Orthosis - An Overview

Section 1: Introduction

Most therapists who don't make orthoses frequently may be intimidated by the process. This practice area requires a level of precision that some other occupational therapy work does not. However, creating orthoses is a good example of how motor memory can help therapists. The more often you make these devices, take measurements, and fit them according to patient needs, the better you will get at creating them for a range of situations.

Occupational therapists who use their fabrication skills often should also have a good working knowledge of the mechanics of the hand and upper extremity. This helps them ensure their orthoses promote function and prevent injury simultaneously. Therapists should also be aware of other healthcare providers who can assist in meeting the full spectrum of their patients' needs. This will help them present patients with the devices that are best suited for their lives. Creating and fitting orthoses is a learned skill that is a valuable asset for any therapist, regardless of what practice setting they work in. This specialized area helps therapists gain a deeper understanding of biomechanics and joint motion to encourage improved upper extremity function.

Section 2: Purpose & OT Scope[1,2,3]

The term splint may be used synonymously with words like orthosis and prosthesis, but it's important to differentiate between them. What therapists commonly refer to as splints are actually called orthoses. An orthosis is a wearable device (either rigid or flexible) that is used to immobilize and protect a certain part of the body. Orthosis is also the term recognized by insurance companies, so this distinction is important for the purposes of medical billing and documentation. Medicare defines an orthosis as a "rigid or semi-rigid device that supports a weak or deformed body [part], or restricts or eliminates motion in a diseased or injured part of the body."

Occupational therapists most commonly interact with custom-fabricated orthoses. If a device is custom-fabricated, that means a therapist has created it according to specific measurements, castings, images, and clinical data. These devices are made from scratch and unique to the person. Custom-fabricated pieces are designed to remedy a particular deformity on a particular person, so they would not benefit anyone other than the person they are made for.

Devices that are custom-fit are pre-made in factories in large quantities, but their material allows them to be trimmed, molded, or otherwise modified by a therapist so they are fitted to each person's needs. Prefabricated orthoses are the opposite of custom-fabricated devices. If you have seen orthoses (usually marketed as splints or braces) for sale in pharmacies like Walgreens or CVS, these are considered prefabricated. They come with straps and all the materials you need to wear them right away. These may be a good fit for some individuals with an average body type who want added stability when completing activities like working or walking. But the downside is that they rarely fit people with more than one medical need, since they do not accommodate anyone with notable deformities or injuries. These are also similar to the devices used when someone experiences an acute injury.

These devices, called splints, are often part of the first aid process and are provided when someone gets injured and needs immediate medical attention. In the case of broken bones, splints serve to relieve pain, mobilize the injured joint, and avoid damaging nearby tissue. Splints for acute injuries such as bone breaks are usually temporary options until the bone can be surgically set and casted (or only casted in the case of simple fractures) to allow long-term healing to begin. This type of splinting can be used on the upper body or lower body, depending on where the injury is.

Within the realm of occupational therapy, orthoses serve a similar purpose of stabilizing a certain joint (or a series of smaller joints). However, since occupational therapists primarily address the top half of the body, an OT's knowledge of orthoses focuses on its application in the hand and upper extremity. From the perspective of a rehabilitation provider such as a therapist, orthoses can treat injury (as they do briefly for fractures). Yet, the main goals of orthoses are dependent on the deficit or injury they are intended to treat. Orthoses can either increase or decrease range of motion, relieve pain, encourage functional use, protect bodily structures such as bones, joints, and tissue, allow for rest, and prevent contractures or other deformities.

Some of these options are more common for individuals living with chronic conditions that can worsen or progress without intervention. Depending on the type of orthosis an occupational therapist recommends, these devices may work to support, immobilize, or protect the joints in the arm and/or hand. In many cases, orthoses will also help improve range of motion and increase someone's ability to participate in various activities.

