clients who have undergone a CMC joint arthroplasty. This protocol is intended for utilization by occupational therapists who work with clients with hand injuries and occupational therapist who are Certified Hand Therapists. In addition

to the need of an occupation-based protocol for therapists, research has identified that there is no information guide or manual available to clients in regards to educating them on what they can and cannot do on a more functional and/or occupational level on a weekly basis. Our intention for the development of this new protocol is to provide an intervention tool to therapists in order to increase the use of occupation and client-centeredness in therapy, while also providing clients with the education to identify additional occupational tasks that they can complete at home in order to facilitate re-engagement in his or her meaningful roles.

Chapter II provided a review of current literature regarding the etiology of OA and RA, the CMC joint, role of occupational therapy in the treatment process. In addition, current therapeutic and surgical interventions were described as well as assessments utilized in clinical practice. In this chapter, we identified the need for a more occupation-based approach is necessary following a CMC joint arthroplasty. Chapter III consists of descriptions of the methodology utilized in the development of the CMC joint arthroplasty occupation-based protocol.

CHAPTER III

METHODOLOGY

The product of this scholarly project is an occupation-based protocol. This protocol is to be utilized in clients' rehabilitation following a carpometacarpal (CMC) joint arthroplasty. This protocol would be used to improve client outcomes and increase client understanding of the various tasks in which they can engage in post-operatively. This process began when we identified a need for an occupation focused protocol to be utilized in conjunction with current existing protocols. The need was identified through a thorough literature review. The literature review included that focused on gathering information regarding the anatomical structure of the hand, the kinematics of hand function, arthritis and its effect on the CMC joint, interventions (both surgical and non-surgical), current protocols being utilized following a CMC joint arthroplasty, and the benefits of utilizing occupation in the rehabilitation process.

In order to conduct this review of literature, various available resources were utilized to gather all vital information. The Harley E. French Medical Library and Chester Fritz Library located on the University of North Dakota (UND) campus, and the American Journal of Occupational Therapy (through the American Occupational Therapy Association [AOTA] website), were crucial sources for professional journal articles and books. Professional journal articles were also located through the utilization of various search engines which include: PubMed, Cumulative Index to Nursing and Allied Health

(CINAHL), OT Search, and Google Scholar. In addition, occupational therapy textbooks were also used to gather information for the purpose of this scholarly project.

Additionally, Anne M. Haskins, PhD, OTR/L, a professor in the occupational therapy department at UND provided a plethora of valuable resources that she has collected over the years through her roles of a therapist, instructor, and researcher.

After the review of literature and analysis was completed, it was evident that there was a lack of inclusion of “occupation” in the rehabilitation process following a CMC joint arthroplasty. Intervention protocols identified through research primarily were developed through the utilization of the concepts of the Biomechanical Frame of Reference. Additionally, there was no evidence of a guide or manual that included the implementation of occupation-based interventions to aid in the rehabilitation process, despite the benefits of occupation-based treatment. Subsequently, we developed a plan to develop an occupational-based intervention protocol. In order to develop an intervention protocol with a central focus on the inclusion of occupation in the rehabilitation process, an occupational behavioural model (OBM) was required as a key element. After the researchers reviewed the various OBM’s, authors of this scholarly project decided that to develop a comprehensive CMC joint arthroplasty protocol using a protocol through the combination of the Model of Human Occupation (MOHO) and the Occupational Adaptation Model as a foundation.

The focus of MOHO is assessing client’s holistically and systematically where his or her motivation (volition), habituation, and performance capacity, in combination with the environment are key aspects that contribute to an individual’s level of occupational performance and independence (Cole, & Tufano, 2008c). Additionally, MOHO is

composed of an occupation focused approach to therapy practice, which fits perfectly with the goals we set in developing an occupation-based intervention protocol. The concepts of this model, assisted in the development of this occupation-based protocol as MOHO provides a framework for evaluation (in which to gather information about the client to develop a comprehensive occupational profile), which is needed in order to appropriate select and implement meaningful interventions to increase clients' occupational engagement and performance. Through developing occupation-based interventions that were pertinent to clients' roles and habits (habituation), a client would see more value in the activities and perceive them as more desirable to engage in (volition). Additionally, the activities could be completed in a home exercise program within a variety of contexts in addition to the clinic (environment). Thus, this would increase skills required to facilitate improved occupational performance (performance capacity).

In terms of the Occupational Adaptation Model, the focus is on utilizing a holistic approach to treatment and facilitating occupational adaptation through the process of following the three main constructs of this process, which include the person, the environment, and the interaction between the two (Cole, & Tufano, 2008d). The implementation of this model was beneficial for this protocols development as it provided us with a framework that can assist therapists throughout the therapy process from the evaluation through planning, guiding, and implementing interventions. For example, with evaluation and assessment, this model emphasizes the importance of utilizing a combination of standardized and also observation assessments as this will assist in developing comprehensive understanding of the client (Cole, & Tufano, 2008d). Another

main component of developing an occupation-based intervention protocol is ensuring client-centered was in the tasks selected for intervention, and the best way to do this is through matching tasks within a client's occupational roles. This model was valuable for this reason as it has a strong emphasis on identifying the client's role(s), role demands and expectations, and using meaningful occupations that correlate with the identified roles as a medium in the therapy process in order to improve occupational engagement; in addition to a client's ability to adapt to occupational challenges across contexts (Cole, & Tufano, 2008d). With this, we tried to select meaningful occupational tasks that could fit a variety of occupational roles in order to ensure that the protocol and interventions selected client-centered. Additionally, with providing clients with occupational tasks that they are able to complete at home (and how they can adapt tasks in order to complete them successfully), it provides them with the knowledge to identify additional tasks at home that they can participate in that fall within the post-operative limitations.

In order to develop a comprehensive protocol, we decided to develop a protocol that combined the key components of the OBM's, with several major pre-existing protocols that were discovered during the literature review process. The pre-existing protocols that we utilized were from Ataker et al., (2012), Cannon (2001), and Saunders (2006). In Table 2, each of the three protocols are described in their entirety.

Based on the protocols described in Table 2, we combined the key components of each to develop one universal, week-by-week biomechanical treatment protocol. The protocols in Table 2 have a combination of weekly and bi-weekly intervention processes, whereas we addressed each week individually; in order to determine what functional

tasks the client will be able to complete each week specifically within the protocol and sedentary exercises that can be accomplished.

