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Kinesio taping for tennis elbow

Click to subscribe to our newsletter Learning how to wrap a tennis elbow or use KT tape can help support your joint and reduce pain. Image Credit: dragana991/iStock/GettyImages Tennis elbow, or lateral epicondylitis, is a type of tendonitis that affects the tendons that join the outside of the elbow with the muscles of the forearm. It typically develops in response to overuse of the elbow and may cause significant pain, according to the American Academy of Orthopaedic Surgeons. Soreness and tenderness in the outer or top part of the elbow are the most common symptoms. The injury, as the name implies, is associated with tennis and other racket sports, though it can also result from sudden violent injury or other repetitive tasks and sports like golfing. Fortunately, the condition is usually temporary and easy to relieve at home through wrapping and taping. Bracing your elbow joint can help reduce stress and discomfort, according to the Mayo Clinic. Using wraps is one way to do that. These help stabilize the joint. They also compress inflamed tissues to minimize swelling, which is why they are sometimes called compression wraps. When wrapping, use an elastic, non-adhesive wrap. Try the ACE 3" Elastic Bandage with Hook Closure pack (Amazon.com, $13.99 for 2). Follow these steps to wrap your tennis elbow: Hold the loose end of the rolled wrap against your arm close to your elbow. Wrap the bandage twice around your arm so that the bandage overlaps itself. This will keep the loose end secured against your arm when the wrap is finished. Roll the wrap a few times over your elbow and to the other side of the joint. Keep the pressure fairly firm to counteract the swelling that will result from the injury. Secure the end of the wrap with tape or metal clips. (Some packages include these.) Kinesio or KT tape can help relieve pain, aid in grip strength and improve functionality in people with tennis elbow, according to a March 2020 International Journal of Surgery review. Kinesio tape is an elastic one-sided tape that, when stretched between points of your elbow, provide support for the joint. They may also act as a cue for your muscles to further stabilize the joint. Try KT Tape Original Cotton Elastic Kinesiology Therapeutic Athletic Tape 10" Strips (Amazon.com, $10.53 for 20). Here's how to use KT tape for tennis elbow: Bend your arm at a 90-degree angle and feel the outside of your elbow with your fingertips to locate the lateral epicondyle bone. It feels like a rounded projection or small ball at the end of your humerus bone, next to your elbow, and points outward when your arm is folded and placed against your torso. Bend the affected elbow slightly while your arm hangs at the side of your body, and apply KT tape around the elbow about 2 cm below the lateral epicondyle. Apply the tape parallel to your wrist. Apply the tape to the outer side of the elbow firmly and to the inner portion of the elbow gently. Taping too tightly inside your elbow can interfere with circulation. Remove the tape and readjust if your symptoms do not improve or if you experience a worsening of pain. This may indicate the tape is on incorrectly. Remove the tape slowly by pressing down on the skin nearest the tape mark and gently pulling the tape away from the skin. Replace the tape every 24 hours, or more often if it becomes wet or damaged. If the taping doesn't help ease the symptoms of tennis elbow or the pain persists, talk to your doctor. Is this an emergency? If you are experiencing serious medical symptoms, please see the National Library of Medicine’s list of signs you need emergency medical attention or call 911. Study record managers: refer to the Data Element Definitions if submitting registration or results information. March 13, 2020 Patty Weasler, RN Using kinesio tape for tennis elbow is an excellent treatment option for lateral epicondylitis, or tennis elbow, which involves using kinesiology tape to reduce symptoms. Taping your elbow allows you to perform activities that would normally be painful by minimizing pain and changing how you move your arm. Keep reading to learn more about how kinesio tape works, benefits of taping, and a few helpful tips to get you back to work or playing your favorite racquet sports. How Kinesiology Taping Works Kinesio taping doesn’t work the same way as traditional athletic tape which typically creates a restrictive brace-like structure around your joint. It works to reduce elbow pain in three very different ways. Here is an explanation of how each way works to provide pain relief. Changes How You Feel Pain Kinesiology tape causes a slight stretch on the skin and underlying tissues and provides constant pressure when it is applied to the affected area. This stretch and pressure can change how pain is processed by the brain or interrupt pain transmission. Decreases Elbow Pressure Another way that kinesio tape manages the symptoms of tennis elbow is by reducing the load on the elbow during muscle contraction of the wrist extensors. The taping technique is done in such a way that they hinder muscle activity and minimize irritation of the connective tissue between the tendon and bone. Improves Self Awareness When you use kinesiology tape it actually causes you to become more aware of your body placement and movement. Kinesio tape on the arm and elbow will remind you to move more ergonomically and avoid strenuous activities. This type of improved self-awareness is also referred to as proprioception. Benefits of Taping When you are deciding exactly how you want to manage tennis elbow it’s important to know all of the benefits of the treatment. Kinesiology tape can build your awareness of how your body moves, support your