There are instances where occupational therapists will need to refer patients to other providers to get orthoses made. This may be indicated if the therapist does not have experience making orthoses. In some cases, doctors will refer patients directly to an

orthotist. Orthotists are medical professionals whose sole job is to fit and create braces and orthoses of all kinds for patients. Once an orthotist receives a doctor's order to create a certain device for a patient, they will take measurements and learn about the patient's past treatments. They then determine whether the patient would benefit from adaptations to their current device or if they need to create a different one to meet the patient's needs. Orthotists can make all sorts of braces, including those that are within or outside of an occupational therapist's scope of practice. They are trained in the fabrication and adaptation of ankle-foot orthoses (AFOs), knee-ankle-foot orthoses (KAFOs), HALO braces for cervical and spinal injuries, and more.

Another professional who can assist patients in wearable devices is a prosthetist. These providers also have medical training and are well-versed in making and fitting artificial limbs for people who have lost body parts due to diabetes, cancer, or other injuries. They often give patients top-surface training regarding how to use their new devices, but therapists often supplement this education as part of self-care training during OT treatment.

Section 2: Personal Reflection

What other devices might warrant someone seeing an orthotist rather than a therapist?

Section 2: Key Words

Custom-fabricated orthosis: A wearable device used to support or restrict motion in a certain body part; this device is made individually based on measurements, images, castings, and other clinical data; such an orthosis is only beneficial for the person it was made for

Custom-fit orthosis: A wearable device used to support or restrict motion in a certain body part; this device is made in mass quantities that is able to be bent, trimmed, or otherwise modified by therapists to meet a patient's needs

Orthosis: a rigid or semi-rigid device that can support a weak or deformed body part; it may also be used to restrict or eliminate motion in a diseased or injured part of the body; orthoses can be custom-fit, custom-fabricated, or prefabricated; plural is orthoses

Orthotist: A medical professional who makes and fits upper and lower body orthoses for individuals with a variety of medical needs

Prefabricated orthosis: A wearable device used to support or restrict motion in a certain body part; this device is made in mass quantities and does not allow for modifications or adjustments

Prosthesis: A long-term device (also known as an artificial limb) that individuals wear after they experience an amputation to a certain part of the body; plural is prostheses

Prosthetist: A medical professional who makes and fits artificial limbs for patients who recently underwent a traumatic or surgical amputation

Splinting: The process of treating a broken bone or dislocated joint via casting or strapping; this may be done as part of the first aid process or on a more long-term basis to promote bone healing

Section 3: Biomechanics & Evaluation[1,2,3,4]

Biomechanics are at the root of all orthoses. The biomechanical frame of reference places a strong emphasis on motion, endurance, and strength as they relate to occupational performance. The biomechanical approach is not intended to be a singular treatment method. But, in the case of orthoses, the treatment is the device itself. Orthoses similarly focus on enhancing a patient's range of motion (ROM), strength, and endurance, which makes these two treatment methods a great fit.

Orthoses and biomechanics are primarily used in physical rehabilitation departments (typically in hospitals or hospital-based outpatient clinics), work hardening and readiness programs, orthopedic settings, and ergonomic education forums. No matter what setting you are working in, it is important to complete a biomechanical-based evaluation before fitting someone for an orthoses.

Evaluation

The components of any biomechanical evaluation include range of motion, strength testing (including grip strength and pinch strength), endurance/activity tolerance, edema, and sensation. As long as a patient is cleared by a doctor and has no ROM restrictions, a therapist can measure a patient's motion using a goniometer. It is ideal to get an idea of their functional range of motion, or the motion they demonstrate while completing typical tasks, as well as their active range of motion. Passive motion may also

be indicated if they have contractures or demonstrated limited movement in certain joints.

Therapists can measure strength using manual muscle testing (MMT), where they test the patient's strength based on their ability to resist pressure from the therapist while in a gravity-eliminated or against gravity position. Grip strength measures the strength of the entire hand using a dynamometer. Pinch strength is tested via a pinchmeter, which assesses the strength of the thumb, index, and sometimes middle finger in a variety of positions.

Endurance is measured by the patient's tolerance for a certain number of repetitions in a period of time. Therapists should also measure edema and take those figures into consideration before fitting an orthosis. Edema can place someone at risk for skin integrity issues, so barriers and goodness-of-fit are especially important for this. Sensation is also crucial because patients must be able to determine if an orthosis is too loose, too snug, causes them pain, or is otherwise ill-fitting. Therapists can assess two-point, temperature, and sharp/dull discrimination.