Table 2		
Comparison of Rehabilitation Protocols		
Thumb CMC Soft Tissue Reconstruction (Cannon, 2001)	Thumb CMC Joint Arthroplasty Rehabilitation Protocol (Saunders, 2006)	Rehabilitation Protocol after Suspension Arthroplasty of Thumb CMC Joint Osteoarthritis (Ataker et al., 2012)
<p>Postoperative Rehabilitation</p> <p>“The course of the postoperative rehabilitation must be carefully managed. Establishing the optimal therapy program must consider the following:</p> <ul style="list-style-type: none"> • Extent of the disease • Joint stability postoperative • Extent of the surgical procedure • Complications” <p>(Cannon, 2001, p. 18)</p>	<p>Postoperative Indications/Precautions for Therapy</p> <p>“MCP joint hypertension can be a concurrent problem, and this may necessitate additional surgical procedures such as MCP fusion or capsulodesis. The operative note should be consulted, if possible” (Saunders, 2006, p. 619).</p>	
<p>10 – 14 Days Postoperative:</p> <p>“The bulky compressive is removed. Following suture removal, the patient is fitted with either a short arm cast or a wrist and thumb static splint with the IP joint free. The thumb is positioned midway between palmar and radial abduction. If a wrist and thumb static splint is fitted, a light compressive dressing is applied to the head and forearm prior to fabricating the splint. Note: The thumb must not be positioned in radial abduction. This would risk stretching out the reconstruction” (Cannon, 2001, p. 18).</p>	<p>0 – 2 Weeks Postoperative:</p> <p>“The patient is immobilized in a thumb spica cast” (Saunders, 2006, p. 619).</p>	<p>0 – 2 Weeks Postoperative:</p> <p>“During the time of immobilization in the spica cast, patients are asked to perform ROM exercises for the unaffected fingers, IP joint of the thumb, elbow, and shoulder; and flexor and extensor tendon gliding exercises as a home-based program” (Ataker et al., 2012, p.376).</p> <p>“At the end of two weeks, the cast and the sutures are removed and a custom-made short opponens orthotic device is made” (Ataker et al., 2012, p.376).</p>
<p>4 Weeks Postoperative:</p> <p>“Active and self-passive ROM</p>	<p>2 – 4 Weeks Postoperative:</p> <p>A. “The bulky, postoperative</p>	<p>2 – 4 Weeks Postoperative:</p> <p>“Continue to perform home</p>

Thumb CMC Soft Tissue Reconstruction (Cannon, 2001)	Thumb CMC Joint Arthroplasty Rehabilitation Protocol (Saunders, 2006)	Rehabilitation Protocol after Suspension Arthroplasty of Thumb CMC Joint Osteoarthritis (Ataker et al., 2012)
<p>exercises are initiated to the thumb and wrist 6 – 8 times a day palmar for 10 minutes sessions. Exercises should emphasize: and radial abduction</p> <ul style="list-style-type: none"> • thumb circumduction, flexion, extension • Wrist flexion, extension • Wrist radial, ulnar deviation” (Cannon, 2001, p. 18) <p>“The CMC joint should be supported during self-passive exercises” (Cannon, 2001, p. 18).</p> <p>“The wrist and thumb static splint is worn between exercise sessions and at night for protection of the surgery and for comfort” (Cannon, 2001, p. 18).</p> <p>“Scar management is initiated (if the patient had been in a cast until 4 weeks). It is critical to emphasize scar mobilization as dense adhesions are common. Scar massage with lotion, scar retraction using a piece of dycem, and use of a scar remodeling product such as Rolyan 50/50TM, OtoformK TM, or Elastomer TM are recommended” (Cannon, 2001, p. 18).</p> <p>“Manual desensitization techniques should be initiated as the area is often hypersensitive along the surgical site” (Cannon, 2001, p.18).</p>	<p>dressing and sutures are removed, and the use of elastic stockinette or Coban can be initiated for edema control” (Saunders, 2006, p. 619).</p> <p>B. “The patient is fitted with a thumb spica cast or splint with the interphalangeal (IP) joint left free for ROM” (Saunders, 2006, p. 620).</p> <p>C. The cast or splint is used continuously until the initiation of AROM of the CMC at 4 to 6 weeks postoperatively (Saunders, 2006, p. 620).</p>	<p>exercise program (HEP) until the end of the postoperative fourth week” (Ataker et al., 2012, p.376).</p> <p>According to Ataker et al. (2012), HEP should be completed 4 times a day and consists of ten repetitions of:</p> <ul style="list-style-type: none"> • Isolated and composite flexion and extension movements at the MP, proximal and distal IP joints • Finger abduction and adduction exercises of the second to fifth fingers <p>The patient is allowed to take off their orthoses only during washing hands. The importance of immobilizing the operated thumb during washing hands is emphasized (Ataker et al., 2012).</p>
<p>6 Weeks Postoperative:</p> <p>“Unrestricted PROM exercises</p>	<p>4 – 6 Weeks Postoperative:</p> <p>A. “Active-assisted range of</p>	<p>4th Week Postoperative:</p> <p>Active and active-assistive</p>

<p style="text-align: center;">Thumb CMC Soft Tissue Reconstruction (Cannon, 2001)</p>	<p style="text-align: center;">Thumb CMC Joint Arthroplasty Rehabilitation Protocol (Saunders, 2006)</p>	<p style="text-align: center;">Rehabilitation Protocol after Suspension Arthroplasty of Thumb CMC Joint Osteoarthritis (Ataker et al., 2012)</p>
<p>may be initiated. Continue to support the CMC Joint” (Cannon, 2001, p. 19).</p> <p>“On rare occasion, it becomes necessary to add dynamic flexion splinting for the MP and IP joint of the thumb. Any dynamic splint must be form fitting and provide maximal support of the CMC joint” (Cannon, 2001, p. 19).</p> <p>“Continue with the wrist and thumb static splint between exercise sessions and at night” (Cannon, 2001, p. 19).</p> <p>“Persistent and dense scars may benefit from ultrasound. The ultrasound can enhance the vasoelasticity of the soft tissues, thus increasing mobility (Cannon, 2001, p. 19).</p>	<p>motion (AAROM) and AROM are initiated to the thumb and wrist” (Saunders, 2006, p. 620).</p> <p>B. “Exercises should emphasize CMC abduction, radial extension, and opposition to each fingertip” (Saunders, 2006, p. 620). At this time the patient may engage in isometric thenar abduction strengthening (Saunders, 2006). “Pinch and grip strengthening are not initiated until 8 to 10 weeks postoperatively” (Saunders, 2006, p. 620).</p> <p>C. “Early metacarpal flexion and adduction puts undue stress on the reconstructed ligament and should be minimized at this time” (Saunders, 2006, p. 620).</p> <p>D. “Complete flexion across the palm to the base of the fifth metacarpal should not be attempted until the thumb can oppose each fingertip with ease and gradually be worked down to the base of the small finger actively” (Saunders, 2006, p. 620).</p> <p>E. “Splinting is continued after exercise and at night, primarily for patient comfort. Patients may resume use of the hand for light activities of daily living (ADLs) with the splint on, as long as they are asymptomatic during performance of the activity” (Saunders, 2006, p. 620).</p>	<p>ROM exercises for the new CMC and first MP joint supervised by a physiotherapist are initiated (Ataker et al., 2012).</p> <p>“During this phase, excessive metacarpal flexion and adduction (trying to do opposition from tip of the thumb to the base of the fourth or fifth finger) are restricted to protect the ligament reconstruction” (Ataker et al., 2012, p.376).</p>