injury, and provide pain relief. But there’s even more than just that, here is a list of all the benefits of taping. Kinesiology tape is inexpensive and easy to find It’s a medication-free treatment that doesn’t require a prescription Decreases pain and boosts circulation Prevents reinjury through support and increase of proprioception Supports the elbow joint and surrounding tissues Kinesio Taping Tips When used correctly kinesio tape is a great way to manage the symptoms of tennis elbow. The tape won’t restrict your range of motion and it’ll help you recover faster. Here are a few tips to ensure you get the best use out of your KT tape. Clean your skin before applying the tape Never apply to wet skin Make sure all areas of the tape are directly on the skin and not on your clothes Activate the adhesive with body heat by warming the tape before you apply it Cut the corners of the tape to be rounded to prevent it from lifting off the skin Don’t stretch the ends of the tape over the skin, this helps with tape adherence Taping Techniques When you’re getting ready to apply kinesiology tape it’s important to have all the supplies you need ready to go. So before you start, grab your kinesiology tape and scissors. Some kinds of kinesiology tape does come pre-cut. Clean your arms and elbow to remove any dirt and oils. This will ensure the tape adheres to the skin. These taping techniques can reduce pain and soreness caused by tennis elbow. They are intended to support your arm while you heal. Forearm Method Cut a piece of kinesiology tape the length of the tips of your fingers to just past your elbow. At the tape end of the tape bend one inch and cut two openings for your middle and ring fingers. With your palm facing downward and flexed down place the tape on the back of your hand and put your fingers through the cutout holes. Remove the adhesive back and press the one-inch piece onto your palm. Remove the rest of the adhesive backing and with about a 10% stretch place the tape over the extensor muscles along the lower arm and up to the lateral epicondyle, the outside of the elbow. Cut a second piece of kinesiology tape approximately six inches long and on one end make a cut ¾ of the length of the tape to create two separate strips. Place the first two inches of the end of the second piece of tape on the back of the elbow. With one of the strips pull it 75% tight and wrap it around the forearm. Repeat the same technique with the second strip. Upper Arm Method Start with a pre-cut piece of kinesiology tape about 10 inches long. Straighten out your affected arm with your palm facing downward and hand flexed down. Remove the backing on a small section of the end of the tape and place it on the back of your forearm, halfway up your arm. Remove the adhesive backing on the rest of the tape and with about 60% to 70% stretch and place the tape down over the upper arm. Kinesiology Tape vs Athletic Tape Kinesiology and athletic tape are two options with different results for pain and discomfort caused by tennis elbow. Athletic tape has been used by athletic trainers and physical therapists for years. The tape is much stiffer than kinesiology tape and restricts your range of motion. Athletic tape performs more like a brace, helping you reduce your movement and supporting your joint. Kinesiology tape works differently than athletic tape by providing light support and slightly lifting the skin allowing better blood flow and lymphatic circulation. It is more flexible than athletic tape and does not restrict your range of motion. Physiotherapists and other healthcare professionals have found the many benefits to kinesio taping for tennis elbow. When to Avoid Taping Taping for tennis elbow isn’t always the right answer. The tape can cause more issues than it solves for certain people. You should avoid taping if you fall into one of these categories. Bone fractures, taping should be avoided unless approved by a doctor Allergy to kinesiology tape Open sores or cuts on the area that needs to be taped If the tape causes pain, numbness, swelling, or redness If you suffer from circulation or sensation issues Precaution when Taping Tennis elbow taping is a great treatment option that can be done at home or during a physical therapy session. When combined with other tennis elbow treatments taping can speed up healing time and reduce pain. If you are unsure if kinesiology taping is right for you talk to your doctor to clear up any questions and make sure you are on the right path to a pain-free elbow. Sources: SHOP TENNIS ELBOW PRODUCTS Cart subtotal $ 50.00 away from free shipping!
{"themeColor":"#574CD5","iconColor":"#574CD5","showLogo":true,"topBottomPosition":10,"rightLeftPosition":10,"iconSize":"small","iconCustomSize":64,"position":"middle-right"} A booming first serve is met with a laser-like backhand return. A rocket of a volley followed by an audible grunt of force sends the ball into the back left corner. Game. Set. Match. Since its adaption from an older game in 1873, modern tennis has dramatically grown to become one of the most prominent sports in the world, consistently ranked in the top 5 most popular sports worldwide. It’s estimated that tens of millions play the racquet sport in the United States alone, with players ranging from young children all the way to senior citizens. Unfortunately, research has found that 40-50% of the tennis playing population develop pain within their elbows at some point during their career. “The mechanics of the tennis stroke require a tremendous amount of force to be transmitted through the elbow,” explains hand, wrist, and elbow surgeon Ian Smithson, MD. “The fundamental overhead nature of tennis mechanics and technique often places high levels of stress upon the elbow joint.” With such a high incidence rate