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CHAPTER 01: THE HAND

If it weren’t for the hands, imagine how you would have to get through the day?

We use our hands every day. From the smallest of things like pressing the button for your coffee maker to start brewing coffee, to the more multifaceted acts of driving and cooking, you are continuously using your hands throughout the course of the day.

The complex structure of the human hand is not just limited to performing everyday tasks. Hands are a regular medium of portraying gestures and body language. For the speech and hearing impaired, hands form the basics of their communication process (sign language).

Apart from perceiving and conveying information, the functions of the human hand extend as the nucleus of our sense of touch. Human fingers have remarkable sensitivity that allows them to collect palpable information from the surroundings. This is how they help the blind to read.

Did you know that together the number of bones in both your hands sum up to almost one fourth of the total bones in your body? Given the diversity of its functions, it is only fair that the human hand boasts a complex design. There are a total of 27 bones with their
corresponding joints in each hand. Hand movements are controlled by 34 muscles that dominate the forearm and the palm. However, surprisingly enough, the fingers operate without any muscles. The movement in our fingers is regulated by tendons and ligaments. Tendons connect bones and muscles. When the muscle contracts it pulls the tendon and the bone attached to it, causing the required movement.

Ligaments, on the other hand, link one bone to the other. They keep the bones aligned and bind them together. They are present on both sides of the fingers, with the ones on the inner side stretched across the palm. This ensures the fingers do not deviate to the sides or bend too far back.

The motor cortex is the part of the brain that controls body movement; almost one fourth of it is dedicated to controlling the movements of the hands alone.

The Human Thumb Extraordinaire

Have you ever considered the fact that it would be almost impossible to get a grip on something if it weren’t for your thumb?

The human thumb adds greater flexibility to the human hand. It is important to note that humans are not the only living beings blessed with an opposable thumb. Several animals, such as possums and chimpanzees, can also touch their thumbs to their index fingers.

However, humans have the additional ability to oppose their thumb to other fingers of the hand. This allows humans a better, stronger grasp. It’s this ability that allows you to grip and grasp objects. The thumb alone can be attributed to around 40% of total functions of the human hand.
**Interesting Thumb Facts**

- The human thumb has only three bones, as opposed to four in the fingers.
- The thumb is also called the pollix.
- Unlike the fingers, the thumb has the ability to make broad circular movements (*circumduction*).
- Pollicization is the surgical procedure of creating a thumb from a finger. This procedure helps people who lost their thumb in accidents or were born without one, to get a thumb.

**Regular Clinicians Or Certified Therapists**

There are certain hand conditions that can be diagnosed and treated by your regular doctor. However, in most cases, they would recommend you to a specialist. These specialists may include rheumatologists, orthopedists, hand surgeons, and physical therapists.

Orthopedists are the ‘bone doctors’, treating injuries and functional abnormalities in the human bones. They are therefore trained in matters of the hands too. Hand surgeons again are orthopedists who specialize in hand surgeries.

General and plastic surgeons can acquire additional training and perform surgery on the hand. Rheumatologists on the other hand are specialized doctors for arthritis and associated conditions. Both the orthopedists and rheumatologists address surgical and non-surgical hand, wrist, and fore arm conditions.

Generally, before being recommended to the specialists, your doctor may recommend physical therapy, to be performed under the watchful eye of a certified hand therapist. These therapists have specialized training and education in rehabilitation and physical training of the hand. They make use of specific exercises, body movement, and postures, to increase the mobility and strength of your hand.
CHAPTER 02: ARTHRITIS OF THE HAND

Statistics by the Center of Disease Control reveal that an average 52.5 million adults in the US were annually diagnosed with some form of arthritis between 2010 and 2012.

1 Arthritis causes joint inflammation, which has become one of the leading causes of physical disability in America. Arthritis usually brings swelling, stiffness, pain, and at times, loss of function and mobility to the joints.

There are several different kinds of arthritis that currently plague the population. These include osteoarthritis, rheumatoid, lupus, gout, and fibromyalgia.

All joints in the human body are susceptible to contracting arthritis—that means the hands too.

1 http://www.cdc.gov/arthritis/data_statistics/arthritis-related-stats.htm
Osteoarthritis

Osteoarthritis is the most common form of arthritis that affects the joints. It mainly targets the cartilage, a flexible tissue cushioning the ends of the bones.

Ideally, the cartilage is a smooth surface that allows joints to move along with ease. When a particular joint develops osteoarthritis, it makes the cartilage lose its suppleness and thin down. As the thinning cartilage breaks down, the primary bone may form an osteophyte or spur. There may also be a chance of fluid-filled cyst formation near the joint in the bone.

This further leads to the inflammation of the synovial membrane that lines the joints, stimulating the release of active protein that may further destroy the cartilage.

A conservative estimate by the Center of Disease Control in 2005 showed approximately 27 million people from the American population to be suffering from osteoarthritis.² Osteoarthritis commonly strikes the hands, hips, knees, spine, and feet.

It occurs largely with age, with people above the age of 50 being most vulnerable to it.

When it comes to osteoarthritis of the hands, heredity plays a vital role. A medical history of joint injuries and muscle weakness makes a person increasingly susceptible to traumatic arthritis (a type of osteoarthritis).

Repeated hand activities like chopping vegetables or writing may contribute to worsening the condition; however, they do not in any way cause the disease.

² [http://www.cdc.gov/arthritis/basics/osteoarthritis.htm](http://www.cdc.gov/arthritis/basics/osteoarthritis.htm)
The Symptoms

The symptoms for arthritis are simple. One needs to take note of them for they are easily mistaken for joint pain resulting from fatigue or weakness. The most common arthritis symptoms include:

- Stiff joints
- Joint pain in the mornings that slowly ebbs during the day only to return at night
- Pain that subsides when you rest the affected joint

Diagnosing Osteoarthritis

Doctors usually use an elimination procedure when attempting to diagnose a patient with any type of arthritis. In order to rule any other possible diseases out, blood tests are conducted as a first step.

The next step is to ask the patient about their symptoms. These questions will be direct and specific to determine how and where the symptoms fit in your current lifestyle. Your personal medical history and details of your family’s relevant medical background will come in handy at this point.

The doctors would order x-rays of your affected joints. This would be an indication of any signs of cartilage breakdown, or the presence of bone spurs within the joint.

For most people aged over 60 years, the x-rays will reveal active signs of arthritis, however only one third of them would be actually suffering from the symptoms too.

In reality, there is often great divergence between the disability and/or pain felt by a person, and the severity of osteoarthritis visible in the x-ray.

Like we mentioned earlier, osteoarthritis can strike almost any joint in the body. There are however, some joints that are more prone to contracting the disease than others. These include:
The MetaCarpoPhalangeal (MCP) joints

The MetaCarpoPhalangeal joints are joints that connect the fingers to the rest of your hand. These joints are prone to being struck by osteoarthritis. The MCPs are knuckle joints that become hinges between the small bones of the fingers, and the longer bones of the hand. Injuries or diseases, like psoriasis and gout, can increase one’s chances of contracting arthritis in this particular joint. When struck with rheumatoid arthritis, these joints swell up, giving your fingers a spindle-like shape.

The Basal or First CarpoMetaCarpal (CMC) Joint

This joint is situated at the base of your thumb, right where your wrist and your thumb meet. When it comes to the osteoarthritis of the hands, this is the second most common spot to be affected. The joint is formed by the three bones in your thumb and the wrist bones. The specific shape of these bones allows the movement of your thumb in different directions. The chances of contracting osteoarthritis at this spot increase if you have had previous injuries, sprains or fractures in this joint.

The Distal InterPhalangeal (DIP) Joint

This joint is the last one on each finger before the nail. It is one of the most commonly affected spots when it comes to the osteoarthritis of the hands. Sometimes, these joints develop bony, fibrous nodules, known medically as the Heberden’s nodes.

The Proximal InterPhalangeal (PIP) Joint

This is the name given to the middle joint in each finger. This joint too, is susceptible to contracting osteoarthritis, causing the fingers to swell and become stiff. Bony, fibrous nodules called the Bouchard’s nodes may also sprout out in these joints.
Treating Osteoarthritis

Osteoarthritis treatment is a two-fold procedure, directed at alleviating pain and improving the physical functionality of the joints. The most successful approaches are a combination of varying therapies that may include medication, splinting, hot or cold therapy, exercise, joint protection, and in extreme cases, surgery.

Splinting
This is the very first line of action for arthritis treatment of the hand. Splinting immobilizes the joint and allows it to rest. This makes the pain subside. Splints are commonly used to provide support to arthritis-ridden joints at night or during the day.

Joint Protection
When you’re suffering from osteoarthritis, it’s imperative to know the importance of protecting your joints. You need to be able to pick up on the signals your body sends you. Professional therapists can help you identify them. To make sure you don’t cause your joints pain from overexertion, you need to work in rest and frequent breaks into your ordinary schedules. You need to look for ways to make your tasks less stressful in order to alleviate arthritis symptoms. Modern day assistive devices and specialized products can bring a world of difference to your arthritis plagued life.

