Occupational Therapy Treatment of Distal Radius Fractures: Best Practices

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Occupational Therapy Treatment of Distal Radius Fractures: Best Practices

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Abstract
This paper describes information on best practices for occupational therapy treatment of distal radius fractures including current information about etiology, incidence and prevalence, diagnostic criteria, comorbidities, associated client factors involved in this injury and the effects of this condition on occupational performance. Two hypothetical case studies are presented using evidence-based treatment information. Discussion of additional research necessary to continue to determine best practice approaches is presented.
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Introduction

Occupational therapy is, according to the Occupational Therapy Practice Framework (OTPF) “the therapeutic use of everyday life activities (occupations) with individuals or groups for the purpose of enhancing or enabling participation in roles, habits, and routines in home, school, workplace, community, and other settings” (AOTA, 2014, pp 609-639). Within occupational therapy, there are many specialty areas such as gerontology, education, pediatrics, mental health, health/wellness, sensory integration, technology, early interventions, developmental disabilities, home/community health, administration/management, and physical disabilities.

Physical disabilities is a specialty branch that includes all physical disabilities, limitations, and comorbidities. Physical disabilities can be the result of impairment of orthopedic function as well as systemic or traumatic diseases or conditions. Orthopedics is the specialty branch of medicine that focuses on the injury or disease of bones, muscles, ligaments, and tendons of the body. Orthopedic conditions can occur due to a variety of criteria including traumatic accidents such as falls, motor vehicle accidents (MVA), or as a secondary complication of pathologic conditions including bone disease and arthritic conditions such as rheumatoid arthritis or degenerative joint diseases. Other orthopedic conditions include osteoporosis, osteopenia, and heterotopic ossification (HO). Osteoporosis is the condition in which the bone density is compromised and becomes brittle. The hallmark feature of this condition is frequent pathologic fractures. Osteopenia is a precursor to osteoporosis. Osteopenia, is a “reversible weakening of the bone, that has no symptoms” (Hock, Javaherian-Dysinger & Pavlovich, 2017 pp. 2-3). However, checking bone density (checking calcium levels) during doctor's visits help determine if someone has osteopenia. Measures to help decrease chances of
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developing osteopenia include: eating a full balanced diet, taking vitamin supplements (C and D), weight bearing exercises, and participating in bone density screenings (Hock, Javaherian-Dysinger & Pavlovich 2017). HO is “an orthopedic condition resulting in abnormal bone formation in extra skeletal soft tissues” (Hock, Javaherian-Dysinger & Pavlovich 2017, p. 3). Often is a result from a traumatic injuries including severe burns, spinal cord injuries, and head injuries. The overproduction of bone growth near joint can cause stiffness and loss of range of motion. It can be very painful, since it has a significant impact on a person's functional abilities. The exact cause of heterotopic ossification is not certain. It typically presents itself with complaints of pain, joint warmth, swelling, and decreased range of motion. Heterotopic Ossification is diagnosed by a physician through use of a bone scan, ultrasound, or computerized tomography scan (Hock, Javaherian-Dysinger & Pavlovich 2017, p.3).