Orthoses Types

Once the evaluation is complete and therapists have a good sense of a patient's strengths and deficits, they can determine what style of orthosis is best. Static orthoses are those without moving parts and they solely serve to immobilize a joint or body part. Dynamic orthoses are made of part rigid material and part of a moving component such as a spring or elastic. Dynamic devices are mainly intended to gradually increase passive range of motion for patients who can't tolerate a device in one fixed position. The individual can adjust the moving component according to their therapist's instructions, which are determined based on their tolerance. Dynamic orthoses can also be used as a form of active-assisted range of motion for patients who have some motion, but need a little boost.

A serial static splint is a type of casting that is molded to accommodate certain joint motion, but can be remolded as the patient's needs change. Static progressive splints are similar to dynamic orthoses in that they have a rigid portion (usually a hard shell) along with an adjustable portion such as a strap or rotating screw called a turnbuckle.

Making & Fitting Orthoses

The aim of orthoses should be to decrease pressure. This most often means that wider and longer devices will be better for patients. Therapists should always be sure to round edges on the device to ensure the patient's comfort and maintain their skin integrity. Keep the three-point pressure system in mind. This means that each orthosis should provide three points of pressure to effectively stabilize the joint and allow it to maintain motion.

Therapists should also always avoid positions of deformity. This will vary based on the joint the orthosis works on, but some examples include thumb adduction, wrist flexion, and MCP hyperextension.

Regardless of the type of orthosis used, therapists should adhere to some of the following principles. It is crucial to maintain the natural arches of the hand, since this allows patients to remain functional while wearing their device. Be mindful of the proximal and distal transverse arches as well as the longitudinal arch. Another way to maintain function is to not disrupt the creases in the hand. This includes the distal and proximal palmar creases, which both run from below the index finger to the ulnar side of the hand, and the thenar crease (a curved line that starts parallel to the base of the thumb and extends down to the wrist). Others are the distal and proximal wrist creases: one below the palm where the wrist begins and another is slightly under that.

There are many general considerations that impact the fabrication process of orthoses. As a result, they also impact the quality of the device and, subsequently, the patient's compliance with their wearing schedule. But there are even more nuances that come along with certain diagnoses, deficits, and populations. All of these should play a part in a therapist's clinical decision-making and the final product. We will discuss these more in the next section.

Section 3: Personal Reflection

What diagnoses might benefit from serial casting?

Section 3: Key Words

Biomechanics: a model of therapy that emphasizes motion, endurance, and strength as they relate to occupational performance.

Dynamic orthosis: A rigid orthosis that has a movable component (such as an elastic or screw) to increase or decrease the support given

Dynamometer: A piece of evaluation equipment that measures pressure exerted by the entire hand, also known as grip strength

Goniometer: A tool used to measure the angle of joints in the body, also known as range of motion

Pinchmeter: A piece of evaluation equipment used to measure pressure exerted by the thumb, index finger, and middle finger in a variety of positions, also known as pinch strength

Serial static splint: Casting that is molded to accommodate certain joints, either for the purpose of fractures or more long-lasting deformities

Static orthosis: A rigid orthosis that immobilizes a joint or body part

Static progressive splint: A rigid cast-like material that immobilizes a joint but also has an adjustable portion such as a strap or a screw that can be adjusted according to patient needs

Work hardening programs: An outpatient program that rehabilitates and prepares workers to return to their employment after an acute injury

Section 4: Diagnostic Indications for Orthoses[1,2,3,4,5]

Orthoses can be helpful for a range of acute health concerns, such as burns, as well as chronic conditions like carpal tunnel syndrome. Each orthoses will come along with different wearing schedules, upper extremity positions, and precautions.

Arthritis

A hand-based orthosis is ideal for helping people with CMC arthritis, which causes stiffness and pain in the thumb joint. This stabilizes the base of the thumb to relieve inflammation. Orthoses for ulnar drift help people with rheumatoid arthritis. This device realigns the MCP joints of the fingers (aside from the thumb) to decrease pain and increase stability. These orthoses are often made as neoprene gloves to improve patient comfort.