Heat or Cold Therapy
Your joints will need regular soothing to relieve inflammation and pain. While medicines are widely used to achieve this purpose, one can explore other alternative ways for that too. Heat and cold therapies provide great reprieve for painful joints. Stiffness and pain can be soothed by the heat from a warm shower or bath. At other times, cold therapy may work better—especially after exertion or exercise. For best results, you should consult your doctor on which of the two therapies would suit you better.

Exercise
To overcome osteoarthritis, specific therapeutic exercises are designed. These help patients in a number of ways. For the most part, the exercises work on improving overall mood and physical fitness of the patients, while simultaneously increasing the mobility and flexibility of joints. These therapeutic exercises, particularly the range-of-motion exercises, target the wrist and the thumb, and help keep joints in the best working condition possible.

Once the pain and inflammation in the joints subsides, you should start practicing gentle, pain-free routines aimed at strengthening the joints. It is recommended that you consult a certified hand therapist before starting any routines. They will be able to furnish you with a detailed exercise plan that will help alleviate your pain.
**Medication**

Doctors usually prescribe a combination of oral and topical painkillers for arthritis patients. The combination of medications may vary from patient to patient. While oral medications are considered more effective for patients suffering from extreme pain, topical medication is a better option for those who have active gastrointestinal conditions.

**Topical Medication**

Topical medication is more effective on joints that are close to the surface of the skin, just like the ones in your hands. None, however, will alter the course of the arthritis. Do not use these on broken or irritated skin, or in combination with a heating pad or bandage. There have been thorough studies been conducted on other creams and gels that have proven moderately helpful treatment for mild pain. These include: Capzasin (capsaicin), ArthriCare (counterirritants), and Aspercreme (salicylates).

**Oral Medication**

Generally, oral medications are taken to be more effective for severe arthritis pain. There are two categories of oral drugs available: the NSAIDs (nonsteroidal anti-inflammatory drugs) and the non-NSAIDs. The ones that fall in the NSAIDs category also treat the inflammation in joints that results from arthritis. These include Motrin (ibuprofen), Aleve (naproxen), and Bayer (aspirin). Other non-NSAID drugs include Tylenol (acetaminophen).

If you are suffering from gastrointestinal problems, it is better not to use NSAIDs. In case you do, make sure you follow a proper diet. Take them with food, milk, or any form of antacid, to keep stomach problems to a minimum.

**Alternative or Complementary Therapies**

The scope of alternative therapies for osteoarthritis spread over a large range of treatments and procedures. These may include acupuncture, dietary supplements, and yoga, among others.

**Surgery**

Often the last resort, surgery is only considered when all other methods of treatment fail. To combat osteoarthritis, there are a number of surgical procedures used by doctors. The most widely practiced osteoarthritis surgery procedure is the removal of osteophytes and cysts at the DIP joint. People suffering from extreme osteoarthritis are the most likely candidates for joint replacement and/or joint fusion procedures.


**Busting Myths: Knuckle Cracking and Arthritis**

It has been recently announced that cracking knuckles does not in any way put you at risk of contracting arthritis.\(^3\) The results were based on several studies conducted by monitoring the rate of hand arthritis among people who do not crack their knuckles, and the ones who do it habitually.

When you crack your knuckles, the result is often a ‘pop’ sound. It is caused by the bursting of bubbles in the synovial fluid. As you stretch or bend your fingers backwards, it creates negative pressure on the bones and pulls them apart making the synovial fluid bubbles ‘pop’.

Although knuckle cracking does not increase the risk of arthritis, it is still a good idea to let go off the habit. Chronic knuckle crackers are found to have swollen hands, and poorer grip strength. Also, in rare cases, there is even a chance of suffering an injury from cracking your knuckles.

**The Development of Finger Cysts**

Finger or mucous cysts usually form on the DIP joints, under the skin of your fingers. They are flesh-colored or clear nodules that are found to be most common among women with osteoarthritis, aged 40 years or above.

Usually these cysts don’t cause obvious symptoms. However, there are instances when they become so painful and tender that they may restrict the mobility of the affected finger. Leaving the condition unattended may lead to further damage in the form of deformity and stiffness.

In rare cases, they may go away without medication. At times, they may even unexpectedly drain and cause infection. The infection requires a lengthy antibiotic treatment. If too many stubborn cysts develop, they may require hand surgery, where the surgeon can remove the cyst after opening up the joints, and simultaneously clear away any abnormal bone growth associated with it.

\(^3\) http://www.medicalnewstoday.com/articles/259603.php
**Rheumatoid Arthritis**

Although rheumatoid arthritis is far less common than osteoarthritis, there is still an estimated 1.5 million people in America who suffer from it. When it comes to the arthritis of the hand, rheumatoid arthritis mostly attacks the smaller joints in the wrists and hands. It is a chronic inflammatory condition, characterized by disfigured fingers in its advanced stages.

Besides the hands, rheumatoid arthritis also strikes the feet, shoulders, neck, hips, elbows, ankles, and knees. It usually occurs in a symmetrical pattern, affecting both sides of the body. The joints affected by rheumatoid normally swell up and become stiff, particularly in the morning when you wake up, or during the day after you have rested. It leaves the joints feeling tender and warm.

It is widely believed that rheumatoid arthritis is an autoimmune disease. Autoimmune diseases cause the immune system of the body to malfunction. The wonky immune system then begins attacking the body's own tissues and organs. With rheumatoid arthritis, the immune system gears up against the joint lining (synovium), causing it to discharge enzymes that wreak havoc on the nearby cartilage. Hence, the resultant pain, redness, and swelling.

Ultimately, the affected joints bloat abnormally, causing mobility issues. The fingers may swell up to look like sausages as a result, and a soft, lumpy mass may develop on the back of the hand. There may even be creaking sounds (crepitus) every time the fingers are moved. As the condition worsens, the tendons and ligaments holding your bones together will weaken and stretch, misaligning your bones.

Rheumatoid arthritis causes severe inflammation. This makes the tendons swell and rupture, causing permanent bends in the fingers. One form of this condition is called the boutonnière (French for buttonhole) deformity, in this condition a small tear resembling a buttonhole appears in the tendon. Another type of this condition is called the swan-neck deformity, where the middle (PIP) joint in the finger hyper extends.

The rheumatoid mostly affects the MCP joints. It may make the fingers move away from the thumb. The condition is known as the ulnar drift of ulnar deviation in medical terms. The deformity and its corresponding pain can prove to be quite devastating for the patient. It is a condition that will make the simplest of tasks an excruciating ordeal for the people suffering from this disease. It would difficult to button a shirt, or even hold your cup of morning coffee. Medical evidence shows that it may be a genetic condition. Certain genes can make people contract and pass on rheumatoid to later generations.

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The Symptoms

Unlike osteoarthritis, symptoms for rheumatoid arthritis may vary from person to person. The pain and inflammation remains the most prominent indicator for the disease, however, there are other distinct symptoms that announce the presence of rheumatoid. These include:

- The symmetrical pattern. Rheumatoid will mostly affect similar joints on each side of the body.
- Joints and adjoining areas swell up. The affected joints become stiff, especially after prolonged resting.
- In certain scenarios, patients may also face loss of appetite, continuous fatigue, anemia, low energy levels, and fever.

Diagnosing Rheumatoid Arthritis

Doctors use physical examination and medical history, in addition to lab tests and x-rays to diagnose the presence of rheumatoid arthritis. No sole lab test can be used to determine whether the patient has rheumatoid arthritis. However, conducting a series of relevant blood tests can clarify the diagnosis of the disease.

Doctors look for the rheumatoid factor; around 70% to 80% of rheumatoid arthritis patients have this antibody present in their blood. The other blood test CRP (C-reactive protein) indicates the level of inflammation. X-rays reveal bone erosion, bone loss surrounding the joints, and any soft tissue swelling near the affected joints. Detailed MRI (magnetic resonance imaging) imagery can help with early detection of inflammation and synovitis.
Treating Rheumatoid Arthritis

Just like the treatment for osteoarthritis, doctors prescribe painkillers for rheumatoid arthritis. In rare cases they recommend corticosteroids (a steroid injected to manage swelling and pain). However, years of research reveal that treating rheumatoid arthritis at early stages using powerful drugs called the Diseasemodifying Anti-Rheumatic Drugs (DMARDs) may reduce the possibility of long-term disability in rheumatoid patients.

Resultantly, a majority of rheumatoid patients take a DMARD, most commonly the methotrexate. Another popular option for medication is the group of drugs called BRM (Biological Response Modifiers). These drugs work by slowing down specific components in the immune system.