One of the most common orthopedic conditions are fractures. Fractures are caused by trauma to the bone and may encompass trauma to the tendons and nerves in the nearby areas which may complicate the healing process. (Kasch & Walsh, 2013). This paper will focus on a more specific type of fracture, called a distal radius fracture. This fracture is caused by impact to the wrist as a person tries to protect themselves from falling, which is the most common cause. A distal radius fracture is a fracture of the radius, which is the larger of the two forearm bones: This type of break affects the distal portion which is that aspect closest to the beginning of the hand bones referred to as the metacarpal bones. Bones are made up of two different tissues known as cancellous or cortical. Cancellous or spongy bone tissue refers to the inside deep layer of bone tissue. This tissue helps form strong healthy bones from the nutrients that the body receives. Cortical bone tissue is the exterior (outer) hard layer that provides support and
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protection. Last the periosteum is a condensed membrane that is made up of fibrous connective tissues, or elastic nerve fibers that help line the outside surface of most bones in the body (Hock, Javaherian-Dysinger & Pavlovich, 2017). There are many different types of fractures including closed fractures (non-operative), open fractures (operative), comminuted, displaced, and greenstick fractures. These fractures are determined by where the beginning of the break is, where the end of the break is, how many pieces the bones break into, and if the bone broke through skin. A closed fracture indicates that the bone did not break through skin. Refer to figure one for an example of this type of fracture. An open fracture, also known as a compound fracture, requires immediate medical attention due to presence of an open wound which can lead to infection. Refer to figure two for an example of this type of fracture. Comminuted fractures occur when the bones break and split into two or more pieces of bone. Refer to figure four for an example of this type of fracture. A displaced fracture is when the two pieces of bone have become separated and have shifted out of alignment. Refer to figure five for an example of this type of fracture. Last, a greenstick fracture is seen more predominantly in children because their bones are still growing and soft. Instead of a bone breaking, completely snapping into two pieces, the bones snap on one side and bend on the other. Refer to figure three for an example of this type of fracture. Fractures are also classified as being complete, incomplete, transverse, oblique, or torsional. A complete fracture is when the break is completely through the whole bone. An incomplete fracture, also known as a hairline fracture, is when the bone does not break cleanly through. A transverse fracture is when the broken part is on a horizontal angle. An oblique fracture is when the fracture line is diagonal. Last, a torsional fracture is when there is intolerable torque applied to a bone resulting in a twisting type of fracture line also called a spiral fracture (Hock, Javaherian-Dysinger & Pavlovich 2017).
This paper will focus on the distal radius fracture. This fracture potentially involves more specific breaks including an intra-articular fracture in which the fracture extends into the wrist joint, and an extra articular fracture, which is a fracture that does not extend into the wrist joint. The Colles/Smith/Barton, and Chauffeur types of distal radius fractures are named to represent the aspect of the distal radius bone that was fractured. These systems were used to represent and identify different fragment patterns to help surgeons manage their decisions for surgery (Hock, Javaherian-Dysinger & Pavlovich, 2017).

**Photos of different types of fractures:**

Figure 1: Distal Radius Fracture Closed:

![Distal Radius Fracture Closed](image1)

Nowak, E. (2017). Used with permission

Figure 2: Open Distal Radius Fracture

![Open Distal Radius Fracture](image2)

(Admin, 2015) Used with permission
Figure 3: Green Stick Fracture
(Orthoinfo, 2017)

Figure 4: Comminuted Fracture:
(Nowak, 2017)
Intra Articular fractures can occur due to an injury to the cartilage of the joint which can cause pain and stiffness (Kasch & Walsh, 2013).

**Etiology**

The most common cause of a distal radius fracture or is from a fall on an outstretched hand (FOOSH), the position that is typically used to catch oneself in a fall. (Reed, 2014).

**Incidence and Prevalence**

The incidence of distal radius fractures among people older than 60 years of age are caused by a fall and are one of the most common types of fractures, accounting for approximately 25% of fractures in the pediatric population due to the increase in sport injuries, and up to 18% of all fractures in the older adults for a fall on an outstretched arm or (FOOSH) (Hock, Javaherian-Dysinger, and Pavlovich, 2017). As bone density decreases with age, older adults remain at risk of experiencing distal radius fractures.

**Diagnostic Criteria**
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Radiographic imaging is necessary in the identification and classification of the patterns of a fracture and for assessing the need for surgical and medical treatment. A computerized tomography (CT) identifies a bone details to determine a fracture. Magnetic resonance imaging (MRI) provides evidence of the healing process and is primarily used for injuries which are chronic, cumulative stress injuries as well as acute / trauma in highly physically active athletes such as young gymnasts. The MRI can identify abnormalities of the epiphyseal or growth plate. It can also identify location of pain in some stress injuries. Regular x-ray technology images are able to clearly identify images of bones, however, not any of the inflammatory areas such as tendons, muscles, and ligaments show in an X-ray (Orthoinfo, 2017).

The Impact of Distal Radius Fractures on Associated Client Factors

Client factors described in the OTPF (see Appendix 1) includes values, beliefs, spirituality, body structures and body functions and are based on International Classification of Function (ICF). Body structures refer to the anatomical structures such as organs and limbs while body functions refer to physiological functioning. Body functions include specific mental functions, global mental functions, sensory functions, neuromusculoskeletal and movement related functions, muscle functions, movement functions, and other physiologic functions such as cardiovascular, neurological, integumentary, respiratory, gastrointestinal, and other body functions (AOTA, 2014).

In terms of a distal radius fracture, the following body functions and structures are involved.

Movement Related Functions
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Following a DRF, wrist mobility is compromised in all motions. The degree of immobility depends on the severity of the fracture and resulting complications, the extent of surgical repair, and severity of pain.

Neuromusculoskeletal and Muscle Function

The function of the radius is to move the wrist. The movement of the wrist includes pronation, supination, flexion, extension, radial and ulnar deviation, and circumduction. Pronation is the movement of the radius along with the ulna while supination is the movement of the ulna and with the radius. Other essential motions include flexion and extension, radial and ulnar deviation. Circumduction is the total range of motion of the wrist combined, using a circular motion. The major joints affected by this type of injury include the radiocarpal and radioulnar (Clark, 2012).