Swan neck deformities are also present with individuals who have rheumatoid arthritis. Silver ring orthoses (also called buttonhole or hyperextension block orthoses) place the finger in slight PIP flexion. This positioning allows the finger to both remain in neutral and prevent further deformity. These may also be called digital dorsal orthoses. A boutonniere deformity also responds well to a silver ring orthosis as well as a PIP extension orthosis. By placing the PIP joint of the finger in slight extension, the lateral bands in the digits can realign and prevent further deformity. Patients who use these devices are also usually instructed to complete DIP flexion exercises to minimize the recurrence of the boutonniere.

Functional orthoses are recommended for general cases of arthritis in the hand. Although this recommendation is dependent on the stage and severity of the arthritis, the general purpose is to keep the hand in a stable position at rest to relieve pain and inflammation.

Burns

When someone burns their hand badly enough to require an orthosis, the positioning is more tedious than it is with orthoses for other purposes. The optimal position to prevent contractures and maintain some level of function is 15-30 degrees of wrist extension, MCP flexion between 50 and 70 degrees, and full extension of the IP joints.

Cumulative overuse syndromes

One of the most common cumulative overuse injuries is carpal tunnel syndrome. While this condition can be minor or severe, an orthosis is not always indicated. Wrist orthoses may be beneficial in cases where individuals sleep in the fetal position with their wrists fully flexed and curled inward. This position can exacerbate numbness and tingling in the hand, so therapists may recommend a nighttime wearing schedule to keep the wrist neutral and prevent those symptoms.

Another similar condition that may require the use of an orthosis is cubital tunnel syndrome. Orthoses for this condition are worn at the elbow to prevent compression of the ulnar nerve. This is not considered a functional orthosis, as it is rigid and keeps the elbow in a flexed position. As such, the wearing schedule for a cubital tunnel orthosis is similar to that for carpal tunnel syndrome in that it’s intended for nighttime use.

Hand injuries

A thumb orthosis is often recommended for de Quervain's, as it includes stabilization from the wrist while leaving the IP joint of the thumb free. In this sense, it is functional and allows for convenient daytime use during someone's usual activities. The intention of this orthosis is to place the entire dorsal aspect of the thumb in a resting position to relieve pain, stiffness, and inflammation that is common with this condition.

Orthoses for skier's thumb are intended to stabilize and protect the ulnar collateral ligament as well as the MCP joint of the thumb, which are all involved in this injury. This orthosis is temporarily meant to immobilize the ligaments until the injury heals. Flexor tendon injuries often require a dorsal protection orthosis, which quite explicitly protects the back of the hand as it heals and also allows for early motion to assist with the healing process.

Neurological conditions

Flaccidity can occur after a spinal cord injury (SCI) or a stroke, and it may benefit someone to wear a resting hand orthosis, also known as a functional orthosis. This serves two purposes: preventing contractures from developing and keeping the hand in an optimal position to use it (as someone is able to) during therapy and other functional tasks. Functional orthoses also ensure that someone is protected during the period where they are waiting for motion to return to their hand and upper extremity. These are often worn throughout the day when someone engages in activities to assist with stabilizing the hand to promote better use. Nighttime use is usually also indicated for protective purposes.

On the other end of the spectrum, spasticity may also be seen with neurological diagnoses. Spasticity orthoses, more commonly known as cone orthoses, keep the hand in a slightly flexed position to prevent contractures from developing. Individuals with conditions such as an SCI, amyotrophic lateral sclerosis (ALS), or Guillain-Barre syndrome may also benefit from a balanced forearm orthosis (BFO) or a deltoid (suspension) sling. These offer stabilization to the upper arm to allow someone functional use of their lower arm during daily activities (usually self-care). These devices prevent a loss of motion in the shoulder. As such, they require more set up than orthoses that focus on the distal forearm and must be mounted to a person's wheelchair.