Surgeries as a treatment procedure for Rheumatoid arthritis have seen a considerable decline. This is mainly due to the widespread use of the powerful DMARDs. The drugs have proved increasingly successful in preventing rheumatoid arthritis from getting worse.

However, for patients who face excruciating symptoms despite their ongoing treatments and therapies, surgery is always an option. Surgical procedures for rheumatoid arthritis strive to lessen pain and enhance physical function. Corrective surgeries may also alter the appearance of your rheumatoid disfigured hands.

Surgeries (synovectomy, tenosynovectomy) are undertaken for soft tissue removal. They involve removal of the diseased tissue around the affected joints and tendons. Surgeons may also, in order to keep fingers from drifting apart, reposition and release certain tendons as a corrective measure.

Undergoing synovectomy brings considerable decrease in swelling and pain. It also slows down the destruction of joints. However, the condition often relapses. Recently there has been an increasing trend of surgeons replacing the wrist joints, and at times the PIP and MCP joints damaged by rheumatoid arthritis altogether.

Treating rheumatoid arthritis of the hand takes a course similar to the treatment of osteoarthritis. It includes the basic splinting, protection of joints, ergonomics, gentle exercise, and pacing. These therapies prove to be the key in rheumatoid treatment as they help manage the disease symptoms and restore function to the affected joints.

However, it is extremely crucial to seek medical help and advice as early as possible. Early detection of the condition can curb it and reduce the chances of permanent deformities.
**Medication**

In order to treat rheumatoid arthritis, these are the medications prescribed to the patients. The same medications proved equally effective for other types of related inflammatory arthritis.

**Disease-Modifying Anti-Rheumatic Drugs (DMARDs)**

These are powerful drugs prescribed for rheumatoid patients for relief in swelling and pain. They also limit the damage to joints and modify the course of this disease. These medications include:

- Plaquenil (hydroxychloroquine)
- Arava (leflunomide)
- Trexall, Rheumatrex, Folex (methotrexate)
- Azulfidine (sulfasalazine)

**Kinase Inhibitor**

This is a special one-of-a-kind medicine that targets the mechanism responsible for inflammation inside cells. It is used to treat moderate to severe conditions of rheumatoid arthritis in patients who are not receptive to methotrexate, or any other type of DMARD. There is just one drug of this type: the Xeljanz (tofacitinib).

**The BRMs - Biological Response Modifiers**

The BRMs, or the biologics as they are often called, are the product of genetically engineered proteins obtained from the human genes. They contain particular immune system components that reduce inflammation and decelerate the advancement of rheumatoid arthritis. These medicines are usually injected into the body or are given by intravenous infusion. There are two major BRM categories:

- The *Anti-TNF compounds* such as Cimzia (certolizumab), Simponi (golimumab) Enbrel (etanercept), Humira (adalimumab), and Remicade (infliximab)
- *Other BRMs* like: Actemra (tocilizumab), Kineret (anakinra), Rituxan (rituximab), and Orencia (abatacept)
Other Types of Arthritis of the Hands

There are several other types of arthritis which aren’t as common as osteoarthritis and rheumatoid, but can lead to symptoms and conditions that debilitating the hand. All these conditions are discussed in detail below.

Gout

According to WebMD, by the end of July 2011, there were around 8.3 million people in the country affected by gout. That came up to 4% of the total population of the United States. The condition is characterized by miniscule needlelike crystals deposited around joints when the human body either excretes less of it or makes more of it than it should. Uric acid is formed when purine (a component of protein-rich foods) breaks down.

The Symptoms

Gout symptoms are similar to those of rheumatoid arthritis:

- Joint pain
- Redness
- Warmth and tenderness around affected joints.

The only difference is that gout does not take a symmetrical pattern when striking joints, and it may trigger anytime rather than occurring after prolonged resting. Gout mostly attacks the joint in the big toe, however, it is also found to be common in joints present in the ankles, hands, and feet. The pain resulting from gout is excruciating, and often lasts for days.

Gout can strike people belonging to all age groups. However, the risk of contracting the disease increases with age. The risk is even higher for people who are overweight and/or drink too much alcohol. Excessive intake of protein, especially sea food and red meat, makes you more prone to the disease.
Diagnosing Gout

Gout diagnosis involves measuring the levels of uric acid in the blood. In addition to the blood tests, doctors also take sample fluids from the joints to determine the presence of uric acid crystals using a special microscope.

However, diagnosing gout isn’t as simple as it seems.

Often, uric acid levels remain low when gout strikes. There are also times when people who have high level of uric acid in their blood do not contract the disease. In other cases, instead of gout, lumpy deposits called tophi develop around people’s joints.

Treating Gout

Doctors usually prescribe NSAIDs—referred above in osteoarthritis treatment, excluding aspirin, to treat gout. Aspirin can raise levels of uric acid in the blood, which is of no help to gout patients. People who are unable to take, or are unresponsive to NSAIDs, are often given corticosteroid by injections or in pills.

On rare occasions, people even take drugs like Probalan, Benemid (probenecid) that increases excretion of uric acid through urine; and Zyloprim (allopurinol), Uloric (febuxostat), and Krystexxa (pegloticase) to monitor the production of uric acid in the body.

Pseudogout

This disease shares similarities with gout. The core difference is the structure of crystals that form around joints. Whereas in gout joints are plagued with uric acid crystals; pseudogout mars them with crystals deposits of calcium pyrophosphate dihydrate. Pseudogout is also commonly known as the Calcium Pyrophosphate Deposition Disease (CPDD). It may affect one or more joints at a time, just like any other form of arthritis. It is most commonly found in knees and wrists.

The body’s immune system attacks the crystals that cause damage to the cartilage surrounding the joint, resulting in swelling. Although the disease is increasing prevalent in people aged 60 and above, it is not necessary that all of them will have the symptoms. However, they may develop abnormalities in the connective tissue or cartilage cells.

Other things that might influence the presence of pseudogout in a person’s system include genetics, and certain medical conditions like hypothyroidism, hypercalcemia, and hemochromatosis.
The Symptoms
The pseudogout symptoms include:

- Shooting pain in the specific joint
- Warmth, swelling, and redness in and around the affected joint

Diagnosing And Treating Pseudogout
To diagnose pseudogout, doctors extract samples of joint fluid and conduct x-rays to determine the deposits of calcium in the affected joint. Once the condition is diagnosed, doctors prescribe NSAIDs and corticosteroids. At times, removal of joint fluid using a needle can bring considerable relief to the patients.

Lupus
Lupus is an autoimmune disease. It is associated with rheumatoid arthritis. The disease may affect different body parts. It is most commonly known to affect the kidneys, blood, skin, and the joints. When lupus strikes the hand, it can simultaneously affect multiple joints in the wrist and the hand.

Also known as the Systemic Lupus Erythematosus (SLE), this disease affects women more than men, and can occur anytime between the ages of 18 and 45. When compared with rheumatoid arthritis, lupus may cause far led joint damage and swelling, but it may carry the same feel, and even affect similar joints. Swan-neck deformities and ulnar deviation can both result from lupus as well.

The Symptoms
The symptoms for lupus include:

- High fever, mostly 100°F or above
- Rashes
- Swollen joints that ache
- Excessive fatigue

Diagnosing and Treating Lupus
Lupus can be challenging to diagnose. Mainly because there is no specific set of symptoms that become prominent in every patient suffering from this disease. The doctors may begin with conducting several blood tests, analyzing urine samples, testing the heart, and getting chest x-rays for an indication of the disease.

Lupus treatment includes painkillers used for osteoarthritis, and certain drugs used in the treatment of rheumatoid arthritis. These may include hydroxychloroquine, antimalaria, and methotrexate.
Scleroderma

Scleroderma is a type of autoimmune rheumatic disease. It mostly affects the fingers and hands. The word Scleroderma was derived from the Greek language, and originally translates to “hard skin.” Scleroderma is a major connective tissue disease too, hence the name.

It affects the skin, bones, and tendons. The disease may occur systematically, where it causes substantial changes to skin, at times getting bad enough to damage the kidneys, heart, and lungs. In other cases where the disease is localized, and it affects limited areas on the skin, bones, and muscles. However, the disease is quite rare, with only a few cases springing up per million people every year.

The Symptoms

When checking for symptoms of scleroderma, doctors look for CREST. A person may have all or some of these symptoms, that are detailed out below.

- **Calcinosis**

  Calcinosis is the condition where calcium deposits form in connective tissues. It is often visible in x-rays, and affects the tissues in the fingertips, trunk, face, and the skin above knees and elbows. Where these deposits infiltrate the skin, they form painful ulcers.

- **Raynaud’s Syndrome**

  This condition occurs when blood vessels in the hands and/or feet contract owing to anxiety or cold.

  - **Raynaud’s Syndrome Or Not?**

    One of the most prominent indicators of Raynaud’s syndrome is your fingers turning numb and ghostly white on being exposed to cold temperatures.