Joint mobility, stability, and alignment can be affected by fractures. This can limit the joint mobility and decline a patient’s ability to do their daily activities. The muscles involved in this condition include:

- Flexor carpi radialis
- Palmaris longus
- Flexor digitorum superficialis
- Abductor pollicis longus
- Extensor carpi ulnaris
- Extensor carpi radialis longus
- Flexor digitorium profundus
- Flexor carpi ulnaris
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- (Clark, 2012)

See Figure 6 below for an example of the muscles in the hand and forearm listed above:

Figure 6: Muscles of the Forearm

(Allia Medical Media, 2017)

Muscle strength and endurance can be affected by orthopedic conditions. This can be due to the immobilization of a joint during recovery. Without strength training and stretching the condition can worsen if a patient continues to not use their wrist (Hock, Javaherian-Dysinger & Pavlovich, 2017).

Integumentary Structures:

According to the OTPF, functions of the skin structures can be affected by orthopedic conditions. Compound or open fractures impact the skin as it is a puncture by the bone, creating an open wound. Having an open reduction due to an open fracture, or bones that need to be placed and set for healing can affect the skin integrity with the healing process following after surgery and scar rendering. Splinting may also have an effect on the skin integrity on patients due to potential irritation caused by the rubbing of the skin on splinting material for a few hours.
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a day of wearing. Bruising can also lead to discomfort with accompanying discoloration of the skin for a few weeks (American Occupational Therapy Association, 2002).

Sensory Functions

The sensory system includes many different kinds of sensation such as pain, touch, and sensitivity to temperature and pressure. Individuals with a distal radius fracture can lose this ability when they fracture their wrists due to nerve compression or nerve damage caused by the injury (American Occupational Therapy Association, 2002). Depending on the severity of the sensory involvement, a patient could have an issue with picking items up. A common sign of injury is pain. The amount of pain and pain tolerance will vary from patient to patient. The experience of pain can also vary based on the severity of the injury and related complications (Hock, Javaherian-Dysinger & Pavlovich, 2017).

Global Mental Functions

Generally, a person with this injury can be quite emotional depending on how they fractured their wrist and resulting limitations. For example, a highly athletic person may be upset by the disruption that the recovery process causes to their daily routine. Temperament and personality may be affected by this change in their life (American Occupational Therapy Association, 2014).

Comorbidities/ Long term Outcomes

Comorbidities are defined as, “a concomitant but unrelated pathologic or disease process; usually used in epidemiology to indicate the coexistence of two or more disease processes” (Comorbidities, 2017 ). Common comorbidities include: smoking, diabetes, hypertension, and depression (Wilson et al., 2014). Other comorbidities include perceived disability of the arm, shoulder, and hand, along with functional outcomes. Long term outcomes
include mild to moderate pain and stiffness for the first year, and some residual stiffness or achy pain after the first two years, sometimes this is permanent (Orthoinfo, 2017).

**General Recovery Process**

The healing process can depend on many different factors such as the patient’s age, type of fracture, fracture location, severity of the fracture, the patient’s basic motivation, and the patient’s preexisting health status. Bones heal based on the influences of the patient’s healing course. An example would be someone under barely any stress, eats healthy, sleeps a good 6-8 hours a night, and takes care of themselves (Hock, Javaherian-Dysinger & Pavlovich, 2017).

**Surgical Treatment for DRF**

This purpose is to set the bones in place by way of closed-internal reduction or if necessary, open reduction with internal fixation, which in both cases will prevent the skeletal structures involved from moving out of place until they are healed. Many treatment options can vary based on age, fracture, activity level, and surgeon's preferences. Open fractures require surgery within 8 hours of the irrigated in the emergency phase of treatment. Antibiotics may be given to prevent infection. Either external or internal fixation methods may be used to hold the bones in place. Internal fixation includes a combination of plates, screws, or rods. External fixation includes pin and needles. Refer to Figure 6 and 7 for examples of these. After the bones have healed, the patient completes a rehabilitation protocol that includes: progressive mobility, strengthening, and coordination, provided by occupational therapy. This therapy is typically recommended to be completed over a course of four to six weeks, depending on the patient. External fixators may be used with or without internal fixators. External fixators help secure the anatomical position of the radius and ulna while also maintaining and continuing the length of the radius (Kasch & Walsh, 2013).
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Pictures of internal and external fixation:

Figure 6 External fixation (Orthoinfo, 2017)

Figure 7: Internal fixation: (Orthoinfo, 2017)

Healing Process

The healing process typically take 6-12 weeks, with 5 distinct stages of healing. The first stage begins with hematoma or blood clot, which forms and seals the damaged vessels. In addition, bone cells, or osteoclasts, replace the damaged bone cells. The second stage is the reformation of fibrocartilage which promotes bone stability. The third stage is when callus forms which is a type of bony healing tissue that grows on the end of broken bones. The callus can form too large and this is why the callus can take time to finalize the overall shape (Callus, 2017). This happens around the second to sixth week of healing. The fourth stage is the ossification process, or the formation of the bones coming to together in union (Ossification,
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The fifth stage is when the remodeling of the bone takes place. This is between the sixth week and one-year time frame. The amount of healing time depends on the severity of the fracture and the current health status of the patient. The final step of the healing process is when the bone is reshaped into the original form. However, this does not always occur properly and the bone may heal abnormally (Hock, Javaherian-Dysinger & Pavlovich, 2017).

Abnormal Healing

Abnormal healing can happen for many reasons such as an open fracture, severe soft tissue damage, infection, poor vascularization, nerve damage, inadequate mobilization, phlebitis and or, compartment syndrome. These complications can lead to three different bone union issues including: delayed union, malunion, and nonunion. A delayed union fracture occurs the bone takes a longer period of time to heal than expected. This complication is indicated by the presence of pain and tenderness that persists at the site from 3 months to one year of time. This can occur from infection, poor vascularization, or adequate mobilization. Once the problem is identified and addressed the bone will heal in a typical manner. A malunion occurs when the fracture heals abnormally. This can occur from muscle imbalance or inadequate protection and positioning of the fractured bone. This causes serous issues with functionality, and may cause limited range of motion, strength, and coordination in a patient. A nonunion fracture is essentially a non-healed fracture. This can happen due to infection, poor alignment, vascularization tissue damage, and stress to the fracture site (Hock, Javaherian-Dysinger & Pavlovich, 2017).

Complications of healing include infection, tendon dysfunction, rupture, post traumatic arthritis, nonunion, stiffness, and contractures. Infection can be avoided by educating the patient to clean the surgical site, adhere to a regimen of antibiotics, and follow pin site care. Two-
cleansing with hydrogen peroxide, saline, and betadine is helpful for pin site care. Tendon ruptures can occur on any type of fracture, even the absolute smallest fracture. Post-traumatic arthritic changes may result from severe articular damage, ORIF (open reduction with internal fixation) and internal fixation. Injury to the median or ulnar nerve may occur as result of a DRF.

**Occupational Therapy Treatment**

Occupational therapy begins during the period of immobilization, which is typically 3-5 weeks post fracture. During this period, the emergence of edema is closely monitored. Edema, or swelling of a body part due to injury and/or infection, is a typical complication after any traumatic injury. It can affect movement, balance, and create pain and stiffness. It must be treated quickly and aggressively to prevent stiffness and permanent disability (Kasch & Walsh, 2013). Treatment of Edema includes: elevation massage, compression and active range of motion. Elevation needs to be above the heart to help blood flow. Active range of motion exercise (AROM), is prescribed for both the injured wrist, fingers, and forearm as well as maintaining mobility and strength of non-impacted shoulder, humerus, and forearm joints. to prevent atrophy due to possible overprotection. Shoulders and elbows should move through full AROM on a regular frequency of 3-4 times per day. Coban wraps may be used as well, which are elastic support wraps which provide compression and support for orthopedic injuries. These specifically at night, to help reduce the swelling (Kasch & Walsh, 2013). Therapy can be done with the fixators in place if the OT has obtained guidelines from the physician. Beginning therapy may involve safe soft active ROM in the fingers and educating the patient on proper care of the pin sites. (Kasch & Walsh, 2013).

**Phase one: Immobilization**
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This phase consists of stabilizing the fracture and ensuring healing to the affected skin, bones, muscles, and tissues by way of an orthosis which is a custom made splinting. This helps to immobilize the wrist while leaving the fingers free to move. There are many different types, colors, and types of material available for the production of splints. The splinting helps to manage swelling and pain in conjunction with elevation, retrograde massage, and compression. The style of splint to use for distal radius fractures is often a wrist cock-up splint or a volar splint due to how the wrist is held, and the type of compression. The volar ligaments give the most stability in comparison to the dorsal ones (Washington Occupational Therapy Blog, 2016). Once there is enough bone stability, the surgeon or physician will give guidelines for mobilization. These guidelines can include the amount of resistance and the precautions. Once the patient is pain free, engagement in activity is very much encouraged using the injured wrist. Using the wrist as soon as possible will help prevent sticking of the tendons, along with decreasing any chances of a patient getting edema (Kasch & Walsh, 2013).