in tennis players, the condition was naturally called tennis elbow. However, tennis players are not the only individuals who are subject to this condition. Forearm muscles and tendons are connected to the upper arm at two bony points of the elbow called epicondyles. Tennis elbow, otherwise known as lateral epicondylitis, is a form of tendonitis that affects the outer anchor point of the elbow. Over time, symptoms develop due to repetitive body motions that lead to an overuse of the elbow joint. While pain appears in the elbow joint, the root cause is often due to strain put on the muscles in the forearm from wrist and hand extension. Motions that involve a pronated or palm down wrist can exert enough stress and force on the muscles and tendons to tear the fibrous tissue. Hold your right arm straight out with your palm facing the ground and point your middle finger in the same direction. Trying to keep your arm and finger perfectly straight in this position, push down on your middle finger using your left hand. Where do you feel tension? Your right elbow. Symptoms may include pain that radiates from the elbow into the forearm and wrist when trying to Open a doorHold a coffee cupMake a fist Numerous activities can lead to the development of tennis elbow, but they all involve overuse and over-stressing the tendons of the elbow past their tolerance point. Tennis players with a poor technique and lack of conditioning may try to “flick” or “reach” for the ball using the more vulnerable wrist and elbow. Yet, as stated before, this issue is often caused by activities outside of the tennis court. “Any activity that results in an increased force generated by the forearm muscle can result in potential for microscopic damage to the tendons of the elbow,” states Wayne Chen, MD, a hand, wrist, and elbow surgeon. Symptoms may develop from activities and professions such as CarpentryCarrying a briefcaseGardeningLifting heavy grocery or garbage bagsPaintingPlumbersUsing power tools Blood flow in the elbow area is poor, so the body’s repair mechanisms have a difficult time making a difference on their own. Paul McDermott, MD, a hand, wrist, and elbow surgery specialist, states, “Non-surgical treatment is aimed at promoting blood flow to the area, breaking up scar tissue and inflammation so that the body’s repair mechanisms can work as efficiently as possible.” As soon as the injury occurs, known as the acute phase, several conservative treatments are viable to relieve symptoms. Rest, ice, compression, and elevation or the RICE protocol.Stretches of the forearm muscles.Over-the-counter anti-inflammatory medication.Ultrasound or electrical assisted topical steroid application with the aid of a hand or physical therapist.Wearing a wrist brace to limit wrist extension.If more ordinary pain medications are not enough, your doctor may recommend corticosteroid injections. For pain that persists for 6-12 months and is not relieved from the above treatments, your doctor may recommend the following treatments. Platelet-rich-plasma therapy: your own blood is centrifuged to concentrate platelets and growth factors and then injected into the site of the injury to promote healing.Surgery may be performed to remove damaged non-healing tissues. When hitting a tennis ball, the entire kinetic chain of your body should be used. The power of the swing is created from the legs, hips, spine, shoulders, through to the elbow and wrist.If there is a weak link anywhere in this chain, then other areas of the body will have more than their fair share of force to deal with.Keep your entire body in shape by regularly training legs, core, arms, and shoulders. Identifying and correcting poor technique in the swing is crucial to prevent symptoms from appearing.Instead of “reaching” for the ball by flicking the elbow and wrist, a player should lead with the shoulder and rotate their torso to deliver power and drive the ball into the desired direction.Make sure your racquet is the correct size. A racquet that is too large or heavy increases your risk for injury.After play, ice the elbow even if there is no pain present. Develop and consistently perform a warm up routine to ease into your training sessions and matches.Stretch the entire body, but especially focus on the forearm muscles of both arms.Start with gentle practice swings and progress into gently hitting a few balls. Off the court, it is important to avoid activities that involve straining the forearm muscles and tendons.Take regular breaks from painting and gardening.Use both arms to carry an especially heavy grocery or garbage bag.Use an over the shoulder briefcase instead of carrying one with a handle. FacebookPinterestLinkedInXReddit Tennis elbow (also known as Lateral Epicondylitis) is quite an annoying condition to have. And while it isn’t the most devastating condition in the world, it can certainly be painful and can absolutely interfere with all sorts of activities you wish to partake in. Thankfully, there are some straightforward things you can do to help treat it on your own, with one of those things being applying Kineso Tape (also called K-tape) over the painful area. While there are plenty of different ways (and beliefs behind how) to tape your elbow if you have Tennis elbow, this post will cover a straightforward K-taping method that you should be able to apply yourself. I will guide you through a step-by-step process to give you the most confidence possible in your application in order to help give you some relief to this stubborn condition. Keep in mind that there are dozens of ways to tape for Tennis elbow, and it can largely depend on all sorts of individual factors along with the taping doctrine that one subscribes to. Taping is really half science and half art. If you’d prefer to watch