    One might say that this is the normal response a body has to cold – true. But when we talk about the Raynaud’s syndrome, it is an amplification of the normal reaction.

    Raynaud’s usually impacts the feet and hands, and in certain cases it spreads to the lips and nose as well. There are a number of people who are extremely sensitive to cold environs.
However, if their extremities do not change color to blue (scantily oxygenated blood) or white (lack of blood), they do not have Raynaud’s syndrome.

Here’s what you need to know about Raynaud’s syndrome:

In cold temperatures, the human body slows down its loss of heat as it tries to maintain the temperature of its core. The mechanism works with the blood vessels closer to the surface, constricting themselves to redirect the flow of blood deep into the body.

When a person has Raynaud’s syndrome, even a slight increase in the temperature can trigger the mechanism. The Raynaud’s episode begins with the blood vessels carrying blood to the toes and fingers contracting sporadically. This impedes the flow of oxygenated blood to the skin. Sometimes these vessels collapse too, rendering the skin pale or stark white as the tissues affected become cold and numb.

A distinctive feature of Raynaud’s is that the condition is reversible. When temperatures get warmer, the blood vessels relax and the flow of blood resumes just like before. Your skin may appear too red—warn and flushed. However, they may remain a slight tingle in the toes and fingers.

At times, although very rare, people suffering from Raynaud’s syndrome have corresponding health issues. These are usually disorders of the connective tissue, like lupus or scleroderma. Doctors diagnose the condition through physical examination, blood tests, and general questioning about symptoms.

- **Esophageal Dysfunction**

This condition is caused by problems in the esophageal muscles. The esophagus is the tube that links the throat to the stomach. An esophageal dysfunction makes swallowing difficult and sometimes leads to chronic heartburn.

- **Sclerodactyly**

If scleroderma is causing the production of excessive connective tissue within the layers of your skin, you will have tight thick skin on your fingers. The condition is known as sclerodactyly. It makes your fingertips tapered. The skin becomes dark, shiny, and often hairless. It is also difficult to bend or straighten your fingers with this condition.
Telangiectasias

Scleroderma often causes small blood vessels to swell. This may result in tiny red spots on your face and hands. These spots do not hurt, but they aren’t pleasing to the eye either.

Diagnosing Scleroderma

Skin biopsies and blood tests are the two most widely used methods to diagnose scleroderma. However, these tests are not always definitive. Symptoms for scleroderma may vary, appearing and disappearing at random, especially when the case is mild.

Treating Scleroderma

There is no permanent cure for treating scleroderma. Hence, the treatments available only provide relief from the symptoms. Doctors may prescribe:

- Acid-lowering medicines to alleviate heartburn
- Blood pressure drugs that can widen the blood vessels to curb Raynaud’s syndrome.
- Painkillers or NSAIDs to bring down the intensity of muscle pain
- Directed hand therapy for scleroderma, with exercises that stretch the range-of-motion.
- Gentle massages and paraffin treatment to prevent joint contracture and soften the skin respectively.
- Modifying the routine to reduce stress on joints.

Psoriatic Arthritis

This type of arthritis is very uncommon. It branches out from psoriasis. Psoriasis is a persistent skin condition characterized by thick red patches marked with silvery scales emerging on skin. Around one fourth of the people suffering from psoriasis, end up getting psoriatic arthritis too.

Generally, it is the skin condition that is diagnosed first; but it is quite possible that the arthritis actually occurs before any of the psoriasis symptoms become evident. There are still people who do not have any sort of skin laceration at all.

People aged between 20 and 50 years are most prone to psoriatic arthritis, although the condition may strike anytime at any age at all. Contrary to the rheumatoid arthritis, psoriatic arthritis strikes in an asymmetric fashion, and affects only a few select joints, including the ones in our hands.
The Symptoms
The symptoms include:

- Small indentations on the fingernails *(lifting or pitting)*
- Swelling and stiffness of joints
- Joint pain.

Diagnosing and Treating Psoriatic Arthritis
To diagnose psoriatic arthritis, doctors do a detailed assessment of patient’s history for possible psoriasis. This is followed by the physical examination of joints, nails, and skin. X-rays and joint fluid tests are also used for diagnosis.

To treat psoriatic arthritis, doctors make use of the same medicines used for osteoarthritis and rheumatoid arthritis. These include:

- NSAIDs
- Steroids
- DMARDs

Hand therapy also works well for patients of psoriatic arthritis. This treatment is based around:

- Reducing activity
- Joint protection to control swelling
- Working on the range of motion
- Gentle techniques for strengthening and stretching
Alternative treatments for arthritis

It is not necessary that everyone suffering from an arthritis condition finds relief with the standard medication for the disease. When the conventional therapies and treatments do not work for certain patients, they tend to look for alternative treatments to ease the excruciating pain.

The alternative treatments discussed below are only for the purpose of discussion. Before taking any of them up, it is recommended that you consult your doctor for guidance. The complimentary treatments for hand arthritis include:

**Yoga**

Studies reveal that yoga helps arthritis patients deal well with painful symptoms like disability, swollen and stiff joints, and joint pain.\(^5\) For hand arthritis, yoga has proved a successful treatment for improving finger mobility, and alleviating tenderness and pain.

**Acupuncture and Acupressure**

Ancient Chinese therapies have always been popular for their healing power. Acupuncture and acupressure have proven specifically effective in the treatment of painful medical conditions. There have been no reliable studies to confirm that these therapies actually work, however, past analysis has shown people who had acupuncture were in far less pain than people who didn’t.\(^6\)

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\(^5\)[http://www.hopkinsmedicine.org/news/media/releases/yoga_improves_arthritis_symptoms_and_mood_study_finds](http://www.hopkinsmedicine.org/news/media/releases/yoga_improves_arthritis_symptoms_and_mood_study_finds)

Dietary Supplements
There are a number of vitamins, minerals and herbal substances available in the market as possible remedies for arthritis. Since these products are categorized as dietary supplements, their effectiveness is not thoroughly scrutinized by the FDA. The National Center for Alternative and Complementary Medicine released the following list of substances that have been tested for their effectiveness for arthritis, with their possible benefits and side effects.

Cat’s Claw

- These are liquid extracts from woody vine
- May have possible benefits for osteoarthritis and rheumatoid arthritis patients
- Vomiting and nausea qualify as the rare side-effects of this substance.

Evening Primrose Oil

- This oil is a concoction of extracts from primrose flowers and the seeds of evening
- May prove useful for rheumatoid arthritis
- Can cause mild gastrointestinal problems as a possible side effect

Glucosamine and Chondroitin Sulfate
A small study conducted in 2012 showed that glucosamine and chondroitin sulfate can have moderate benefits for the patients suffering from the osteoarthritis of the hand.\(^7\) It relieves pain and improves functionality of the joints. It also proved helpful in decreasing the time span of joint stiffness after prolonged periods of rest.

Omega-3 Fatty Acids

- These fatty acids are found in fish oil
- They help alleviate inflammation caused by rheumatoid arthritis
- Side effects may include bad breath, belching, and possible minor gastrointestinal issues.

CHAPTER 03: ARTIFICIAL JOINTS

Joint replacement has become a common procedure these days. However, when it comes to replacing joints in the hand, the procedure becomes ten times more challenging than with the hips or knees. The human hand is an intricate structure made of many small bones, and even smaller joints.

Thankfully, the advancements in technology have made change of hand joints a feasible option. When we say hand joints, it means all of them – the wrist, the knuckles, and the tiny joints in your fingers. Although surgery remains an option, hand surgeons have seen a considerable decline in people opting for surgeries. This is mainly due to the success of DMARDs and other drugs.
Total Joint Replacement of the Wrist or Fusion

Arthroplasty, or total joint replacement, is a procedure that involves removing the damaged joints or bone and replacing them with prosthetics. Prosthetic joints may be made out of titanium, silicone, polyethylene, or pyrocarbon.

In contrast to the prosthetic designs of the past, today’s designs provide far better stability, longevity, and range of motion to the hand. This makes everyday tasks like eating and writing much less of an ordeal after the joint replacement.

Patients of rheumatoid arthritis are most the likely candidates to opt for total wrist replacements. Around two-thirds of rheumatoid arthritis patients are most likely to develop wrist symptoms, within just two years of diagnosis. People who have suffered trauma or osteoarthritis can also benefit from the wrist replacement procedure. The arthroplasty can be done with both the regional or general block anesthesia, and as an outpatient or inpatient procedure.

First the surgeon has to remove the initial carpal bones’ row to shape the end of the main forearm bone (radius). The bone needs to be shaped in order to fit the prosthesis. Next, the radial component of the prosthesis is inserted into the forearm radius, and the carpal component is inserted into the bone of the hand. The surgeon then fits a plastic spacer between the two.

For people who have severely damaged painful wrists, a joint fusion is a better solution than the total replacement of the wrist. In order to correct deformities and relieve pain, a joint fusion procedure stiffens the joint permanently. This improves both the function and the overall appearance of the hand.