Phase two: Mobilization

The time period for the mobilization phase is variable because every person heals differently and at different times. Another factor that affects the rate of healing depends on whether the patient had surgery or not. At this stage in the healing process, occupational therapy may be prescribed with a regimen of progressive, passive range of motion to active range of motion and finally active-resistive exercises. The therapist will monitor the shoulder and the elbow for stiffness, or pain while focusing on the forearm, wrist, and fingers. During therapy, the OT will use different physical agent modalities (PAMS) to decrease a patient’s pain level and prepare him or her for functional activity using tools such as ultrasound, ice packs, hot packs, hydrotherapy, paraffin, or fluidotherapy (Washington Occupational Therapy Blog, 2016).
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After the brace or cast is removed, the patients’ evaluation includes base measurements to provide a baseline to measure progress and to develop a program of mobilization, strengthening, and coordination. In most cases, a splint is fabricated to help prevent abnormal joint changes that may arise from the immobilization phase. The therapist also could prescribe a dynamic splint instead of a standard static splint to help achieve full ROM and to prevent more abnormal changes at the 6-8 week after fracture time period. If joint pain and stiffness occur after the fracture, without any signs of joint damage, then the patient should be treated with thermal modalities or joint mobilization and dynamic splinting (Kasch & Walsh, 2013).

Pain management:

Typically, after surgery patients use ice, elevation (holding their arm above their heart), and simple, non-prescription medications for pain relief, such as Acetaminophen or Ibuprofen, used in combination to relieve pain and inflammation. If their pain is severe they may need a prescription strength pain medication. (Orthoinfo, 2017).

Cast Care

Original casts do not last more than a few days – to a week, due to the sizing being too big for the patient, typically because the swelling goes down. The final cast is usually removed after 6 weeks of use. Casts and splints must be kept dry. A plastic bag over the arm during a shower is a common solution. If the cast does become wet, it will not dry very well. Some patients have found that using a hair dryer on the cool setting may be helpful for drying them. Also incisions need to be kept dry and cool for a few days or until the sutures are removed (Orthoinfo, 2017).

Wound Care
There are several critical stages of wound healing. The first is the acute inflammatory phase which occurs within hours of the trauma. The white blood cells act on the invasive cells that emerge as a result of the injury followed by cellular action which promotes skin growth and help to heal the wound. This happens within the first 72 hours of trauma. The second stage is the formation of the collagenous fibers, which increase vascularization as can be observed by the erythema, redness of an acute scar on a patient’s skin. During the third through sixth week, the collagenous fibers are replaced with new fibers to heal the skin which are stronger than the initial skin cells that are formed ones. The tissue continues to grow and replace older cells for three months or longer. Scar formation is dependent on a patient’s age, and the size of the scar left (Kasch & Walsh, 2013). Scars can be cared for by an OT using pressure, massage, and neuromuscular electrical stimulation (NMES). NMES “uses electric muscle stimulation to cause excitement in the muscle tissue” (Compex, 2015). Pressure is applied using sleeves, gel sheets, or by manual manipulation. Massage can be used to help with scar management by using firm pressure in linear, angular and circular motions along with lotions or ointments to helps soften scar tissue. Active –resistive exercise is recommended along with functional activity. Thermal modalities are often effective as well, including: paraffin, fluidotherapy, and ultrasound. In addition, coban wrapping may be used to provide compression. Thermal modalities also help scars heal, due to the stimulation and currents from them such as ultrasound. (Kasch & Walsh, 2013).

Wounds are evaluated by a three color scale. They are indicated by red, yellow, or black. The colors set the type of treatment they receive. A red wound indicates that it is clean ready to start healing. Yellow indicates that the wound needs to be irrigated and as it is at risk for infection. Black means dead tissue, and is the most severe grade of infection. Topical creams
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include: antimicrobials that are used to control bacteria. Along with the creams healthcare staff use different types of dressings as well. Dressings are a way to bandage up a wound to keep bacteria out and promote healing. Some dressings include: gauze, ointments, N-Terface, and creams. The types of materials used for different wounds depends on the amount of g fluids seeping from the wound. Before putting on a dressing the wound must be irrigated using sterile saline. This helps to remove dead tissues, soak up old bandage adherents, and clean the area or stitches (Kasch & Walsh, 2013).