the step-by-step walkthrough, you can do so by viewing my YouTube video! This way I’m showing you in this blog post is nice and simple (but still quite effective) since this post is all about doing this yourself.Also, if you need to do this for the other side of your elbow (a condition known as Golfer’s elbow, or medial epicondylitis), be sure to check out my blog post: GOLFER’S ELBOW: HERE’S A GREAT WAY TO TAPE YOUR ELBOW ALL BY YOURSELF, where I’ll walk you through a very similar process. Disclaimer: While I am a physical therapist, I am not YOUR physical therapist. As a result, I cannot tell you whether or not any treatments mentioned on this website may or may not be appropriate for you, including taping your elbow. By following any information within this post, you are doing so at your own risk. You are advised to seek appropriate medical advice for any pain you may be experiencing. Click/tap on any of the bulleted headlines to instantly jump to that particular section of this article.Evidence for Kinesio tape helping with tennis elbowPrecautions & considerations for using Kinesio tapeStep by step procedure for taping your Tennis elbowBonus: A little-known secret for ensuring that your tape stays on longer!Concluding remarks Related article: How to Voodoo Floss Your Own Elbow — Pro Tips For Better Results Evidence for Kinesio tape helping with tennis elbow It’s always nice to have some evidence behind an application, and while I won’t go into lengthy detail here, I believe that it’s quickly worth mentioning that there have been some studies done that have shown kinesio taping to be effective for decreasing pain, recovering grip strength and improving functional abilities. If you want to read up on these studies, just click on the respective links below to be taken to the PDF journal articles. Precautions & considerations for using Kinesio tape One of the best things about using any type of Kinesio tape is that it is incredibly low risk while potentially offering incredibly high reward for the many people who use it. That being said, there’s a few quick things to keep in mind and look out for: If you have any known allergies to adhesives, you may want to avoid using tape until you have found a tape that you know won’t irritate your skin. Once you’ve applied the tape, if at any point in time you feel that the tape is making your skin itchy or red/irritated, simply remove the tape – no point in keeping it on if it’s just being more of a nuisance than an assistance; you can still rehab this condition just fine without any tape. Lastly, tape always sticks better when it has a greater amount of skin to stick to. So if you’re a male with some pretty hairy arms, you may want to buzz down the length of the hair over the area you’re needing to tape. No need to shave down to the skin (unless you want to), but the shorter the hair, the better the tape will stick. Sorry, men. Also, try your best to avoid wrinkles when you do this taping procedure. Small ones aren’t a big deal, but big ones certainly won’t help anything. Step by step procedure for taping your elbow Step 1: The first thing to do is to locate the area(s) that are sore. You can mark them on your skin if you’d like so that you know where you need to lay the tape down, but you certainly don’t have to (I’ve done so here just for the sake of helping you better visualize the process). You’re going to want to apply tape over the epicentre of the pain, so knowing where you want the tape to land is important. Notice the red marker dot I placed on my elbow. This is typically the region of greatest pain for people with tennis elbow. You want to know where the greatest area of pain/sensitivity is so that you can make sure that the tape runs right over this spot. Step 2: The next step is to determine the length of tape strips that you need. An unstretched length of approximately eight inches should work just fine. You want this strip to be long enough to stick on appropriately without peeling off when you bend and straighten your elbow. For this taping technique, we will be using two pieces of tape of this length. Don’t worry about which brand of tape is best – they’re largely all the same. In this blog post I used a brand known as T-Max tape. Rocktape, however, is always my preferred brand. If you’re looking to pick up some tape, I’d go for this particular roll (link takes you to Amazon). Great quality tape at a very fair price. Purchases made through this link help me earn a small commission at no extra cost to you, which help to cover the expenses I incur for running this website. Two pieces of tape each about eight inches in length should do the trick! Step 3: Use some scissors to round off the corners of the tape. Rounding off the corners just ensures that the tape won’t peel up off the skin as easily. With the corners all rounded off, the tape won’t have any corners that can easily peel up off of the skin. Step 4: Peel off one end of the tape and place it about half-way down on the back of your forearm. When you place the end down on the skin, make sure you place it at an angle that will allow the tape to travel over the sore spot as you begin to lay the strip down. Lay the first inch of tape down at an angle that will allow the tape to cross over the sorest spot on your elbow in a straight line. Step 5: To the best extent possible (only do so within a pain-free range of motion), straighten your elbow, rotate your arm inwards and pull your palm towards your wrist and hold it there as you begin to lay the tape down (next step). We want to apply the tape with the skin as stretched as much as comfortably possible. Hold the arm in this position as you perform step six. Refer to the position of the arm in step 4 for the position you want to keep your arm in (as comfortably