For the joint fusion, the bones are aligned by the surgeon into their natural position. However, these bones are fused together, which makes the joint lose its usual mobility. The first ever wrist fusion procedure was performed back in the 1900s. If anything, wrist fusion brings lasting relief from pain.
**Wrist Replacement: the Procedure**

When undertaking a wrist replacement procedure, the surgeon replaces the debilitated wrist joint with a prosthetic (artificial) joint that has a number of metal components.

Using one long, and a couple of short stems, the carpal component is secured attached to the carpal bones, while the radial component is inserted into the radius bone. The other two components are then fitted into the joint area using a polyethylene spacer.

The spacer is specially designed, rounded on one side and flat on the other. This allows it to rock on the radial component, while staying fixed to the carpal component. The result is the restoration of natural motion to the wrist.

**Thumb surgery for Arthritis**

The basal, or the first CMC joint, it is the most frequently replaced joint in the hand. It is more common in people suffering from osteoarthritis. There are several different techniques used for the surgery, and each has turned out to be particularly effective.

One of the most common approaches is the one involving the removal of the base bone of the thumb – the arthritic trapezium. The arthritic trapezium is removed and replaced with a portion of tendon. This tendon is extracted from the forearm. It is then folded in accordion-style to make a cushion or spacer. An alternate measure is the total joint replacement using a prosthetic joint.

**Other Joints in the Hand**

Apart from the wrist, the MCP joint and the knuckles are prone to being affected by rheumatoid arthritis. This often leads to an ulnar deviation – a disfiguring displacement of fingers away from the thumb. Both the knuckles and the MCP joints are condylar.

Condylar joints are characteristics of bones that are rounded at the joint; it makes them less stable and more challenging to replace than other finger joints. Surgeons have used of spacers made from silicone and/or silastic (a mixture of plastic and silicone) for replacing MCP joints. However, in the long run, they become less effective with time.

The pyrocarbon joint replacements for MCP joints appear far more promising than their silicone counterparts. These are most useful for osteoarthritis patients, and in some cases for ones suffering from rheumatoid arthritis too; but there have not been any long-term studies done to monitor their effectiveness.
**Do You Need a Joint Replacement?**

Joint replacement is an option, and it is likely that your doctor may suggest it. However, to go ahead with it or not is entirely your decision. You may want to weigh the risks and benefits attached to the surgery before you decide.

Age plays a vital role as an influencer to the decision, but it is the level of disability that becomes the main deciding factor. Joint troubles can be extremely painful. For some, they even limit the activities they can undertake. In such cases joint surgery, whether replacement or fusion, can prove highly beneficial to the patients.

Further factors to consider for joint surgery include:

- You have trouble completing ordinary everyday tasks without seeking help.
- You are in considerable pain on a daily basis.
- The pain doesn’t let you sleep, even when you’re on medication.
- Splints, medication and other non-surgical methods do not relieve your pain.
- A less complicated surgery will not help your condition
- Limited joint mobility restricts your activities
- The pain does not go away or subside even after rest.
- The pain relieving medication is having severe side-effects on you

**How to Prepare for a Hand Surgery**

Your preparation for hand surgery needs to be focused around the fact that your recovery period will be challenging. You will have to make do with just one hand for several weeks after the surgery. Also bear, in mind that you cannot risk overusing the other hand – it can strain or get injured. In order to ease the inconveniences as much as you can, take the following steps:

**Get Organized**

- Get a complete overview of your surgery and everything related to it.
- Call your insurance company to determine the extent of your medical coverage for this procedure.
- Compile a folder where you document the surgery – appointments, bills, prescriptions, and doctor recommendations.
- Question your doctor about the estimated time of recovery. Apply for leave from work accordingly.
- Automatic or advance bill payments are a good idea.
**Look for Help**
You’ll need loads of help.

- List down the people from around you, the ones you can approach in case you need a helping hand.
- Draw up a calendar to track availability. You’ll know who to call, and when.
- Update your contacts. Email addresses, phone numbers, and emergency contacts. Keep them handy.
- Have someone who can drive you to and from your surgery, and later the follow-ups.
- Consider hiring help if you can’t find any. There has to be someone to mow the yard, clean the house, and look after the pets.

**Pay Attention to Self-Care**

- Practice your everyday tasks using just one hand. Tasks like undressing and dressing, flossing, bathing, using the toilet, etc.
- Get some handy tools, like an electric toothbrush, pump or flip-top dispensers for toothpaste and shampoo
- A hairbrush in the shower can help you shampoo better with one hand.
- Invest in a terry cloth robe to cut down on the effort of drying yourself after shower.
- Buy a cast protector. You will need it to keep your hand from getting wet.

**Eat Well**

- Make sure your meals are sorted well before you go into surgery.
- Pre-cook meals and freeze them for later.
- Invest in microwavable frozen dinners.
- Think ‘no-cut’ meals. Subs and sandwiches maybe.
- Stock your grocery with non-perishing items.
- List down your preferred delivery and takeout options.

**Simplify the Wardrobe**
You need to ensure your easy-to-wear and manage.

- Keep your clothes loose.
- Avoid zippers; pick something with large buttons instead.
- Slip-on shoes work best.
CHAPTER 04: TROUBLE WITH TENDONS

The tendons in the human limbs are more or less like a marionette’s strings. They allow you to lift your hands, wrists, and move your fingers whichever way you want. At times, these tendons and tendon sheaths become inflamed. The inflammation is painful, and may be caused due to a number of reasons, or no apparent reason at all.

There are certain tendons and sheaths in the human elbows, wrists, and fingers that are more prone to inflammation than others. This gives rise to particular types of tenosynovitis, epicondylitis, and tendinitis.
**De Quervain's Tendinitis**

The De Quervain’s tendinitis (tenosynovitis) is also known as the “new mother’s disease”. As the name suggests, the disease commonly develops in women in their postpartum phase. This may be because of the repetitive movements a new mother makes in the process of caring for her child. The condition affects the tendons along the wrist on the same side as the thumb.

It starts off as pain on the thumb side of the wrist, and may extend all the way up to the forearm. There may be swelling right above the swollen tendon, and a fluid-filled cyst could appear at the same place. As the pain worsens, it may become impossible to hold things or twist the wrist. Occasionally, the thumb may ‘snap’ or ‘catch’ when you try to move it.

**The Symptoms**

Look for the following symptoms on the thumb side of your wrist:

- Excruciating pain when you grasp, pinch, or ball your hand into a fist.
- Tenderness or the formation of a small knot.

**Diagnosing de Quervain’s Tendinitis**

In an attempt to diagnose a patient for de Quervain’s, the doctors will use the Finkelstein test. The maneuver makes you ball your hand into a fist. The fingers need to be placed on top of the thumb, and then one has to bend their wrist in the direction of the little finger.

The test is extremely painful for someone who has de Quervain’s; however it successfully reveals the tenderness if any on the thumb side of the wrist.

**Treating de Quervain’s Tendinitis**

For treating de Quervain’s, the doctor may recommend:

- Wearing a splint to rest the wrist and thumb
- Anti inflammatory medication to alleviate pain and swelling
- Steroid injections to the tendons
- In case none of the above works, surgery is a viable option
- Hand therapy to restore mobility, and strengthen the tendons post surgery
**Trigger Finger**

The condition is known as stenosing tenosynovitis in medical terms. It mostly strikes the thumb or the ring finger. The condition causes a trigger-like snap that briefly catches, and then releases, the finger when a person tries to straighten or bend it.

This condition affects both the tendons and the pulleys. Pulleys are the connective tissue rings that hold tendons near the finger bones. In case the tendon develops a nodule (knot), or if there is swelling in the lining that covers the tendon, the tendon has to squeeze past the opening. This causes pain, or a popping feeling in the thumb or finger.

When the tendon gets locked up, it irritates the pulley, causing it to swell up. The process creates a brutal cycle of unbearable pain. At times, the tendon gets stuck in the pulley. This restricts the movement of the finger. It can either remain straight, or bent.

**The Symptoms**

Since the condition mostly affects the ring finger and the thumb, symptoms include:

- Pain and occasional swelling where the thumb or finger connects with the palm
- A sudden catch and release effect when you straighten or bend the effected finger

**Diagnosing and Treating Trigger Finger**

To diagnose a trigger finger, the doctors usually rely on the physical examination of the fingers and hand. In certain cases, the finger itself may be swollen, or there or there may be a lump at the place where the finger joins the palm. In other cases the finger could be locked and stiff in a bent or straight position, causing pain.