A tenodesis orthosis is indicated for individuals who have experienced a spinal cord injury at the C6 or C7 level. This orthosis helps someone improve their ability to grasp

and release. This not only plays a big part in the completion of self-care tasks, but it allows someone with this condition to be more independent with transfers and self-positioning.

Nerve injuries

A flail arm orthosis is a good way to stabilize the arm after a brachial plexus injury. It keeps the shoulder in place and prevents further injury to the nerves in this sensitive area. Someone with a radial nerve injury may be fitted for a Colditz orthosis or a radial nerve orthosis. These devices offer someone partial wrist motion and finger extension to assist with grasp, release, and other movements that help with functional performance. In some cases, therapists may also recommend that patients with a radial nerve injury wear a resting hand orthosis at night to prevent any contractures from forming.

Individuals with a median nerve injury are often given a C-bar or opponens orthosis to keep the thumb in opposition, which assists during functional activities. Additionally, someone with this injury may benefit from a thumb post orthosis to prevent a contracture in thumb adduction. This is minimalistic and supports the thumb in a position of function.

An anti-claw orthosis may be recommended for someone who suffers an ulnar nerve injury, since they are at risk of developing a claw deformity where the last two fingers form a hook. Another orthosis for ulnar nerve injuries is the lumbrical bar orthosis that blocks the dorsal side of the hand at the MCP joints of the fourth and fifth fingers. This places those digits in a flexed position and prevents hyperextension. A combined median ulnar nerve injury can similarly benefit from a lumbrical bar orthosis, but a figure-eight orthosis can also help this condition. However orthoses for this combined injury instead encourage flexion in digits two through five.

Precautions

While specifics will vary based on the type of orthosis a patient uses, there are some general considerations to keep in mind. Be sure to educate patients against exposing their orthosis to high levels of heat. They can do this by keeping it away from direct sun, heaters, hot cars, and more. This can cause the orthosis to become warped and impact the way it fits the patient. Most orthoses are able to be hand-washed (unless otherwise specified), so patients can use warm or cold water and gentle, fragrance-free antibacterial soap to wash their orthosis daily. They should not place their device in a

dryer, rather hand dry it with a towel. Straps may take longer to dry, but they should always be air-dried and not ironed or placed under any artificial heat. Patients should also be given a stockinette (a thin, glove-like material that is put on the hand before donning the orthosis). This serves to protect the hand by preserving the integrity of the skin. The stockinette can be washed the same way as the orthosis: in warm or cold water with gentle soap. This should also be laid flat to dry and kept away from heat sources, since this can cause shrinkage.

If the orthosis has straps, patients should place them at a level that is comfortable for them. Patients should be able to comfortably fit their pinky finger under the strap when it is affixed. If it's any tighter than that, it can leave red marks on the skin or impair circulation. If it's any looser than that, the orthosis will likely not serve the purpose the therapist intends. Patients should be advised to contact their therapist if they begin to experience pain, tingling, swelling, numbness, or if the orthosis is uncomfortable while they wear it. Patients should also contact their therapist if their skin turns white or if they begin sweating a lot, as this can point to a circulation issue. If any parts fall off, loosen, or otherwise change, they should similarly contact their therapist for guidance instead of attempting to mend the orthosis on their own.

Wearing schedules

Therapists will give all patients instructions regarding their wearing schedule. Depending on the patient's diagnosis and their reason for wearing the orthosis (pain, inflammation, loss of motion, etc.), therapists may indicate one of the following wearing schedules:

- Daytime use (to be worn during before and after regular daily activities with the exception of bathing)
- Nighttime use (to be worn while asleep)
- Day and night use (to be worn full-time, aside from when showering or bathing)
- Remove for physical activity/exercise and personal hygiene (this is ideal for orthoses that are not water-resistant)
- Do not remove for physical activity/exercise and personal hygiene (this is intended to assist during these activities, so the orthosis should be kept on for the duration)

- Use during functional activities (to be worn during functional activities such as dressing, bathing, eating, grooming, and toileting; therapists should also give specific instructions regarding how to protect the orthosis from getting wet)

If patients have a lower extremity orthosis such as an AFO or KAFO, they should always wear them with shoes. Otherwise, they can easily fall when the slick surface touches the floor. Additionally, therapists will fit such orthoses to a certain pair of shoes that offer the ideal support, so a patient should not wear their AFO or KAFO with any other footwear.