<p align="center">Thumb CMC Soft Tissue Reconstruction (Cannon, 2001)</p>	<p align="center">Thumb CMC Joint Arthroplasty Rehabilitation Protocol (Saunders, 2006)</p>	<p align="center">Rehabilitation Protocol after Suspension Arthroplasty of Thumb CMC Joint Osteoarthritis (Ataker et al., 2012)</p>
<p>8 Weeks Postoperative:</p> <p>“Gentle strengthening may be initiated between 6 and 8 weeks postoperative. If edema and/or pain persists, delay strengthening until 8 weeks” (Cannon, 2001, p. 19).</p> <p>“The wrist and thumb static may be discontinued. Patients who require use of their hand in repetitious, heavy lifting of pinching activities may be more comfortable in a short opponens splint. The splint will provide external support. Depending on the level of need, either a thermoplastic or neoprene splint can be used” (Cannon, 2001, p. 19).</p> <p>“Persistent hypersensitivity along the surgical site typically responds well to high rate, conventional TENS worn continuously until the pain dissipates. Fludiotherapy can be beneficial in reducing the hypersensitivity, as well” (Cannon, 2001, p. 19).</p>	<p>7 Weeks Postoperative:</p> <p>“Dynamic Splinting to increase MCP and IP joint motion may be initiated if the CMC joint is well stabilized” (Saunders, 2006, p.620).</p>	<p>6th Week Postoperative:</p> <p>“Orthoses are used during the day and night until the end of the sixth week” (Ataker et al., 2012, p.376).</p> <p>“Patients remove their orthoses only during therapy sessions and washing hands” (Ataker et al., 2012, p.377).</p> <p>“For scar tissue management, massage, silicone sheaths, and ultrasound applications are added to the treatment protocol according to the patients’ need” (Ataker et al., 2012, p.377).</p> <p>“After six weeks, progressive ROM and strengthening exercises, including isometric abduction, extension, and adduction are initiated. If the patient can perform opposition to the tip of the fifth finger without any pain, complete flexion across the palm can be attempted gradually” (Ataker et al., 2012, p.377).</p>
<p>10 – 12 Weeks Postoperative:</p> <p>The patient may resume normal use of his or her hand in daily activities. Patient education is important. Guidelines outlined in conservative management of CMC arthritis should be reviewed again. Simple suggestions such as using non-skid pads to remove jar lids, etc. should be reinforced” (Cannon, 2001).</p>	<p>8-10 Weeks Postoperative:</p> <p>A. “Static splint use may be discontinued if the joint is stable and the patient is asymptomatic” (Saunders, 2006, p. 620).</p> <p>B. Light grip and pinch strengthening can be initiated if patient reports being relatively pain free and if the</p>	<p>8th Week Postoperative:</p> <p>“The orthoses is used only at night for two additional weeks and completely stopped at the end of eighth week” (Ataker et al., 2012, p.377).</p> <p>According to Ataker et al. (2012) the following exercises are added to the HEP (should be completed 4 times a day and</p>

Thumb CMC Soft Tissue Reconstruction (Cannon, 2001)	Thumb CMC Joint Arthroplasty Rehabilitation Protocol (Saunders, 2006)	Rehabilitation Protocol after Suspension Arthroplasty of Thumb CMC Joint Osteoarthritis (Ataker et al., 2012)
	<p>joint is stable (Saunders, 2006). “The compressive force generated at the CMC joint is 12 times the force generated at the thumb and index finger (IF) tip with lateral pinch. This factor should be kept in mind as use of the hand and strengthening activities are progressed. No attempt should be made to pinch between the thumb and the ring and small fingers, because this movement risks stretching out the ligament reconstruction” (Saunders, 2006, p. 620).</p>	<p>consists of ten repetitions of:</p> <ul style="list-style-type: none"> • Active ROM exercises of the thumb IP, MP, and CMC joint • Thumb opposition with the other fingers (from tip to the bases) are added to the HEP as four sets per day, every set included 10 repetitions • Isotonic strengthening exercise are initiated by gentle pinch, grip using putties, and power webs (the resistance is increased gradually by the end of eight weeks).
	<p>10 – 12 Weeks Postoperative:</p> <p>“Normal use of the hand may be resumed without restrictions if the joint is stable and the patient is asymptomatic” (Saunders, 2006, p. 621).</p>	<p>10th Week Postoperative:</p> <p>“Strengthening exercises with putty are given as discharge HEP after the 10th week of surgery” (Ataker et al., 2012, p.377).</p>
		<p>12th Week Postoperative:</p> <p>“If the treatment team is sure about the stability of the joint without any pain, then the patients can let them use their hands during active daily living without any restrictions after 12 weeks” (Ataker et al., 2012, p.377).</p>

The occupation-based tasks that were selected for each week of the protocol were carefully chosen through assessments of various tasks to determine if they met the biomechanical protocol's restrictions and limitations, address the key areas needing to be addressed, incorporate the exercises and mobility guidelines outline in the biomechanical protocol, and provided the right amount of challenge for the clients in order to facilitate therapeutic gains in function and occupational engagement. In addition, based on discussion with Lance M. Norman, MOT, OTR/L, CHT, we described the amount of force and weight restrictions on a weekly basis.

An important element of any intervention process is the evaluation and re-evaluation of the client and his or her outcomes. We researched and reviewed a variety of assessment tools that could be used conjointly with one another throughout the intervention process to develop a comprehensive understanding of the client, monitor the progression of the client through the therapy process, and re-evaluate and assess client outcomes in preparation of discharge.