The treatment pattern is similar to treating de Quervain’s. Doctors recommend:

- Splinting for resting the affected tendon
- Anti-inflammatory drugs and steroid injections to reduce swelling and pain
- A quick 10-minute surgery if nothing else works. Full recovery may take three months to a year
**Tennis Elbow**

The condition is known as the lateral epicondylitis in medical terms. It involves degenerative modification of the fibers that connect the forearm muscles to the outer side of the elbow. These muscles allow us to lift the hand and wrist. So, for people who have a tennis elbow, whenever they use their hand, the tendon connected to their elbow hurts. It may begin as a mild pain on the outer elbow; but it will gradually escalate in intensity until it becomes extremely severe, pressing on the outside of the elbow.

**The Symptoms**

Symptoms may include:

- Pain down the forearm on the outer side, starting from the elbow
- The intensity of pain worsening when one straightens the wrist, or attempts to lift a heavy object

**Diagnosing and Treating Tennis Elbow**

Doctors conduct a thorough physical examination of the elbow and forearm to diagnose a tennis elbow. They will usually make you flex your wrist, elbow, and arm to determine the area that hurts. They may also resort to X-rays and MRIs for diagnosis, or to rule out other medical complications.

The treatment for a tennis elbow is primarily focused on relieving the pain. The doctors at this stage recommend:

- Reduced activity and ice packs
- Anti-inflammatory medications
- Splints and/or braces
- Stretching and massage
- Physical therapy that aims at strengthening core, shoulders, and arms for better mobility

Normally, the condition improves within 6 to 18 months. However, if it doesn't, one may need surgery to remove the damaged tissues in the tendon.
**Golfer's Elbow**

This condition occurs because of the development of degenerative tissues on the inner side of your elbow. The medical name for this condition is medial epicondylitis. The condition arises from frequent arm movements that involve turning it down and flexing the wrist – just like in a golf swing – hence the name.

The condition is not just limited to golfers, it can affect anyone who makes routine movements as described above. The most prominent symptoms for this condition include pain and tenderness on the inside of the elbow that worsens when you bend the wrist. The treatment for golfer’s elbow remains the same as that of the tennis elbow, only with greater focus on the inner elbow.

**Dupuytren’s Disease**

This is an uncommon hand condition that causes fingers to gradually curl and contract towards the palm. The condition occurs when the fascia (tissue between the tendons and skin) thickens abnormally. At times people develop a rough cord underneath the skin that stretches from the center of the palm to the fingers. This prevents the fingers from straightening properly.

**Diagnosing Dupuytren’s Disease**

Doctors will diagnose Dupuytren’s disease by physically examining your hands. In extremely rare cases they might ask you to get certain lab tests. They will compare both your hands with each other and look for specifically wrinkled skin on your palm. They make you flatten your hand on a flat surface to see if you can open your palms and straighten your fingers properly.
**Treating Dupuytren’s Disease**

- Over the years, surgery that releases bent fingers has been used as the main treatment for Dupuytren’s disease.
- An alternate procedure, only less invasive, is the percutaneous fasciotomy or needle aponeurotomy. Doctors use needles to sever the bands contracting the fingers and palm.
- FDA recently approved the Xiaflex drug to curb Dupuytren’s disease. However, the drug brings side effects at times.
- Splinting and physical therapy are also beneficial.

**Ganglion Cysts**

When a person develops this condition, small, solid lumps may start appearing on the back of their hand or wrist. The condition is harmless, and grows from inside the joint; it resembles a miniscule balloon on top of a stalk.

The ganglion cysts may be filled with jellylike substance or fluid that can usually be felt beneath the skin. The cyst may grow painful with time and may also keep varying in size. Ganglion cysts may also appear on the inside of the wrist, on the base of the fingers, and sometimes even in between the pulse point and the thumb.

**The Symptoms**

The symptoms include:

- Appearance of a small, hard lump on the hand. It is usually painless. Could vary in size from a peach pit to a pea
- The lumps may keep appearing and disappearing
Diagnosing and Treating Ganglion Cysts

In order to diagnose a patient for Ganglion cysts, the doctors usually rely on physically examining the condition. They would press down on the cyst to see if it’s tender. They may also hold a penlight to it to see if the light passes through.

Treatment would be focused on relieving pain. This is why doctors may prescribe:

- Wearing a splint to limit unnecessary movements
- Once the pain becomes bearable, you may be referred to a physical therapist who may give you exercises to strengthen the wrist.
- Doctors may even resort to aspirating the cyst. The process involves puncturing the cyst with a needle after numbing the area; and drawing out any fluid present in it. However, this is not as effective as other treatments because the cyst almost always recurs
- Surgery is also a viable option
**The Different Types of Splints**

Splints are basically used to immobilize or rest an inflamed or injured body part. It allows them to heal. Splints provide relief from pain and allow proper functioning. They also realign joints to their correct positions.

A splint can only work if it is the right type and is used correctly. There are several types of splints, including:

**A Short Opponens Splint**
- Used to rest the hand
- Immobilizes the thumb
- Relieves osteoarthritis of the thumb

**A Semi-Rigid Splint**
- Used to rest the thumb base
- Eases osteoarthritis
- Allows limited movement of the hand

**A Wrist Immobilizer**
- Used to hold the wrist in a straight position
- Helps the carpal tunnel condition
- Can also help to treat a tennis elbow

**A Soft Functional Splint**
- Provides thumb support
- Allows hand movement for light activities

**A Long Opponens Splint**
- Recommended for de Quervain’s tendinitis
- Immobilizes the wrist and thumb
- Used to rest the hand
CHAPTER 05: EXERCISES FOR THE HAND

Specific exercises treat specific conditions. Therapists usually divide hand exercises into four different categories. Each set of exercises is directed at treating a specific condition. While range-of-motion exercises help patients with osteoarthritis, others are beneficial for tendinitis.

The following is a list of basic exercises recommended for different hand pain conditions.
Range-Of-Motion Exercises

Your joints are moved by the muscles and tendons through arcs of motion. If the normal range-of-motion gets impaired, it may cause you trouble getting through ordinary tasks like cutting vegetables. These exercises are designed to restore your fingers and wrist to their normal ranges of motion.

- Hold position for 5–10 seconds
- Complete a set of 10 repetitions, thrice a day

Wrist Extension and Flexion

- Keep a rolled up towel on the table to support your forearm
- Place the hand handing palm down off the table’s edge
- Slowly move the hand upward till you feel the stretch
- Return to position and repeat with the palm up and elbow bent

Wrist Supination/Pronation

- Bend your elbow at 90° palms down
- Rotate the forearm to make the palm face up and then down

Wrist Ulnar/Radial Deviation

- Keep a rolled up towel on the table to support your forearm
- Place the forearm thumb side up
- Move the hand up and down straight

Thumb Flexion/Extension

- Position your thumb outward
- Move it across the palm and then back to original position

Hand/Finger Tendon Glide

- Extend your fingers straight out
- First make a hook fist, and then return to the initial position
- Then make a full fist. Return and repeat
**Strengthening Exercises**

For strengthening the muscles, combine the first 3 exercises in the range-of-motion category with light weights; usually 1 to 3 (lbs.). Always begin with a gentle program and gradually increase the intensity by increasing the weight—keep it within the recommended range:

- Start with 1 set of 10 reps
- If you don’t feel any pain in the next 24 hours, bring it up to 3 sets of 10

**Stretching Exercises**

Stretching exercises help maximize muscle-tendon length. Shortened muscles become tight and eventually painful. The stretches listed below are specifically useful for tendinitis and pain caused by a tight forearm muscle. Do the stretches only to the extent where you can feel the stretch:

- Repeat each stretch 4 times
- Stretch twice a day
- Hold position for about 15–30 seconds

**Wrist Extensor Stretches**

- Keep your elbow bent
- Grasp the hand on the thumb side with your other hand
- Bend the wrist downward. Stretch it towards the little finger
- Repeat with the arm straight

**Wrist Flexor Stretches**

- Keep your elbow bent
- With the other hand hold the fingers of the affected hand
- Gently pull your hand backward
- Repeat with the arm straight
**Resisted Isometrics**

Isometrics keep the muscle and the joint angle in their original position, while working them against external force that brings resistance.

- One set has 10 repetitions
- Hold each position for at least 10 seconds
- Do it daily, not more than twice

**Isometric Wrist Extension**

- Hold down the affected palm facing down
- Place the other hand on top
- Try and raise your affected hand without allowing it to move

**Isometric Wrist Flexion**

- Repeat the above procedure with palms facing up
CHAPTER 06: CARPAL TUNNEL AND OTHER PINCHED NERVES

The human hand is connected to the spinal cord with three major nerves: the ulnar, the median, and the radial. Each has its own tunnel. These tunnels may narrow down for a myriad of reasons. This puts pressure on the nerves, causing a painful pinched nerve condition.

Carpal tunnel syndrome is the most common type of these conditions. It affects the median nerves, where it passes from the wrist to the thumb, middle, and index fingers. The carpal tunnel is a U-shaped 8 bone cluster located at the base of the palm. The strong carpal ligament bends across the bones like the roof of a tunnel. The median nerve lies inside this tunnel. This nerve is responsible for sensations in the index and middle fingers, and the thumb.