as possible) when applying the tape. Step 6: Lay the end of tape down on the back of your forearm at an angle that will allow it to cover the sore spot on your elbow. The first inch of tape being applied to your skin should have NO STRETCH (may irritate the skin if the end is on stretch as the tape is placed down). Pull the tape up your arm with about 50% stretch on the tape. As you place it down, continue to pull off the paper backing. With about one inch of tape left, lay this end down on the skin without any stretch. Bring the tape upwards across the sore spot while applying about 50% stretch to the tape. Step 7: Repeat this same process with the second strip of tape, but starting at a slightly different angle. The goal is to create an X pattern with the two strips of tape intersecting right at the highest point of pain in your elbow. This point of intersection should theoretically provide maximal skin lift over the painful, irritated area, which should help with maximizing fluid exchange/flow within the area. Same process as before, but now with the second strip of tape. Make sure that the center of the “X” where the tape crosses is right over the sorest spot on your elbow/arm. Step 8: With the tape applied, quickly rub your hand firmly up and down the tape for ten seconds or so, as a means to help heat up the adhesive a bit more, in order to ensure that it’s really sticking to your skin and that you haven’t missed any spots where the tape could be pressed onto the skin more. With the tape now firmly anchored down, you’ll notice that your skin (and the tape) gets a bit wrinkled when you bend your elbow. That’s what we want! This wrinkling of the skin helps to just lift some of the tissue layers within the skin and below just enough to give a bit better fluid movement and flow for fluids within the sore area. Bonus: A little-known secret for ensuring that your tape stays on longer K-tape usually stays on for a few days rather well without any problems, but if you want some re-enforcement, here’s a little trick that you can use:If you purchase a special type of hypoallergenic stretch tape, known as Cover Roll (also sometimes called Hypafix), you can cut off a few small squares, round their corners and then stick half of the square on the end of the tape and the other half onto your skin. Cover roll sticks to skin quite nicely and is hypoallergenic. From left to right: Box of Cover Roll/Hypafix, what the tape looks like, cutting the tape into small tabs (be sure to round off the corners). Place each one of the tabs on the tape so that half of the tab is on the tape while the other half is on the skin. Do this for all four tape ends. This isn’t a necessary step, but if you think you will need some re-enforcement, will be sweating a lot with the tape on, etc., then this is quite a nice little bit of added re-enforcement that takes only a few extra seconds to do! The finished product on yours truly! Tennis elbow is a stubborn condition, so seeking a qualified healthcare professional who can provide specific treatment is a wise move to make in addition to having some tape over the area. That being said, having a bit of tape on the skin for tennis elbow tends to feel quite nice. In addition to the sensation of tape on your skin giving your brain something else to think about (i.e. the tape decreases nociception to the brain from the painful area), the theory is that the tape will help to enhance fluid dynamics around the area a bit more. You can shower with the tape on (just pat it dry with the towel when you dry off) and it should stay on for a handful of days, but remove it at any point should you feel the need or desire to do so. Keep making sure that any activities you do are pain-free. Having tape on your skin is not a license to be careless and ignore pain, and you’ll only set yourself back further if you keep repeatedly irritating the area. So, be smart, be safe and use the tape to help foster the recovery process to this stubborn (yet treatable) and common condition. Hi! I’m Jim Wittstrom, PT, DPT, CSCS, Pn1. I am a physical therapist who is passionate about all things pertaining to strength & conditioning, human movement, injury prevention and rehabilitation. I created StrengthResurgence.com in order to help others become stronger and healthier. I also love helping aspiring students and therapists fulfill their dreams of becoming successful in school and within their clinical PT practice. Thanks for checking out my site! FacebookPinterestLinkedInXReddit Branch of surgery concerned with the musculoskeletal system Medical intervention OrthopedicA fracture of the lower cervical vertebrae, one of the conditions treated by orthopedic surgeons and neurosurgeonsMeSHD019637[edit on Wikidata] Orthopedic surgeonOccupationNames Physician Surgeon Occupation typeSpecialtyActivity sectorsMedicine, SurgeryDescriptionEducation required Bachelor of Medicine, Bachelor of Surgery (M.B.B.S.) Bachelor of Medicine, Bachelor of Surgery (MBChB) Doctor of Medicine (M.D.) Doctor of Osteopathic medicine (D.O.) Fields ofemploymentHospitals, Clinics Orthopedic surgery or orthopedics (alternative spelling orthopaedics) is the branch of surgery concerned with conditions involving the musculoskeletal system.[1] Orthopedic surgeons use both surgical and nonsurgical means to treat musculoskeletal trauma, spine diseases, sports injuries, degenerative diseases, infections, tumors and congenital disorders. Further information: International scientific vocabulary and List of Greek morphemes used in English Nicholas Andry coined the word in French as orthopédie, derived from the Ancient Greek words ὀρθός orthos ("correct", "straight") and παιδίον paidion ("child"), and published Orthopedie (translated as Orthopædia: Or the Art of Correcting and Preventing Deformities in Children[2]) in 1741. The word was assimilated into English as orthopædics; the ligature æ was common in that era for ae in Greek- and Latin-based words. As the name implies, the discipline was initially developed with attention to children, but the correction of spinal and bone deformities in all stages of life eventually became the cornerstone of orthopedic practice.