For this product we wanted to develop a protocol to facilitate practicing therapists' implementation of occupation in the therapy process. We also sought to build a guide that was easy to use and would be a good fit for any clinical setting.

Chapter III consisted of an overview of where the literature was collected, the focus of each OBM and how they aided the protocols development, an overview of three CMC joint arthroplasty protocols, as well as how the occupation-based protocol was developed. Chapter IV of this scholarly project provides an overview of the occupation-based protocol. Within the product is an introduction its development and purpose, a post-operative treatment intervention guide designed to be used weekly and in

conjunction with the Biomechanical Frame of Reference as well as suggested evaluation and assessment measures.

CHAPTER IV

PRODUCT

Chapter IV consists of an overview of the product of this scholarly project (An Occupation-Based Intervention Protocol for Carpometacarpal Joint Arthroplasty), which can be located in its entirety in Appendix A. The product is a protocol intended to provide therapists with a clinical guide to implement occupation-based interventions in correlation with current biomechanical approaches for clients who have undergone a carpometacarpal (CMC) joint arthroplasty. The product includes occupation-based tasks that correlate with the universal biomechanical methods with consideration for intervention time lines so that the two approaches (biomechanical and occupation-based) can be used in conjunction with one another. The protocol was designed to increase the inclusion of meaningful tasks and occupation in the rehabilitation process.

The occupation-based intervention protocol can be used by occupational therapists who wish to use occupation-based interventions during in-clinic treatment and in their development of home programs for clients. The protocol will also act as a resource for occupational therapist to educate clients in identifying what they can do on a functionally and occupationally after a CMC joint arthroplasty to promote a successful recovery and re-engagement in their meaningful occupations and roles. The development of the biomechanical focused intervention protocol utilized for this product consisted of a review and combination of three intervention protocols, which included: Rehabilitation

Protocol after Suspension Arthroplasty of Thumb CMC Joint Osteoarthritis (Ataker et al., 2012), Thumb CMC Soft Tissue Reconstruction (Cannon, 2001), and the Thumb CMC Joint Arthroplasty Rehabilitation Protocol (Saunders, 2006). Additionally, in order to complete a comprehensive evaluation to develop an occupational profile of a client, evaluation tools were included within the product that can be used to complete the initial evaluation, monitor progress and assess client outcomes.

The development of this occupation-based protocol following a CMC joint arthroplasty was facilitated through using the key concepts of the Model of Human Occupation (MOHO) and Occupational Adaptation Model. These were beneficial models to guide the products development as they emphasize the importance of occupation, motivation, environments/contexts, roles, habits, routines, and performance within meaningful occupations (Cole, & Tufano, 2008c; Cole, & Tufano, 2008d). Using the occupational behaviour models (OBM), along with the current protocols from Ataker et al., (2012), Cannon (2001), and Saunders (2006), we created an occupation-based protocol to be used in conjunction with the current biomechanical approach to intervention.

The occupation-based CMC joint arthroplasty protocol describes the occupational therapists (OT) approach to the post-operative treatment of a client following a CMC joint arthroplasty on a weekly basis to promote a successful recovery and re-engagement in his or her meaningful occupations.

Chapter IV consisted of an overview the occupation-based protocol developed for the purpose of this scholarly project; the protocol can be located in Appendix A. Chapter V consists of a summary of the scholarly project, the purpose of the protocol's

development, limitations of the protocol, recommendations for implementation and further actions

CHAPTER V

SUMMARY

Chapter V is composed of a review of the purpose of this scholarly project, an overview of the carpometacarpal (CMC) occupation-based protocol, limitations of the protocol, and recommendations for implementation into practice and further actions. The purpose of the development of this occupation-based intervention protocol was to provide practicing occupational therapists with an easy to use guide to assist them in implementing occupation-based interventions into their clinical practice. Additionally, the protocol was also established to assist occupational therapists in designing occupation-based home exercise programs that would also assist persons who undergo a CMC joint arthroplasty in understanding what they can do functionally on a weekly basis.

This intervention protocol was developed through a review of current literature regarding the rehabilitation following a CMC joint arthroplasty, which included the rehabilitation approaches utilized as guides for the development of this protocol: Ataker et al. (2012), Cannon (2001), and Saunders (2006). The biomechanical protocols for intervention were combined to form one universal approach for the rehabilitation of a CMC joint arthroplasty and used as a guideline for developing functional tasks. The product integrated occupation-based tasks that correlate with the universal Biomechanical approach on a week-to-week basis so that the two approaches (biomechanical and occupation-based) can be used in conjunction with one another. The protocol was

designed to increase the implementation of occupation and meaningful tasks in therapy, the degree of client compliance with therapeutic activities through addressing volition, the clients' level of understanding regarding functional limitations on a weekly basis, and the amount of repetitions of exercise/activities completed through engagement in meaningful/occupational tasks.

The limitation of this intervention protocol is that the occupational activities selected for this guide have not been tested with persons whom have undergone a CMC joint arthroplasty. The activities selected for this guide were dependent on what the functional abilities and limitations would be following this surgical intervention on a week to week basis according to the current rehabilitation protocols, in addition to what we learned through our literature review.

The occupational therapist who implements this intervention protocol into clinical practice should focus on the ability to incorporate occupation-based activities into the therapy process. Occupation-based activities should be used in conjunction with current biomechanical approaches for the rehabilitation of a CMC joint arthroplasty. The implementation relies on the ability of therapists to complete a comprehensive evaluation (to identify clients' abilities, limitation, roles, interest, etc.), monitor progression, and complete activity analyses of a client's meaningful occupations and determine how to integrate or grade them accordingly in order to facilitate functional and occupational gains. This protocol provides a guide for various occupation-based tasks that correlate with the weekly progression of treatment; however, additional occupations should be included in a client's treatment that are meaningful and correlate with his or her occupational roles and routines that were identified through evaluation. In terms of

providing our intervention protocol to practicing therapists for implementation, we will implement this protocol into our own clinical practice and share information with colleagues. Additionally, the protocol within its entirety has been created in the form of a durable booklet that consists of occupation-based activities along with 11 evaluation/assessment tools that can be used throughout the therapy process, and can be implemented by anyone working with this diagnostic population.

It is recommended that the therapists include more occupation-based interventions within the therapy process in the clinical setting of hand and upper extremity rehabilitation. Additionally, further research should focus on the utilization of occupation (meaningful tasks) as a medium in the therapy process and the impacts this method would have in regards to a client's functional outcomes specifically the level of improved occupational performance, and clients' satisfaction with the therapy process and their perceived performance should be assessed. The outcomes should be further evaluated utilizing a variety of evaluation tools to assess functional abilities, physical capabilities, client's perceptions, and client's overall level of satisfaction.