When the carpal tunnel narrows, it causes pressure on the nerve restricting its blood supply, leading to carpal tunnel syndrome.
**Who gets it?**

There are several factors that may contribute to the development of this condition. These include:

- **Heredity:** Experts reveal that almost half of the carpal tunnel cases are attributed to the genes.
- **Tunnel size:** People with a smaller carpal tunnel are more prone to this condition.
- **Diseases:** Autoimmune diseases like connective tissue disorders, and rheumatoid arthritis; and metabolic diseases like thyroid and diabetes are found to be linked with the development of carpal tunnel syndrome.
- **Bone Fracture or Dislocation:** Past injuries can cause bone protrusion into the carpal tunnel making it narrow.
- **Hormones:** About one fifth of pregnant women contract the carpal tunnel condition in their last trimester, probably because of the fluid retention by hormones. Surgical menopause also increases the risk.
- **Occupation:** Occupations that involve the use of power tools in repetitive motion have been known to increase the possibility of carpal tunnel syndrome.
- **Wrist Position:** Continuously keeping the wrist bent, especially when reading, driving, or sleeping may lead to the development of this condition.
- **Body weight:** Obese people increase their chances of contracting the condition, nearly by a double.

**The Symptoms**

Carpal tunnel syndrome may cause:

- Weakness, pain, and numbness in the middle and index fingers, and the thumb
- It may become difficult to form a fist or grip small objects

**Diagnosing Carpal Tunnel Syndrome**

The doctors will usually:

- Ask for prevailing symptoms
- Physically examine the wrist, hand, shoulders, arms, and neck
- Conduct routine lab tests: x-rays and blood tests
- Test for sensation in fingers
- Additional tests: the modified Phalen and the NCV (nerve conduction velocity)
Treating Carpal Tunnel Syndrome
If there are any underlying health conditions that you have, they need to be treated first. The carpal tunnel treatment then follows with:

Self-Help
This involves:

- resting the hand, for at least two weeks
- Avoiding activities that can worsen the condition
- Wearing a wrist immobilizer

Medications

- Doctors prescribe NSAIDs or the celecoxib (Celebrex), COX-2 medication. However, there is no evidence that these medications are effective for carpal tunnel
- Sometimes, rarely, doctors even prescribe corticosteroid pills. However, these shouldn’t be continued for more than a week or two. People with diabetes shouldn’t take corticosteroid pills at all

Hand Therapy
The hand therapy to treat carpal tunnel syndrome is designed to relieve pressure from the median nerve. The therapist may:

- Prescribe splinting
- Adapt tools that reduce vibrations
- Hand exercises

Surgery
A majority of patients recover from the condition with the above listed treatments alone. Only a third of them require surgery. One may need a surgery if they have:

- Chronic numbness
- Trouble in grasping or gripping things for more than 6 months.

The surgery is aimed at creating more room in the tunnel. They release the carpal ligament, and that lifts pressure from the median nerve. There are 3 basic surgical procedures:

- The Open: the procedure involves a 2-inch long incision in the wrist and hand
- The Endoscopic: this consists of one or two small incisions (up to half an inch) in the palm and wrist
- The Small Palmer Incision: the surgeons operate through a small 1 inch incision in the palm
Other Alternative Treatments

Just like arthritis, there is a set of alternative treatments that have proved effective in relieving the carpal tunnel syndrome for some people. These include:

- Yoga
- Acupuncture
- Vitamin B₆

Repetitive Strain Injury

There are particular work-related medical conditions that affect the neck and the body’s upper extremities. These are known as the repetitive strain injuries. These conditions are more common in industries that have repetitive-motion tasks. Repetitive strain injuries result from excessive contracting of the wrist and forearm muscles.

It is important to note, the carpal tunnel syndrome is not a repetitive strain injury.

Treating Repetitive Strain Injury

The treatment mainly involves relieving the tension in wrists, hands, and forearms.

- Switching to an ergonomic work style helps people with too much computer work.
- Other treatments include:
  - Therapies, both hot and cold
  - Massages
  - Exercises

Cubital Tunnel Syndrome

The muscles in the hand and forearm are connected to the spinal cord by the ulnar nerve. This nerve goes from behind the medial epicondyle or the ‘funny bone’. When something hits this spot (the inside of your elbow) it traumatizes the nerve, and triggers a short-lived tingling sensation that radiates all the way down to the little and ring fingers.

Bending the elbow more than 90° stretches and pushes the ulnar nerve into the bony canal. The condition can be caused by tasks that repeatedly flex and extend the elbow, or leaning or resting on the elbow for long durations. Sometimes accidental injuries also cause this condition.
Symptoms of cubital tunnel syndrome

These include:

- Clumsy or weakened hand
- Sudden sharp pain shooting from a touch on the inner elbow
- Tingling, numbness, and/or pain in the little and ring finger

Diagnosing and Treating cubital tunnel syndrome

Diagnosis will include:

- Physical examination of the hand and elbow
- A detailed questioning of your daily and work habits
- x-rays, NCV test, and electromyography

Treating the condition involves:

- Self help through lifestyle changes
- Hand therapy with soft splint and elbow pads
- Medication
- Surgery if nothing else works

Writer’s Cramp and Musician’s Cramp - Hand Dystonias

Dystonia is a neurological condition. It results from sudden, spontaneous muscle contractions. The writer’s cramp is a type of hand dystonia. It’s a rare condition develops due to unusually tight grips on the pen, and abnormal positioning of the wrist, hand, and elbow. It is often mistaken for a repetitive strain injury.

The writer’s or musician’s cramp is an intermittent contraction of the muscles in the forearm and hand. It may cause the fingers to freeze unexpectedly, making the person unable to write or play an instrument. This affliction is assumed to be the product of the basal ganglia - the part of the brain responsible for controlling body movements.

It is believed that the underlying cause of dystonia is the imbalance in the neurotransmitter dopamine. The condition is often treated using drugs that are used for Parkinson’s treatment. These include benztropine (Cogentin) and trihexyphenidyl (Artane).
Coping with Computer-Related Hand Problems

If you spend most of your time in an office on a workstation, it would be highly beneficial to have it ergonomically evaluated. It can help you avoid the risk of getting musculoskeletal disorders. If that doesn’t seem possible, try out the following tips:

- Keep the wrists in their natural position — straight — not flexed or extended
- Make it a habit to get up and stretch every once in a while, preferably every hour, and take breaks from typing
- Avoid using laptops. Desktops are better for strain prevention
- Do not use medication or splints to be able to type more; it may only worsen the condition
- Consult a hand therapist for stretching exercises and techniques

To self implement in ergonomics into your work style, make the following changes to your workstation:

- Keep everything: documents, mouse, keyboard, and supplies in simple horizontal reach. Not more than 18 inches away.
- Use adjustable keyboard trays for better posture
- Keep the mouse and keyboard close with your elbows by your side
- Use voice-activated computer programs

Use adjustable chairs. Look for one with good upper and lower back support. Position it to a level where your knees are slightly lower than your core, and your feet are firm on the ground.
Chapter 7: TRAUMATIC INJURIES

You use your hands all the time. This makes them highly vulnerable to injuries. Whether you have an accident or get hurt while playing sports, hands are usually the first to get affected. Sprains, fractures, and tendon injuries are increasingly common in athletes, children, and even adults.
**Wrist sprains**

Sprains occur when a ligament gets torn completely or partially. It can result from a fall or a sudden twist. A sprain can turn out to be extremely painful, and take a long time to heal. Symptoms of a wrist sprain may include:

- Tenderness
- Swelling
- Bruises
- Discoloration and pain

Treatment may require immobilization of the wrist using a splint, and may take weeks to completely recover.

**Finger Injuries**

Tearing ligaments in the fingers, dislocation of bones, or fractures, can all affect the fingers too. It is recommended to immediately see a doctor when you suspect a finger injury. The symptoms may include:

- Pain
- Swelling
- Redness
- Numbness and immobility

Finger bones are small and may require a long time to heal. Several weeks in case of a ligament tear and around 6 months in the case of fractures.