[citation needed] As with many words derived with the "æ" ligature, simplification to either "ae" or just "e" is common, especially in North America. In the US, the majority of college, university, and residency programmes, and even the American Academy of Orthopaedic Surgeons, still use the spelling with the digraph æ, though hospitals usually use the shortened form. Elsewhere, usage is not uniform; in Canada, both spellings are acceptable; "orthopaedics" is the normal spelling in the UK in line with other fields which retain "ae".[citation needed] Many developments in orthopedic surgery have resulted from experiences during wartime.[3] On the battlefields of the Middle Ages, the injured were treated with bandages soaked in horses' blood, which dried to form a stiff, if unsanitary, splint.[citation needed] Originally, the term orthopedics meant the correcting of musculoskeletal deformities in children.[4] Nicolas Andry, a professor of medicine at the University of Paris, coined the term in the first textbook written on the subject in 1741. He advocated the use of exercise, manipulation, and splinting to treat deformities in children. His book was directed towards parents, and while some topics would be familiar to orthopedists today, it also included 'excessive sweating of the palms' and freckles.[5] Jean-André Venel established the first orthopedic institute in 1780, which was the first hospital dedicated to the treatment of children's skeletal deformities. He developed the club-foot shoe for children born with foot deformities and various methods to treat curvature of the spine.[citation needed] Advances made in surgical technique during the 18th century, such as John Hunter's research on tendon healing and Percival Pott's work on spinal deformity steadily increased the range of new methods available for effective treatment. Robert Chessher, a pioneering British orthopedist, invented the double-inclined plane, used to treat lower-body bone fractures, in 1790.[6] Antonius Mathijsen, a Dutch military surgeon, invented the plaster of Paris cast in 1851. Until the 1890s, though, orthopedics was still a study limited to the correction of deformity in children. One of the first surgical procedures developed was percutaneous tenotomy. This involved cutting a tendon, originally the Achilles tendon, to help treat deformities alongside bracing and exercises. In the late 1800s and first decades of the 1900s, significant controversy arose about whether orthopedics should include surgical procedures at all.[citation needed] Hugh Owen Thomas, a pioneer of modern orthopedic surgeryExamples of people who aided the development of modern orthopedic surgery were Hugh Owen Thomas, a surgeon from Wales, and his nephew, Robert Jones.[7] Thomas became interested in orthopedics and bone-setting at a young age, and after establishing his own practice, went on to expand the field into the general treatment of fracture and other musculoskeletal problems. He advocated enforced rest as the best remedy for fractures and tuberculosis, and created the so-called "Thomas splint" to stabilize a fractured femur and prevent infection. He is also responsible for numerous other medical innovations that all carry his name: Thomas's collar to treat tuberculosis of the cervical spine, Thomas's maneuvere, an orthopedic investigation for fracture of the hip joint, the Thomas test, a method of detecting hip deformity by having the patient lying flat in bed, and Thomas's wrench for reducing fractures, as well as a so-called "osteoclast" implement to break and reset bones.[citation needed] Thomas's work was not fully appreciated in his own lifetime. Only during the First World War did his techniques come to be used for injured soldiers on the battlefield. His nephew, Sir Robert Jones, had already made great advances in orthopedics in his position as surgeon-superintendent for the construction of the Manchester Ship Canal in 1888. He was responsible for the injured among the 20,000 workers, and he organized the first comprehensive accident service in the world, dividing the 36-mile site into three sections, and establishing a hospital and a string of first-aid posts in each section. He had the medical personnel trained in fracture management.[8] He personally managed 3,000 cases and performed 300 operations in his own hospital. This position enabled him to learn new techniques and improve the standard of fracture management. Physicians from around the world came to Jones' clinic to learn his techniques. Along with Alfred Tubby, Jones founded the British Orthopedic Society in 1894. During the First World War, Jones served as a Territorial Army surgeon. He observed that treatment of fractures both, at the front and in hospitals at home, was inadequate, and his efforts led to the introduction of military orthopedic hospitals. He was appointed Inspector of Military Orthopedics, with responsibility for 30,000 beds. The hospital in Ducane Road, Hammersmith, became the model for both British and American military orthopedic hospitals. His advocacy of the use of Thomas splint for the initial treatment of femoral fractures reduced mortality of open fractures of the femur from 87% to less than 8% in the period from 1916 to 1918.