Non-Surgical Treatment:

If the bone is in good placement, then a plaster type cast may be put on a patient, until the bone is healed. If the position of the bone is out of alignment. Then the bones will have to be "reset" to realign the broken bones. “Reduction" is the term that doctors use when they move the broken bones into place. When a bone is straightened without having to make an incision, it is called a closed reduction. Once the cast is on a patient’s arm, which is added on a few days to a week later, and is changed 2-3 weeks after the injury after the swelling has gone down. Roughly, casts are removed 6 weeks after injury when the bones are healed. However, doctors may closely monitor certain fractures by taking regular x-rays (Orthoinfo, 2017).

Surgical Treatment:

Surgical treatment is used when the position of the bone is so out of place that it cannot be corrected, open fractures, or needs to be corrected with adjustments to internal and external fixators. This is also known as an open reduction. Depending on the fracture, there are many different options for holding the bone in place. Internal fixators include: Metal pins, plate and screws. External fixators are rods and screws going into the skin from the outside (Orthoinfo, 2017).
Occupational Therapy Treatment in DRF

Occupational Therapy is “is a client-centered health profession concerned with promoting health and well-being through occupation. The primary goal of occupational therapy is to enable people to participate in the activities of everyday life. Occupational therapists achieve this outcome by working with people and communities to enhance their ability to engage in the occupations they want to, need to, or are expected to do, or by modifying the occupation or the environment to better support their occupational engagement” (WFOT 2012). Occupations include what our patients need to do and want to do every day. Occupational therapists do not diagnosis patients, however they can refer a patient to a specialist, doctor for a prescription to have an x-ray, prescription, to have further evaluation, or to other medical professionals. As the occupational therapist their job is to help their patients with pain management, range of motion in the bones, muscles and joints, while progressing in self-esteem, self-awareness of the injury, and maintaining positivity in treatment sessions with our patients. Occupational Therapists should be working closely with the physician to determine the appropriate protocol and precautions for their patients.

CHT and PD Discussion of specialty areas

A CHT or Certified Hand Therapist is an occupational therapist with a specialty in hand therapy. A hand therapist, according to American Society for Hand Therapy (ASHT) is “a nationally registered occupational therapist or physical therapist who, through advanced continuing education, clinical experience and integration of anatomy, physiology and kinesiology, has become proficient in treatment of pathological upper-quadrant conditions resulting from trauma, disease, or congenital or acquired deformity” (ASHT, 2017). These types
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of OTs see patients based on diagnosis, surgery and condition. Certified hand therapists treat conditions such as “crush injuries, tendon and/or ligament lacerations/repairs, tendinopathies, peripheral nerve disorders, fractures/dislocations, infections sports-related syndromes and more. Hand therapists also treat patients who suffer from chronic problems which affect upper extremity function, such as autoimmune disorders, neurological conditions, pain, diabetes, focal dystonia, congenital anomalies and psychogenic disorders involving the upper quarter” (ASHT, 2017). In treatment, hand therapists specialize in the following:

- Activity/exercise regimes custom designed to increase motion, dexterity and strength with the ultimate goal of improving function
- Behavior management
- Compressive therapy
- Desensitization, sensory re-education or sensory compensatory techniques
- Electrical modalities
- Ergonomic modifications
- Adaptive techniques and suggestions for adaptive/assistive devices equipment
- Industrial consultation
- Joint protection and energy conservation training
- Manual therapy
- Orthotic fabrication for post-op surgical protection/immobilization, correction of injury or deformity and conservative management of common upper extremity syndromes
- Pain management, acute or chronic
- Patient and family education
- Prosthetic training
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- Scar tissue management
- Thermal modalities
- Wellness education
- Work conditioning/hardening/retraining
- Wound management (ASHT, 2017)

Assessment and treatment of persons with physical disabilities is another type of specialty for occupational therapy. Physical disabilities are conditions which affect the ability to participate, perform and interact every day in their activities of daily living. These activities of daily living or ADL’s include: toileting, sleeping, dressing, grooming, eating, drinking, bathing, bowel bladder management, personal hygiene, and personal device care (Pendelton & Schultz-Krohn, 2013). Both of these are relatable for this condition of a distal radius fracture because they are a physical disability that is temporary, and they may need hand therapists for their recovery process.