Regardless of the type of orthosis, whenever patients are not wearing it, they should be in a place where they can get some air. This will prevent bacterial build-up and make cleaning much easier when the time comes.

Section 4: Personal Reflection

What are some things to keep in mind when creating an orthosis for someone with sensitive skin?

Section 4: Key Words

Boutonniere deformity: A deformity of the finger that usually occurs as a result of an injury or arthritis; this is caused by an injury to the tendon that keeps the middle finger joint straight; as a result, the end of the finger assumes the shape of a boot

De Quervain's: Also called De Quervain's tenosynovitis, this condition causes inflamed wrist tendons; due to the location of these tendons, pain and loss of motion usually occurs in the thumb; this condition is usually worsened by overuse of this part of the hand

Skier's thumb: An injury that causes a partial or complete rupture of the ulnar collateral ligament in the thumb; this leads to pain, swelling, and impaired motion

Stockinette: A thin, glove-like material that is placed over the hand before placing an orthosis on; this serves as a barrier that protects the skin from moisture build up or bacteria

Swan neck deformity: A deformity of the finger that results in the base of the finger bending, the middle of the finger straightening out, and the tip of the finger bending;

this forms the appearance of a swan neck, which is common in conditions such as a rheumatoid arthritis

Tenodesis: A grasp pattern that requires wrist movement to open and close the fingers

Section 5: Reimbursement & Continuing Education[6,7]

When billing for the fitting of orthoses, occupational therapists can use the following CPT codes:

- **97760:** 15 minutes of orthotics management and training for an initial encounter; this includes patient assessment and fitting of the upper and lower extremities or trunk
- **97761:** 15 minutes of prosthetic training related to the upper and lower extremities for an initial encounter; this also includes ADL training and walking for UE and LE amputations, self-care related to the device itself (donning, doffing, and others), and management of the residual limb
- **97763:** 15 minutes of orthotics or prosthetics management or training related to the upper and lower extremities or trunk for subsequent encounters

When occupational therapists are fabricating an orthosis, they can bill for their time using the 97760 and 97761 codes. Regardless of whether the orthosis is custom-made or prefabricated, therapists should use the 97763 code when they make any sort of adjustment outside of the first visit.

There are also other nuances that come along with making orthoses. This includes the art of fabrication, more specific knowledge of the structures in and around the hand, and coding, billing, and reimbursement considerations. Much of this content is specialized, which is why it's a good idea to pursue a Certified Hand Therapist (CHT) credential if you are interested in making a niche for yourself or you want to better serve patients with upper extremity injuries and deformities.

Practicing occupational and physical therapists with three years of experience are able to apply for the CHT exam. They also must have 4,000 hours of work experience in upper extremity rehabilitation. Once a therapist has met these basic requirements, they can take a competency exam that demonstrates their knowledge in hand therapy. CHT candidates who pass this exam will then be able to use the letters "CHT" as a

designation after their name. As a hand therapist, these professionals will then be able to provide more detailed and comprehensive assessments, take specialized referrals to develop a wider patient base, and expand their role within the continuum of care. This serves the purpose of more quickly connecting patients with specialized care, rather than needing to refer them to a different hand therapist, which may not even be conveniently located near them. In this way, CHTs can better improve functional outcomes, give patients a faster recovery time, and reduce overall medical costs associated with extraneous care and added visits.

Section 6: Case Study

The patient is a 70-year-old woman with a history of osteoporosis and dementia who recently got diagnosed with De Quervain's. During the initial evaluation, she presents as pleasantly forgetful. Her range of motion is limited during grooming, eating, and dressing, and she demonstrates impairments in strength and endurance. She fatigues after grasping an item for less than 20 seconds and her dynamometer values are below 10 on the affected hand (which is also her dominant hand) and below 20 on her other hand. There is no edema, coordination appears to be intact, and there are no major sensory deficits present.