[9] The use of intramedullary rods to treat fractures of the femur and tibia was pioneered by Gerhard Küntscher of Germany. This made a noticeable difference to the speed of recovery of injured German soldiers during World War II and led to more widespread adoption of intramedullary fixation of fractures in the rest of the world. Traction was the standard method of treating thigh bone fractures until the late 1970s, though, when the Harborview Medical Center group in Seattle popularized intramedullary fixation without opening up the fracture. X-ray of a hip replacement The modern total hip replacement was pioneered by Sir John Charnley, expert in tribology at Wrightington Hospital, in England in the 1960s.[10] He found that joint surfaces could be replaced by implants cemented to the bone. His design consisted of a stainless steel, one-piece femoral stem and head, and a polyethylene acetabular component, both of which were fixed to the bone using PMMA (acrylic) bone cement. For over two decades, the Charnley low-friction arthroplasty and its derivative designs were the most-used systems in the world. This formed the basis for all modern hip implants. The Exeter hip replacement system (with a slightly different stem geometry) was developed at the same time. Since Charnley, improvements have been continuous in the design and technique of joint replacement (arthroplasty) with many contributors, including W. H. Harris, the son of R. I. Harris, whose team at Harvard pioneered uncemented arthroplasty techniques with the bone bonding directly to the implant. Knee replacements, using similar technology, were started by McIntosh in rheumatoid arthritis patients and later by Gunston and Marmor for osteoarthritis in the 1970s, developed by John Insall in New York using a fixed bearing system, and by Frederick Buechel and Michael Pappas using a mobile bearing system.[11] External fixation of fractures was refined by American surgeons during the Vietnam War, but a major contribution was made by Gavril Abramovich Ilizarov in the USSR. He was sent, without much orthopedic training, to look after injured Russian soldiers in Siberia in the 1950s. With no equipment, he was confronted with crippling conditions of unhealed, infected, and misaligned fractures. With the help of the local bicycle shop, he devised ring external fixators tensioned like the spokes of a bicycle. With this equipment, he achieved healing, realignment, and lengthening to a degree unheard of elsewhere. His Ilizarov apparatus is still used today as one of the distraction osteogenesis methods.[12] Modern orthopedic surgery and musculoskeletal research have sought to make surgery less invasive and to make implanted components better and more durable. On the other hand, since the emergence of the opioid epidemic, orthopedic surgeons have been identified as one of the highest prescribers of opioid medications.[13][14] Decreasing prescription of opioids while still providing adequate pain control is a development in orthopedic surgery.[14][15][16] This image, taken in September 2006, shows extensive repair work to the right acetabulum six years after it was carried out (2000). The onset of arthritis, a bone/joint disease, has made further joint damage visible. The examples and perspective in this section deal primarily with the United States and do not represent a worldwide view of the subject. You may improve this section, discuss the issue on the talk page, or create a new section, as appropriate. (December 2011) (Learn how and when to remove this message) In the United States, orthopedic surgeons have typically completed four years of undergraduate education and four years of medical school and earned either a Doctor of Medicine (MD) or Doctor of Osteopathic Medicine (DO) degree. Subsequently, these medical school graduates undergo residency training in orthopedic surgery. The five-year residency is a categorical orthopedic surgery training. Selection for residency training in orthopedic surgery is very competitive. Roughly 700 physicians complete orthopedic residency training per year in the United States. About 10% of current orthopedic surgery residents are women; about 20% are members of minority groups. Around 20,400 actively practicing orthopedic surgeons and residents are in the United States.[17] According to the latest Occupational Outlook Handbook (2011–2012) published by the United States Department of Labor, 3–4% of all practicing physicians are orthopedic surgeons. Many orthopedic surgeons elect to do further training, or fellowships, after completing their residency training. Fellowship training in an orthopedic sub-specialty is typically one year in duration (sometimes two) and sometimes has a research component involved with the clinical and operative training. Examples of orthopedic subspecialty training in the United States are: Foot and ankle surgery Hand and upper extremities Hip and knee surgery Orthopedic oncologist Orthopedic trauma Osseointegration Pediatric orthopedics Shoulder and elbow Spine surgery Surgical sports medicine Total joint reconstruction (arthroplasty) These specialized areas of medicine are not exclusive to orthopedic surgery. For example, hand surgery is practiced by some plastic surgeons, and spine surgery is practiced by most neurosurgeons. Additionally, foot and ankle surgery is also practiced by doctors of podiatric medicine (DPM) in the United States. Some family practice physicians practice sports medicine, but their scope of practice is nonoperative. After completion of specialty residency or registrar training, an orthopedic surgeon is then eligible for board certification by the American Board of Medical Specialties or the American Osteopathic Association Bureau of Osteopathic Specialists. Certification by the American Board of Orthopedic Surgery or the American Osteopathic Board of Orthopedic Surgery means that the orthopedic surgeon has met the specified educational, evaluation, and examination requirements of the board.