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APPENDICES

Appendix A

An Occupation-Based Intervention Protocol for Carpometacarpal Joint Arthroplasty

Appendix B
Image Approval

-----Original Message-----

From: Joshua.Gilbertson@my.und.edu [mailto:Joshua.Gilbertson@my.und.edu]

Sent: Thursday, April 04, 2013 4:41 PM

To: mayoinfo@mayoclinic.com

Subject: MayoClinic.com (Thread:2787926)

Date: 04/04/2013 04:40

Name: Joshua Gilbertson

Email: Joshua.Gilbertson@my.und.edu

User Selected: comments

Message:

To whom it may concern,

I am a graduate student at the University of North Dakota and am completing my scholarly project as a part of partial fulfillment of the requirements for the Degree of Master's of Occupational Therapy from the University. I was seeing if I could gain permission to use the picture at the following link <http://www.mayoclinic.com/health/medical/IM02759>. I would be using this picture of the carpometacarpal (CMC) joint in a non-profit manner as it would be placed on my poster and within my scholarly project materials. The use of the picture is for educational purposes only and the reference of the image will be provided within the poster and materials.

Using the picture will allow those to understand where the CMC joint is located and tie the materials together, as I am creating a CMC joint occupation-based protocol in conjunction with the current biomechanical approaches.

Please inform me of the possible use of the picture.

Thank you for your consideration.

Sincerely,

Joshua A. Gilbertson, MOTS

University of North Dakota

User Browser: Mozilla/5.0 (iPad; CPU OS 6_0_1 like
Mac OS X) AppleWebKit/536.26 (KHTML, like Gecko) Version/6.0 Mobile/10A523
Safari/8536.25

Javascript Status: Enabled

Form Submitted From: /invoke.cfm

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Please do not hesitate to let us know if you should have any additional questions or concerns.

Sincerely;
Stacey
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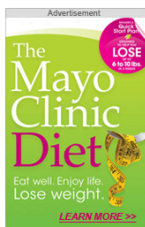
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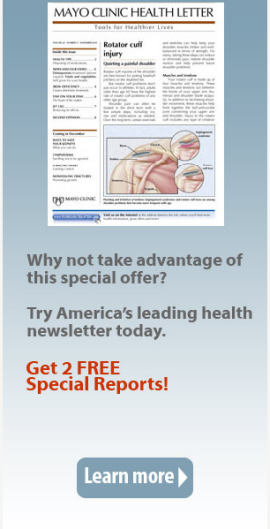
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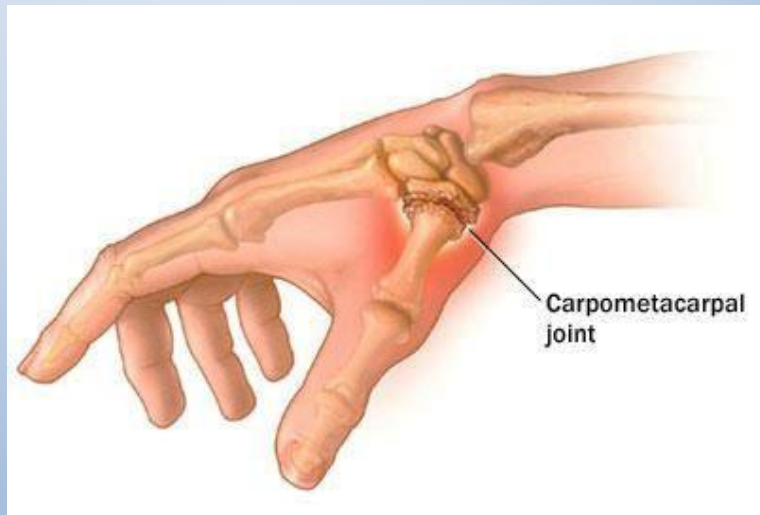


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Carpometacarpal (CMC) Joint Arthroplasty:

An Occupation-Based Intervention Protocol



Christopher G. Johnson, MOTS
Joshua A. Gilbertson, MOTS
Anne M. Haskins, PhD, OTR/L

Photo used with permission

Table of Contents

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Introduction

1

◆ Musculoskeletal impairments (MI) are found in individuals of all ages, and these impairments can significantly impact an individual's engagement and level of performance in one's activities of daily living and meaningful occupations. Common MI include both osteoarthritis and rheumatoid arthritis (RA). Varying reports of osteoarthritis prevalence exist in literature. Harra et al. (2004) stated that the prevalence of CMC osteoarthritis has been reported to vary between 8-12 % of the population while Lubahn, Wolfe, and Feldscher et al. (2004) reported as 40% of the adult population may be affected by osteoarthritis. In terms of RA, the prevalence in the adult population ranges between 0.3-1% with RA occurring 2.5 times more often in women and between the ages of 40-50 years (Gornisiewicz & Moreland, 2001; Goronzy & Weyand, 2001).

INTRODUCTION

Introduction

2

◆ A common site for the development of osteoarthritis and rheumatoid arthritis (RA) is within the carpometacarpal (CMC) joint of the thumb. Neumann and Bielefeld (2003) stated that one of the most important structures of the hand is the thumb, as it is largely responsible for the characteristic dexterity of human prehension. Thus, with the importance the thumb has on a person's everyday occupational performance, the functional limitations due to deformities and stability, pain, or swelling can significantly affect his or her occupational engagement in performance satisfaction.

◆ When a person experiences any, or all, of the aforementioned symptoms and if conservative intervention was not effective, an individual will likely receive surgical intervention to repair the damaged area. A common surgical technique utilized for repairing CMC joint arthritis is known as ligament reconstruction with tendon interposition (LRTI). Following surgery, the individual would be referred to a therapist for intervention.

INTRODUCTION

Introduction

3

◆ A thorough literature review was conducted to assess the intervention processes and finding protocols utilized for treating a CMC joint arthroplasty. Findings indicated that intervention has historically focused strongly on the Biomechanical Frame of Reference, which premise is based on the physics of human movement and posture (Cole, & Tufano, 2008a). What the findings also indicated is that there is no evidence or existing protocol that focuses on an occupation-based approach to the intervention process, more specifically, the interventions utilized in rehabilitation.