She has a full-time caregiver who is a family member. This caregiver reports that her loved one can still provide some level of assistance during self-care and has never become combative or agitated. This woman sometimes verbalizes pain in her hand. But she is more often seen touching and gently rubbing the area that hurts and wincing when she puts too much pressure on it. The therapist discusses with the caregiver the possibility of fabricating an orthosis.

1. In this situation, what orthosis would best meet this woman's needs?
2. What education can the therapist provide to improve patient compliance and the caregiver's ability to assist their loved one?

Section 7: Case Study Review

This section will review the case studies that were previously presented in each section. Responses will guide the clinician through a discussion of potential answers as well as encourage reflection.

1. In this situation, what orthosis would best meet this woman's needs?

For a patient with De Quervain's, a thumb orthosis is the best way to stabilize the thumb joint while allowing freedom of motion at the IP joint. This stability allows the patient to rest the CMC joint of the thumb and the wrist, which is where the pain and inflammation stems from in this condition. By offering this proximal stability, it frees up the IP joint and allows it to move more ably.

2. What education can the therapist provide to improve patient compliance and the caregiver's ability to assist their loved one?

Since this patient is still participating in self-care (with some level of assistance) it is important that the caregiver continues to allow this woman to do as much for herself as she is comfortably able to. This will not only preserve the motion in the thumb, but it will increase her functional improvements, which are measured and monitored as an indicator of progress during the therapy plan of care. Additionally, since this patient has early-stage dementia, the caregiver should monitor the patient's wearing schedule to ensure she is adhering to it as the therapist recommends. The caregiver should also be trained to assist with donning and doffing the orthosis during this time, to ensure it is done correctly and is not causing injury. The therapist should educate the caregiver on warning signs that may indicate the orthosis is not fitting properly or serving the appropriate purpose. Since this patient doesn't always verbalize her pain, the caregiver should watch her body language, reactions, and responses. This will allow her to determine whether or not the patient is in discomfort and, if so, what is causing it. The caregiver should be instructed to do daily skin checks to ensure there are no red marks, signs of skin breakdown, or blisters forming, as this can lead to an infection or other complications.

Section 8: Case Study

An average-sized 8-year-old child with a diagnosis of ADHD and Autism Spectrum Disorder recently sustained a brachial plexus injury while playing outside. His doctor originally chose not to give him an orthosis, since it was only a minor injury. However, this child's recovery has been complicated by his inability to comply with the rest recommendation as part of his home program. The doctor is now referring him to occupational therapy, so he can be fitted for an orthosis. He attends school, but he is currently participating in remote learning.

1. What are some recommendations and training that might be helpful for the therapist to give to this patient and their family?
2. Would this child benefit from a prefabricated or custom-fit orthosis?
3. What type of orthosis is indicated for a child with this type of injury?

Section 9: Case Study Review

This section will review the case studies that were previously presented in each section. Responses will guide the clinician through a discussion of potential answers as well as encourage reflection.

1. What are some recommendations and training that might be helpful for the therapist to give to this patient and their family?

The therapist should discuss ways to improve the child's compliance with the orthosis. Since this child has some learning difficulties, this may make simple instructions ineffective. The therapist should educate the parents on the use of visual reminders to remind him of the wearing schedule. Parents should also assist the child in developing restful leisure activities to occupy his time, since he cannot play sports or do anything very active during the healing process.

2. Would this child benefit from a prefabricated or custom-fit orthosis?

Since this child is of an average stature (height and weight), they would likely be a good candidate for a custom-fit orthosis. This allows the therapist to obtain a mass-produced child-sized orthosis and make small adjustments or additions as needed to improve the comfort and functionality of the orthosis. Since the wearing schedule for a brachial plexus orthosis will likely be full-time (daily) for several weeks, the fit should be even more specific to allow for their comfort. A prefabricated orthosis would not allow these changes to be made for goodness of fit, so this is not the best option for this situation.

3. What type of orthosis is indicated for a child with this type of injury?

The best orthosis for any brachial plexus injury is a flail arm orthosis. This type of device is ideal for stabilizing the arm at the shoulder joint and allowing the nerves and musculature in this sensitive area to heal.

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