Hypothetical Case Study 1

History

Mark is a 68-year-old man was hauling a kayak to the lake from his vehicle. While trying to set the kayak into the water he slipped and fell back onto his hand and back while trying to catch himself. While falling, was still holding onto the kayak so he could not protect himself from the fall. His break punctured through the skin, and along with his wrist, broke his left hip as well, due to falling onto rocks from the dock in the marina. Mark’s occupation is that of an accountant. Luckily, someone watched him fall and immediately called 911. Mark’s secondary conditions include: diabetes, and high blood pressure.
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**Precautions/Contraindications:** Dysphagia, leading to risk of choking secondary to a previous stroke, ibuprofen allergy, allergy rhinitis.

**Surgery**

Left Hip Arthroplasty

Left wrist: distal radius fracture with tendon tear

**Medical Tx**

Surgery heal time

Heal infection

Surgical site healing

Bones healing

External fixators put in and taken out

**Reason for Referral**

The reason for the referral is to help Mark how to help with scar management after the bones have healed, pain management, wrist stability, how to return to work, and strengthen the wrist muscles.

**Evaluation Procedure**

**Step one:** Interview, explanation of OT, assessment of current status, and what Mark would like to go back to doing

**Step two:** Canadian Occupational Performance Measure (COPM)

**Step three:** Assessment of grip strength via the drag dynamometer

**Step five:** Assessment of pinch strength

**Step six:** In hand manipulation assessment
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**Step seven**: Toileting

**Step eight**: shower chair usage

**Step nine**: brushing teeth

**Step ten**: Standing balance and sitting balance

**Step eleven**: education on hip fractures and broken wrist protocol and schedule for therapy

**Step Twelve**: Sensory testing

**Step thirteen**: Purdue peg board test

**Step Fourteen**: DASH (disabilities of the arm, shoulder, and hand outcome)

**Evaluation Results**

Mark’s results confirmed that he has joint stiffness, lots of pain, a lower pinch and grip strength due to stiffness. COPM results: Would like to get back to work, everyday tasks, use the bathroom, and shower alone. Mark would like to be able to use his dominant hand again as well.

Pinch measurements: Low

Grip measurements: Low

In hand manipulation: N/A

Slow Purdue peg board

Alertness: Low

Fever from infection of open reduction

Raised surgical site

Referral to physician for guidelines with the external fixation in the allotted time period

Blood infection due to infection from open reduction

**Analysis**
Problem List:

1) Client is unable to complete toileting hygiene due to having hip surgery.
2) Client is unable to write due to a painful/raised surgical site and stiff wrist.
3) Client is unable to perform self-grooming due to elbow stiffness and standing balance.
4) Client is unable to sit for too long due to hip pain.

Caregiver Interview and observation

After talking with the caregiver she explained that this has been hard on Marks job at work being an accountant. Writing with his left hand is difficult. He is also in some pain all the time. The caregiver would like him to be pain free at night, and be able to do his job as an accountant. Now with an additional broken hip injury on top of the wrist learning to make sure Mark is not bending to much past 90 degrees.

Frame of Reference

The biomechanical frame of reference is used along with rehabilitation because of the treatment sessions and what these patients requires to get better. According to All things OT, the rehabilitation frame of reference concentrates on what the patient can do, rather than on what they cannot do. It applies adaptation, compensation, and modification in order to aid the patient’s ability to participate in their activities. The rehabilitation approach modifies tasks for patients focusing on their independence as a person and where the patient currently is in their recovery journey (2017).

Recommendations and Treatment Plan

If I was the Occupational Therapist (OT) the recommendations, I would give this patient include:

OT sessions 3 times a week for 6 weeks.

Therapy would include:
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- Progressing on strengthening and stretching the wrist
- Scar management (edema care if needed)
- Practicing on personal bathroom care
- Working on standing balance while at a vanity
- Trying different sitting positions
- Practice using different cushions to sit on
- Referral for medication check
- Bathroom evaluation

List Specific Outcomes

- Bones healed
- Joint stiffness on wrist and hip on and off with very mild pain due to cartilage and scar tissue.
- Ability to all ADL’s with mild stiffness due to age

Hypothetical Case Study 2

History

Phil is an 18-year-old male who is on the track team at his high school. While practicing hurdles during practice, Phil tripped on a hurdle and fell. While trying to catch himself he landed on his right hand. When he landed he heard a snap but he thought he was okay. Overnight, his wrist swelled up and turned purple. When he woke up he went right to the doctor. After x-rays were taken the doctor explained he had a closed distal radius fracture from his fall and landing on his wrist. Phil has no preexisting conditions or secondary conditions.

Surgery

No surgery required, just a bone realignment done physically by the orthopedic doctor
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Medical Tx.