◆ The utilization of occupation as a medium in therapy has been well documented in occupational therapy literature, supporting improvements in strength, range of motion, endurance, self-esteem, satisfaction, and overall functional engagement in occupations. An occupation-based protocol is necessary as it will provide a therapist with a guide/manual for implementing more occupation-based interventions in therapy, while also facilitating a more occupation-based intervention approach to upper-extremity rehabilitation. Additionally, the information the therapist would gain from utilizing this guide will also assist his or her clients in allowing the clients' to have a greater understanding of what they can do functionally on a weekly basis until they have fully recovered.

INTRODUCTION

Description of Protocol

4

- ◆ This guide consists of a combination of the Biomechanical Frame of Reference focused intervention protocol and an occupation-based protocol. More specifically, occupation-based interventions that can be utilized in conjunction with the biomechanical techniques outlined in this protocol.
- ◆ It is anticipated that this occupation-based intervention guide will assist therapists in utilizing more occupation-based interventions during in-clinic treatment and in the development of home exercise programs for clients.
- ◆ This protocol will also act as a guide in assisting clients in identifying what they can do on a functionally and occupationally after a CMC joint arthroplasty weekly basis to promote a successful recovery and re-engagement in their meaningful occupations.

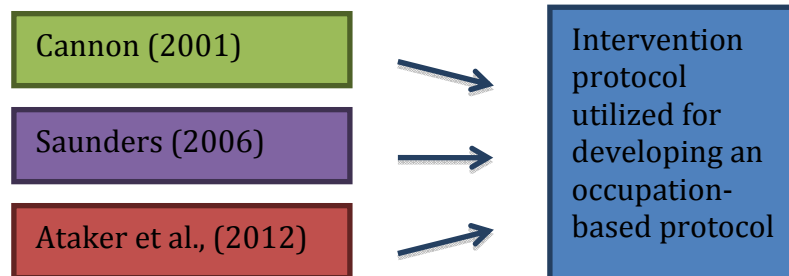
DESCRIPTION OF
PROTOCOL

Description of Protocol

5

◆ The development of the biomechanical focused intervention protocol utilized for this product consisted of a review and combination of three intervention protocols which included:

- Thumb CMC Soft Tissue Reconstruction (Cannon, 2001)
- Thumb CMC Joint Arthroplasty Rehabilitation Protocol (Saunders, 2006)
- Rehabilitation Protocol after Suspension Arthroplasty of Thumb CMC joint Osteoarthritis (Ataker et al., 2012).



DESCRIPTION OF
PROTOCOL

Occupation-Based Models

6

◆ In order to develop an occupation-based intervention protocol (to be utilized in conjunction with the biomechanical approach to intervention), an occupation-based model was selected as a foundation for guiding the development. In order to develop the type of intervention protocol we envisioned, we utilized two occupation-based models to guide the intervention protocol development:

1. The Model of Human Occupation
2. Occupational Adaptation Model

◆ The brief overview of the models and a description of how they were used to assist in the protocol's development are listed on the next few pages of this guide.

OCCUPATION-BASED
MODELS

Occupation-Based Model

7

THE MODEL OF HUMAN OCCUPATION (MOHO)

◆ The focus of MOHO is on assessing clients holistically and systematically where their motivation (volition), habituation, and performance capacity, in combination with the environment, are key aspects that contribute to an individual's level of performance. Additionally, MOHO takes on an occupation-focused approach to therapy practice.

◆ The concepts of MOHO were used in the development of this occupation based protocol as this model provides a framework in which to gather information about the client to develop a comprehensive occupation profile (some of the assessments/evaluations have been selected), which is needed in order to select and implement meaningful interventions to increase occupational performance.

(Cole, & Tufano, 2008b)

OCCUPATION-BASED
MODEL

Occupation-Based Model

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THE MODEL OF HUMAN OCCUPATION (MOHO)

◆ Through developing occupation-based interventions that were pertinent to a client's roles and habits (habituation), a client would see more value in the activities and perceive them as more desirable to engage in (volition). Additionally the activities could be completed in a home exercise program within a variety of contexts in addition to the clinic (environment); thus increasing skills required to facilitate occupational performance (performance capacity).

(Cole, & Tufano, 2008b)

OCCUPATION-BASED
MODEL

Occupation-Based Model

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OCCUPATIONAL ADAPTATION MODEL (OA MODEL)

◆ The OA Model focus centers around utilizing a holistic approach to treatment and facilitating occupational adaptations through the process of following the three main constructs of this process: the person, the environment, and the interaction between the two.

◆ The concepts of OA Model were used in the development of this protocol as this model provided therapists with a framework that assists them throughout the therapy process from the evaluation through planning, guiding, and implementing interventions. Additionally, OA Model has a strong emphasis on identifying client's occupational roles, role demands and expectations, and using occupation as a medium in the therapy process in order improve occupational engagement and a client's ability to adapt to occupational challenges across contexts.

(Cole, & Tufano, 2008c)

OCCUPATION-BASED MODEL

Intervention Protocol

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The column on the left represents the Biomechanical focused approach to intervention, while the right column consists of occupation-based activities that can be completed in conjunction with the biomechanical approach.

Week 1

Biomechanical	Occupation-Based
<p>Post-operative (Immobilization Period)</p> <ul style="list-style-type: none">- Thumb Spica Casted <p>Ask the client about his or her anticipated results for expected outcomes? Additionally, therapist can describe their anticipated results for the client.</p>	<p>During the immobilization period, it is important to keep uninvolved joints mobile.</p> <p>Activities:</p> <ul style="list-style-type: none">- Keyboarding using uninvolved joints (DO NOT use thumb on spacebar when typing)

**INTERVENTION PROTOCOL
WEEK 1**

Intervention Protocol

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Week 2

Biomechanical	Occupation-Based
<p>Continuation of immobilization period for CMC joint.</p> <p>Home Exercise Program (HEP) provided to client:</p> <ul style="list-style-type: none">- IP joint of the thumb- Elbow- Shoulder- Flexor and extensor tendon gliding exercises- Forearm rotation (include if feasible; may not use secondary to post-operative immobilization)	<p>Activities:</p> <p><u>With splint on</u></p> <ul style="list-style-type: none">- Light Sweeping/Swifer- Wiping off counter or table- Dusting