[18][19] The process requires successful completion of a standardized written examination followed by an oral examination focused on the surgeon's clinical and surgical performance over a 6-month period. In Canada, the certifying organization is the Royal College of Physicians and Surgeons of Canada; in Australia and New Zealand, it is the Royal Australasian College of Surgeons. In the United States, specialists in hand surgery and orthopedic sports medicine may obtain a certificate of added qualifications in addition to their board primary certification by successfully completing a separate standardized examination. No additional certification process exists for the other subspecialties. Radiography to identify eventual bone fractures after a knee injury Orthopedic implants to repair fractures to the radius and ulna. Note the visible break in the ulna. (right forearm) Anterior and lateral view x-rays of fractured left leg with internal fixation after surgery According to applications for board certification from 1999 to 2003, the top 25 most common procedures (in order) performed by orthopedic surgeons are:[20] Knee arthroscopy and meniscectomy Shoulder arthroscopy and decompression Carpal tunnel release Knee arthroscopy and chondroplasty Removal of support implant Knee arthroscopy and anterior cruciate ligament reconstruction Knee replacement Repair of femoral neck fracture Repair of trochanteric fracture Debridement of skin/muscle/bone/fracture Knee arthroscopy repair of both menisci Hip replacement Shoulder arthroscopy/distal clavicle excision Repair of rotator cuff tendon Repair fracture of radius/ulna Laminectomy Repair of ankle fracture (bimalleolar type) Shoulder arthroscopy and debridement Lumbar spinal fusion Repair fracture of the distal part of radius Low back intervertebral disc surgery Incise finger tendon sheath Repair of ankle fracture (fibula) Repair of femoral shaft fracture Repair of trochanteric fracture A typical schedule for a practicing orthopedic surgeon involves 50–55 hours of work per week divided among clinic, surgery, various administrative duties, and possibly teaching and/or research if in an academic setting. According to the American Association of Medical Colleges in 2021, the average work week of an orthopedic surgeon was 57 hours.[21][22] This is a very low estimation however, as research derived from a 2013 survey of orthopedic surgeons who self identified as "highly successful" due to their prominent positions in the field indicated average work weeks of 70 hours or more.[23][21] Main article: Arthroscopy The use of arthroscopic techniques has been particularly important for injured patients. Arthroscopy was pioneered in the early 1950s by Masaki Watanabe of Japan to perform minimally invasive cartilage surgery and reconstructions of torn ligaments. Arthroscopy allows patients to recover from the surgery in a matter of days, rather than the weeks to months required by conventional, "open" surgery; it is a very popular technique. Knee arthroscopy is one of the most common operations performed by orthopedic surgeons today, and is often combined with meniscectomy or chondroplasty. The majority of upper-extremity outpatient orthopedic procedures are now performed arthroscopically.[24] Main article: Arthroplasty Arthroplasty is an orthopedic surgery where the articular surface of a musculoskeletal joint is replaced, remodeled, or realigned by osteotomy or some other procedure.[25] It is an elective procedure that is done to relieve pain and restore function to the joint after damage by arthritis (rheumasurgery) or some other type of trauma.[25] As well as the standard total knee replacement surgery, the unicompartmental knee replacement, in which only one weight-bearing surface of an arthritic knee is replaced, may be performed,[25] but it bears a significant risk of revision surgery.[26] Joint replacements are used for other joints, most commonly the hip[27] or shoulder.[28] A post-surgical concern with joint replacements is wear of the bearing surfaces of components.[29] This can lead to damage to the surrounding bone and contribute to eventual failure of the implant.[29] The plastic chosen is usually ultra-high-molecular-weight polyethylene, which can also be altered in ways that may improve wear characteristics.[29] The risk of revision surgery has also been shown to be associated with surgeon volume.[28][30] Between 2001 and 2016, the prevalence of musculoskeletal procedures drastically increased in the U.S., from 17.9% to 24.2% of all operating-room (OR) procedures performed during hospital stays.[31] In a study of hospitalizations in the United States in 2012, spine and joint procedures were common among all age groups except infants. Spinal fusion was one of the five most common OR procedures performed in every age group except infants younger than 1 year and adults 85 years and older. Laminectomy was common among adults aged 18–84 years. Knee arthroplasty and hip replacement were in the top five OR procedures for adults aged 45 years and older.[32] Medicine portal Bone grafting Index of trauma and orthopaedics articles List of orthopedic implants Orthopaedic physician's assistant Orthotics Outline of trauma and orthopedics [33] ^ "Orthopedic Surgeons: Seven Things You Need to Know". Penn Musculoskeletal and Rheumatology Blog. Philadelphia, PA: The Trustees of the University of Pennsylvania. 4 December 2019. Retrieved 2022-02-26. ^ Andry de Bois-Regard N (2 November 1980). "Orthopædia, or, The art of correcting and preventing deformities in children". Classics of Medicine Library – via Google Books. ^ Smith DC (September 2015). "Extremity Injury and War: A Historical Reflection". 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