- Splint till swelling goes down
- Moved to a plaster cast for 4 weeks
- Occupational therapy to follow for another 6 weeks.
  - Customized splint for protection and help of the continuation of healing
  - Thermal modalities for pain

Reason for Referral

Reason for referral is for pain management, splinting, casting, muscle strengthening, joint stiffness, finger paresthesia (tingling), and difficulty with school related tasks such as writing and typing.

Evaluation procedure

Step one: interview, explanation of OT, pain level, how OT can help him, and physician approval and notice of how far out the injury is.

Step Two: COPM

Step Three: Stretching (AROM, PROM)

Step Four: Pinch meter

Step Five: Grip Meter

Step six: Jebsen test (in-hand manipulation)

Step Seven: Sensory testing

Step Eight: 9-hole peg board test

Step nine: DASH (disabilities of the arm, shoulder, and hand outcome)

Evaluation Results
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Phil’s results confirmed that he has some serious joint stiffness, pain in the wrist. He has a moderate to low pinch and grip strength. His COPM results shared that he would like to be college ready and he wants to go back to track because that is his favorite thing to do. His in hand manipulation is very very slow.

Analysis

**Problem List:**

1) Client is unable write for class notes due to stiffness after bones have healed.

2) Client is unable to open doors due to stiffness in wrist gliding bones at CMC joint.

3) Client is unable to sleep due to pain at the wrist during the night.

**Caregiver interview and observation:**

After getting information from Phil’s mother she explained that his sports, and going off to college to run track is very important to him. Since his job is being a student he would like to be able to write and type with no pain. He has some serious pain every morning and every night. Mom would like Phil to be pain free and back on track for college.

**Frame of Reference**

Biomechanical frame of reference is the framework that addresses the physical deficits in order to help a patient participate in meaningful activities (allthingsOT, 2017).

A key element of the biomechanical frame of reference is that it takes a restorative approach to deficits by attempting to restore or develop skills in the client rather than compensate for the lack of ability. This is important to note because it requires that the client have both the cognitive and physical ability to restore or develop skills in order for this approach to be effective. It does not, however, require the level of cognitive functioning necessary in some other approached.
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It has a focus on the positioning of clients in order to facilitate functional activity. By adjusting or supporting the positioning of a client with physical deficits, the biomechanical approach can prevent or delay the onset of fatigue in order for a client to fully complete an activity, or it can provide support to a particular physical component of the body, such as the trunk, in order to better facilitate more distal movements.

Includes: physical exercises, orthotics, physical agent modalities, and any other intervention that specifically targets an identified deficit. However, intervention is not limited to it.

Recommendation

If I were the OT I would recommend the following treatment plan as follows:

Stretching

1. Home program
   a. Gliding exercises
   b. Flexor extensor exercises
   c. Lightweight strengthening

RICE

2. Rest
3. Ice
4. Compression
5. Elevate

Sensorimotor:

- Home sensory diet program with bucket
- Alignment of the bones
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- Thicker grips for pens/ pencils

Yoga poses:

- Plank position
- Downward Dog
- Side Plank
- Upward table top
- Crow pose
- Handstand

Table Top activities:

- Stacking monkeys
- Playing ball
- Gliding in cool gel

Sensory Bins:

- Gooey water marbles
- Rice bine with fuzz balls, coins, and hard marbles
- Sand with objects in them with keys, marbles, and sticks

Discussion

Findings from many readings conclude that distal radius fractures are the most common fracture in the whole human body, but with older people their falls can be more complicated cases. Older people can have many comorbidities, such as dementia, diabetes, and or post stroke
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that could inhibit them from recovering as fast as everyone else. They can also be more at risk for another fall from these comorbidities. It is not about how someone broke their bone, but about the force of the trauma, and the density and strength of that patient’s bone. Occupational therapists can ensure proper healing, minimize pain, swelling and weakness. OT’s build back muscle strength that was lost during the recovery period of being immobilized, and then some. OT’s then help both of these patients get back to their occupations and help they get modifications if needed or get them on their way back to work. This field is so rewarding in any of the specialty areas and this is something that I cannot wait to follow and progress with my own patient’s one day.

Conclusion

In conclusion, distal radius fractures are extremely common at all ages from a wide variety of reasons, as in sport injuries on the field, or falls, or accidents at home. These types of injuries can be straightforward waiting on the bones to heal, or may require complex open reduction surgeries to align bones to heal using rods, plates, and screws. There are many other complications that may result from a wrist fracture such as infection, another break, or even comorbidities of older age such as dementia and Alzheimer’s, Parkinson’s, or osteoporosis. The treatment on the elderly patients with open reduction distal radius fractures should also have more treatment options for their healing process and care.

References


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