**INTERVENTION PROTOCOL
WEEK 2**

Intervention Protocol

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Week 3

Biomechanical	Occupation-Based
<p>Cast is removed at the end of the two week period.</p> <p>Begin sedentary Passive Range of Motion (PROM)</p> <p>Custom-made splint is fabricated for the client</p> <ul style="list-style-type: none">- Short opponens/thumb spica splint <p>Coban or elastic stockinette can be utilized to control edema</p> <p>Continue HEP of unaffected joints as laid out in week 2.</p>	<p>Use of a maximum of 6 ounces of force.</p> <p>Activities:</p> <p><u>With splint on</u></p> <ul style="list-style-type: none">- Making an instant drink <p><u>With splint off</u> (as tolerated)</p> <ul style="list-style-type: none">- Handle Paper<ul style="list-style-type: none">o Examples: Holding mail, grabbing individual pieces of paper- Data entry (keyboard use)

INTERVENTION PROTOCOL WEEK 3

Intervention Protocol

13

Week 4

Biomechanical	Occupation-Based
<p>Active and active assistive ROM exercises implemented with therapist supervision.</p> <p>Splint is worn between therapy sessions and at night for protection of joint, surgical area, and comfort.</p> <p>Scar Management initiated.</p> <ul style="list-style-type: none">- Critical to emphasize scar mobilization as dense adhesions are common	<p><u>Wound Care:</u></p> <ul style="list-style-type: none">- Use a wash cloth to clean along the surgical site- Apply rubbing lotion to the surgical site.- Apply hydrating gel or cream enriched with vitamin E- Mobilizing surgical site in a perpendicular, circular, and parallel pattern.

**INTERVENTION PROTOCOL
WEEK 4**

Intervention Protocol

14

Week 4

Biomechanical	Occupation-Based
<p>Manual desensitization techniques should be initiated as the area is often hypersensitive along the surgical side</p> <ul style="list-style-type: none">- Fluidotherapy <p>HEP Additions:</p> <ul style="list-style-type: none">- Isolated and composite flexion and extension movements at the MP, and proximal and distal IP joints.- Finger abduction and adduction exercises of the second to fifth fingers	<p>Maximum use: several ounces to one pound.</p> <p>Activities:</p> <p><u>With splint on</u></p> <ul style="list-style-type: none">- Hold a coffee cup no more than 8 ounces- Hold juice cup (6 ounces) <p><u>With splint off</u> (as tolerated)</p> <ul style="list-style-type: none">- Hold a sub-sandwich- Search the phonebook- Collecting the mail

**INTERVENTION PROTOCOL
WEEK 4**

Intervention Protocol

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Week 4

Biomechanical	Occupation-Based
<p>HEP additions continued:</p> <ul style="list-style-type: none">- Palmar and radial abduction- Thumb circumduction, flexion, and extension- Wrist flexion and extension- Wrist radial and ulnar deviation <p>*CMC joint should be supported throughout all passive and self-passive exercises.</p> <p>*MP flexion and extension is limited at this time to not aggravate reconstructed lig.</p>	<p>Activities:</p> <p><u>With splint on</u></p> <ul style="list-style-type: none">- Typing on a keyboard with thumbs using the space bar- Clean out a drawer (silverware, junk drawer; light items only)- Depositing coins into a piggy bank <p><u>With splint off</u> (as tolerated)</p> <ul style="list-style-type: none">- Reading a newspaper, magazine, or book- Writing a letter- Holding a telephone

INTERVENTION PROTOCOL WEEK 4

Intervention Protocol

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Week 5

Biomechanical	Occupation-Based
<p>Continuation of scar mobilization, manual desensitization techniques, and ROM exercises</p> <p>Strengthen</p> <ul style="list-style-type: none">- Isometric thenar abduction <p>Continuation of HEP as described in week 4</p>	<p>Activities:</p> <ul style="list-style-type: none">- Stirring- Retrieve small items from the cabinets- Prepare a grilled cheese sandwich and cook it- Filing- Set the table- Open lid of previously opened bottle- Using a spray bottle- Washing one's hair, apply lotion, and shave

**INTERVENTION PROTOCOL
WEEK 5**

Intervention Protocol

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Week 6

Biomechanical	Occupation-Based
<p>Unrestricted PROM exercises while supporting CMC joint</p> <p>Educate client of continuing to wear splint at night and between therapy sessions.</p> <ul style="list-style-type: none">- Joint and ligament protection <p>Client may resume engagement in activities of daily living (ADLs) with splint on as long as he or she is asymptomatic during engagement in tasks.</p>	<p>Continue to use exercises that facilitate: Palmar and radial abduction</p> <p>Activities:</p> <ul style="list-style-type: none">- Dealing cards- Playing cards- Dressing: put on loose clothing, put on nylon stockings- Wash and dry cups, utensils and small plates or bowls

**INTERVENTION PROTOCOL
WEEK 6**

Intervention Protocol

18

Week 6

Biomechanical	Occupation-Based
<p>If need be:</p> <ul style="list-style-type: none">- Persistent and dense scar formation may benefit from ultrasound as it can enhance the vasoelasticity of the soft tissues, thus increase mobility.	<p>Activities:</p> <ul style="list-style-type: none">- Playing a board game- Use larger sized beads to make jewelry- Flipping coins- Use a remote control with thumb- Using utensils to eat- Putting on make-up

**INTERVENTION PROTOCOL
WEEK 6**

Intervention Protocol

19

Week 7

Biomechanical	Occupation-Based
<p>Progressive AROM and strengthening exercises, including:</p> <ul style="list-style-type: none">- Isometric abduction- Extension- Adduction <p>If client can perform opposition to the tip of fifth finger without pain, complete flexion across the palm can be gradually attempted.</p> <p>Dynamic splinting to increase MCP and IP joint motion may be initiated</p> <p>Splint must be form fitting and support CMC joint.</p>	<p>Activities:</p> <ul style="list-style-type: none">- Hanging clothes on a hanger- Retrieving heavier items from the cabinet (1 to 3 pounds)- Pour coffee from a pot- Use a fork to eat- Laundry: load clothes into the washing machine, folding laundry that is dry, or put laundry away

**INTERVENTION PROTOCOL
WEEK 7**

Intervention Protocol

20

Week 8

Biomechanical	Occupation-Based
<p>Splint may be discontinued, depending on level of need for continuing splint (i.e. engagement in daily tasks/activities).</p> <ul style="list-style-type: none">- Depending on need, a thermoplastic or neoprene splint can be used <p>Recommended that splint is worn for additional two weeks at night.</p> <p>No attempt should be made to pinch to the ring and small fingers as this risks stretching out the ligament reconstruction.</p>	<p>Activities:</p> <ul style="list-style-type: none">- Cutting food- Mixing ingredients- Unloading the dishwasher- Shoe tying- Putting on a pillow case- Folding the laundry- Shopping: allowed to pick up items weighting less than 3 to 5 pounds