**Tendon Injuries**

**The Flexor Tendons**

- Connect the muscles in the forearm and wrist to the fingertips
- Controls finger movements
- Cuts and tears in the tendon can cause numbness
- This damage requires immediate medical attention in order to fully repair

**The Extensor Tendons**

- Allow straightening of thumb and fingers
- Are susceptible to injuries because they are located at the back of the hand right beneath the skin
- Injured tendons can cause swelling, pain, and tenderness
Fractures

A fracture is the result of a forceful impact that breaks the bone. When you fall down, your natural instincts make you thrust your hands out to break the fall. The phenomenon is referred to as FOOSH (fall on outstretched hand) in medical terminology. At times, you hit the ground way too forcefully for the bones in your hand take the brunt of the blow. There are several different types of hand fractures, these include:

The Colles’ Fracture

- Fractures the radius – the forearm bone
- Causes swelling and pain above the wrist
- May require repositioning and immobilization using a cast or splint
- May take 6 to 9 months to heal

The Smith’s Fracture

- Displaces the bone on the outside of the wrist
- May require surgery to realign

Finger Fractures

- Rare but can occur due to trauma broken
- Causes swelling, pain, and difficulty in finger movement
- May cause bone displacement or finger deformity

Preventing Falls

Here’s how you can prevent yourself from falling:

- Take the following measures to make your home safer:
  - Get rid of things you could trip over from places with more traffic
  - Use non-skid mats, or tape the ones you have to prevent them from slipping
  - Keep frequently used items within easy reach
  - Install lights and handrails on all staircases
  - Install grab bars in bathrooms
  - Use bright lights throughout the house
  - Wear shoes that have good grip in their soles
  - Walk carefully in snow, and use shoes with extra traction.
- Exercise regularly for strong core and balance.
- Have your medications reviewed by the doctor every once in a while. With time, drugs may change the way they affect you.
- Get your eye sight checked regularly
Accidental Finger Amputations

Accidental finger amputations occur mostly in small children, or adults that use power tools frequently. Most of the amputations in children result from their fingers getting jammed in car or home doors. For adults it is more to do with carelessness, a moment of distraction, or the complete failure to follow safety measures.

In case you ever run into circumstances where you cut your finger, here’s what you need to do:

- Keep the injury elevated and apply ice to the affected area to reduce swelling and bleeding.
- Cover the wound with a sterile, dry dressing.
- Use a short splint to immobilize the affected wrist and hand.

If the finger gets completely cut off, do the following:

- Secure the severed finger in watertight bag and keep it on ice.
- Rush to the emergency room with it. Depending on the condition and extent of injury, a surgeon may reattach it to the hand.

Hand Transplantation

The first ever successful hand transplant was performed by a team of French surgeons in 1998. The hand transplantation procedure involves transferring a hand from a human donor (deceased) to the person who lost their hand.

Unlike the kidney or heart transplant, a hand transplant does not save lives. However, for those who have been living without hands, it is a life altering surgery. The procedure is highly complicated. It consists of a transfer of nerves, tendons, bones, blood vessels, muscles, and skin. This is the main reason why hand transplantation can take up to 16 hours – double the time it takes to transplant a heart.

People who receive a hand transplant need to take immune system suppressant drugs for the rest of their lives. This way their bodies would not reject the tissue that has been transplanted. There have been significant improvements in these suppressants that have made hand transplants far less risky than before.

Mandatory requirements for a hand transplant include a match of:

- Blood type
- Size
However, more often than not, doctors also consider age, gender, skin tone, and race. For a person to be eligible for a hand transplant they need to adhere to the following requirements:

- Aged between 18 and 60 years
- Should have a minimum gap of 6 months and maximum 15 years between the amputation and the transplant
- Should be physically and emotionally prepared for the transplant. There are extensive tests conducted to ensure this

Post surgery patients often need to undergo a mandatory two year period of intensive physical and occupational therapy.
CHAPTER 08: USEFUL GADGETS AND ADVICE

With your hand hurting all the time, even the simplest everyday tasks become an ordeal. However, the problem can be overcome by making simple changes to lifestyle and using assistive devices to help you get through. Here’s a list of devices, and advice to cope with everyday life and hand pain together.
The Kitchen

- Mini chopper
- Cheese slicer
- Nonskid gripper mats for traction needed to open jars and keep bowls and other things from slipping.
- Electric can opener
- Padded handled utensils
- Spring-loaded or loop scissors
- Bottle brush for easy washing of cups and glasses
- A cookbook stand

If you are suffering from severe disability, like that caused by rheumatoid arthritis, you will need the following:

- Lightweight pots, pans, and utensils
- A rocker knife
- Use a strap to pull open the refrigerator door with less effort
- Buy jar openers and faucet turners

Useful Advice

- Frequently used items should be stored between waist and shoulder level.
- Keep a steady foot stool handy to reach items at higher positions.
- A rolling cart can help move items around the kitchen.
- Avoid gripping utensils tightly.
- Cook food in large quantities and freeze the extra portions.
- One-pot meals will reduce the strain on your hands.

The Bathroom

- An electric toothbrush and razor
- Pump dispensers for toothpaste and soap
- Dental floss holder
- Raised toilet seat
- Grab bars for shower and bathtubs
- Mitts or soap-on-a-rope to hold soap during shower

Useful Advice

- The items you frequently use need to be placed within easy reach.
**The Bedroom**

**Useful Advice**

- Switch to loose clothes and slip-on shoes
- Add clothing with large buttons, zipper pulls, and Velcro fastenings to the wardrobe. Lay out the clothes a night in advance to better deal with morning stiffness
- Buy front-fastening bra, or pick pullover style. You could also fasten the bra in front before turning it around
- Buy a long-handled shoehorn
- Bag choices should include lightweight purses, cross body bags/briefcases, bags with over the shoulder straps, or wide strapped backpacks
- For jewelry, replace normal clasps with magnetic ones

**Home and Car**

- Light switch adapters
- Opt for items with padded handles
- Key turners
- Lightweight vacuum cleaner
- Doorknob turners
- Angled shovels
- Automatic dialing options for phone
- Gel pens, pencils, and roller-ball pens with padding on the grips
- Card holders for holding playing cards
- Car door openers
- Steering wheel padding for resistance
- Snow removal brush with extended-handle

**Useful Advice**

- Use open palms to push down when you stand from a sitting position
- Keep your joints relaxed in a neutral position
- Use headsets rather than holding the phone for prolonged durations
- Adjust your chair to the correct height for your keyboard
- Always give preference to push over pull, and slide over lift, when dealing with heavy items
- Distribute light and heavy chores evenly throughout the week
**The Grocery Store**

Useful advice:

- Packaged, precut fruits and vegetables require less effort
- Get paper bags. Have each filled with limited items. Carry them close to the chest with your forearms

**The Yard**

- Shop for gardening tools that are lightweight and have contoured handles
- Use the right tool for each task
- Make sure the tools are sharp for increased efficiency
- Pick tools with short padded handles for better grip and less strain
- Wear gloves. They will protect your hands against blisters and nerve damaging tremors of power tools.
- Ratcheted tools do not require much effort to use
- Look for tools with an ergonomic design for better posture
- Invest in tool organizers for better reach
- Use wheelbarrows for heavy loads
- Coiled hoses are easier to use and store

**Useful Advice**

- It is important to maintain a good posture. No stooping. Straight neck. Slightly bent elbows. Wrists held in their neutral position
- Keep the load light
- Hold objects closer to your body. This allows the larger joints to support major load
- Try and work below the shoulder level. Where possible, use both hands and arms
- If the job is repetitive, take breaks frequently and rotate tasks where you can
- Keep your overhead activities limited to 30 minutes at a stretch. Stop immediately if you feel numbness.
- Don’t overwork yourself in a single day
CONCLUSION

After reading this book, you should know everything there is to know about hand pain – from identifying it to effectively dealing with it. Here’s a quick recap of what you learned through this book:

- The detailed anatomy of the human hand, including the characteristics that make the human thumb quite extraordinary.
- How regular clinicians and certified hand therapists can help you deal with your hand problems.
- The symptoms, diagnosis, and treatment for different types of arthritis that affect the hand:
  - Osteoarthritis
  - Rheumatoid arthritis
  - Gout
  - Pseudogout
  - Lupus
  - Scleroderma
  - Psoriatic arthritis
• The alternative treatments available for hand arthritis and their respective effectiveness
• The 2 basic surgical procedures of joint replacement: total joint replacement and joint fusion. Also the differences between the two.
• An insight into how artificial joints work, and when is it a good idea to get your hand joints replaced.
• The steps you need to take to prepare yourself for a hand surgery.
• The different tendon conditions that cause hand pain, their symptoms, diagnosis, and treatments. These include:
  o De Quervain’s tendinitis
  o Trigger finger
  o Tennis elbow
  o Golfer’s elbow
  o Dupuytren’s disease
  o Ganglion cysts
• The different type of splints and their particular uses
• Different exercises that help you deal with different hand pains
• Varpal tunnel syndrome, it’s symptoms, diagnosis, treatment, and other related medical conditions.
• A detailed insight into traumatic hand injuries and how to deal with them
• The basic advice and useful tools you need in everyday life to help you mitigate the risk of hand pain

Dealing with hand pain may not always be the simplest of tasks. After all, there is severe pain involved, and treatments take effect gradually. However, conquering hand pain isn’t entirely impossible, especially if you:

• Follow your doctor’s advice religiously
• Be regular with your exercises
• Take the necessary precautions, and make use of handy tools to minimize stress
• Most of all, make sure you do not self prescribe medications. If you wish to try alternative treatments, consult your doctor first.