**INTERVENTION PROTOCOL
WEEK 8**

Intervention Protocol

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Week 8

Biomechanical	Occupation-Based
<p>If client continues to experience hypersensitivity along surgical site, continue fluidotherapy. Additionally, client may respond well to high rate conventional TENS worn continuously until pain subsides.</p> <p>HEP additions:</p> <ul style="list-style-type: none">- Active ROM exercises of the thumb IP, MP, and CMC joints.- Thumb Opposition (from tip of thumb to bases of each finger: 4x/day of 10 reps)	<p>Activities:</p> <ul style="list-style-type: none">- Making the bed- Twisting a doorknob- Drive an automatic transmission with power steering- Clipping finger and toe nails- Tweezing eyebrows- Texting on cell phone with thumb use

**INTERVENTION PROTOCOL
WEEK 8**

Intervention Protocol

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Week 8

Biomechanical	Occupation-Based
<p>HEP Additions Continued:</p> <ul style="list-style-type: none">- Isotonic strengthening exercises are initiated by gentle pinch and grip using putties and power webs (resistance is increased gradually by end of week 8) – client must be relatively pain-free and the joint must be stable.	<p>Activities:</p> <ul style="list-style-type: none">- Use small sized beads to make jewelry- Open lid of a bottle- Curl or straighten hair- Putting on a watch- Flower arranging in a vase

**INTERVENTION PROTOCOL
WEEK 8**

Intervention Protocol

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Week 9

Biomechanical	Occupation-Based
Continue with week 8 protocol and gradually increase resistance and repetitions in strengthening exercises.	<p>Activities:</p> <ul style="list-style-type: none">- Scooping ice cream with a spoon- Longer periods of writing and typing tasks- Baiting a fish hook- Putting only (no use of other clubs at this time)- Holding a watering can (amount of water in can as tolerated and recommended by therapist) to water plants/flowers.

**INTERVENTION PROTOCOL
WEEK 9**

Intervention Protocol

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Week 10-12

Biomechanical	Occupation-Based
<p>Strengthening exercises are added to the client's HEP</p> <p>Putty added in conjunction with HEP strengthening</p> <p>Normal use of hand may be resumed without restrictions if the joint is stable and client is asymptomatic.</p>	<p>Activities:</p> <p>Week 10</p> <ul style="list-style-type: none">- Ironing- Turning food over in a pan- Plugging electrical cord into outlet- Pouring from a heavy jug <p>Week 11</p> <ul style="list-style-type: none">- Packing a suitcase- Hanging clothes on a close line- Hammering nails- Racking leaves <p>Week 12</p> <ul style="list-style-type: none">- Wrapping a gift- Kneading dough- Planting/Gardening- Vacuuming- Shoveling snow/dirt

**INTERVENTION PROTOCOL
WEEK 10-12**

Intervention Protocol

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Week 10-12

Biomechanical	Occupation-Based
<p>Week 10-11</p> <ul style="list-style-type: none">- Continue with the intervention protocol and gradually increase resistance and repetitions in strengthening exercises.- ADLs require 7-10 pounds of force <p>Week 12</p> <ul style="list-style-type: none">- Perform all sedentary tasks 10 pounds or less	<p>Activities:</p> <p>Week 10</p> <ul style="list-style-type: none">- Ironing- Turning food over in a pan- Plugging electrical cord into outlet- Pouring from a heavy jug <p>Week 11</p> <ul style="list-style-type: none">- Packing a suitcase- Hanging clothes on a close line- Hammering nails- Racking leaves <p>Week 12</p> <ul style="list-style-type: none">- Loading clothes into the Washing machine- Fold laundry that is dry/put laundry away- Yard work

**INTERVENTION PROTOCOL
WEEK 10-12**

Evaluation Tools

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◆ A wide variety of evaluation tools can be utilized by an occupational therapist in order to conduct the initial evaluation of the client, to monitor progress, and to assess improvements at discharge. It is recommended that a therapist utilizes a combination of assessments in order to develop a complete occupational profile and understanding of the client.

◆ A list of possible assessments along with a brief description are listed on the next few page in this guide.

EVALUATION TOOLS

Evaluation Tools

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Evaluation/Assessment	Description
Informal Interview	Initial interview to gather information to establish occupational profile (mechanism of injury, roles, interests, level of performance in occupations).
Occupational Circumstances Assessment-Interview and Rating Scale(OCAIRS) <small>(Kielhofner, 2009)</small>	Semi-structured interview focuses on the extent and nature of the client's occupational participation.
Occupational Performance History Interview-II (OPHI-II) <small>(Kielhofner, 2009)</small>	Semi-structured interview that explores client's life history in areas of work, play, and self-care performance.

EVALUATION TOOLS

Evaluation Tools

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Evaluation/Assessment	Description
Disability of the Arm, Shoulder, and Hand (DASH) (MacDermid, 2011)	Client self-report questionnaire to measure clients' physical function, symptoms, and overall quality of life.
Goniometer (Flinn, Trombly-Latham, & Robinson-Podolski, 2008)	Assessment used to measure range of motion of a joint.
Grip and Pinch Dynamometer (Flinn, Trombly-Latham, & Robinson-Podolski, 2008)	Assessment used to measure strength in grasp and pinch (palmer, tip, and lateral).
Canadian Occupational Performance Measure (COPM) (Johnson et al., 2012)	Semi-structured interview used to assess the level of occupational performance and identifying activities in the areas of self-care, leisure, and productivity.

EVALUATION TOOLS

Evaluation Tools

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Evaluation/Assessment	Description
Jebsen Hand Function Test (JHFT) (Jebsen, Taylor, Trieschmann, Trotter, & Howard, 1969)	Assessment used to assess the level of hand function of client through various tasks.
Arthritis Hand Function Test (AHFT) (Backman, Mackie, & Harris, 1991)	Assessment utilized to assess hand dexterity and strength in patients diagnosed with arthritis.
Visual Analog Scale (VAS) (Ataker et al., 2012; Kaszap, Daecke, & Jung, 2012)	Pain measure evaluation that is scaled from 0-10, measuring pain at rest and maximal loading.
Arthritis Impact Measurements Scale (AIMS) 2 (MacIntyre, & Wessel, 2009)	Client self-report questionnaire to measure clients' physical function, symptoms, and overall quality of life.

EVALUATION TOOLS

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