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Fig. The negative effects vaping has on the body

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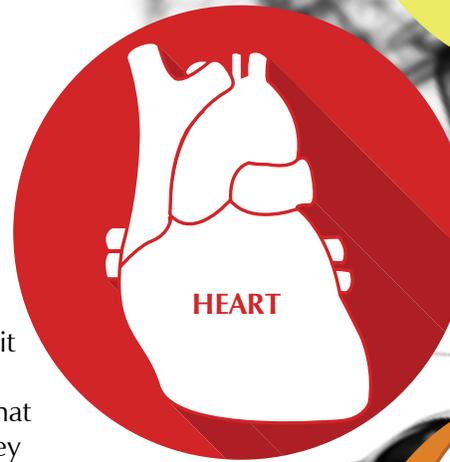
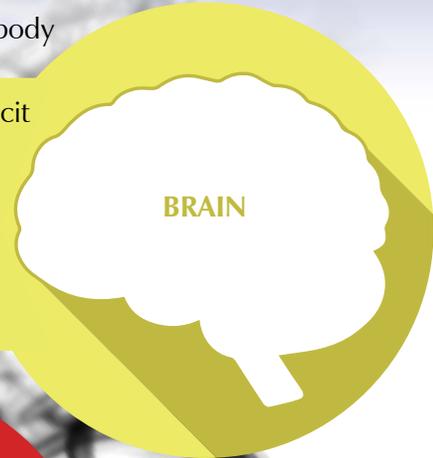
The Verdict on Vaping

Electronic cigarettes have been marketed as “healthier” alternatives to traditional cigarettes and as a good way to quit smoking. Only recently have people begun to look into the science behind these devices and ask the right questions. What exactly are electronic cigarettes? How do they work? Are they safer than tobacco cigarettes? Can they help me quit smoking? Unfortunately, the answers research is providing to some of these questions, especially when it comes to teens and young adults, are not what most people hope to hear.

The e-cigarette

Electronic cigarettes were invented in 2003 by Hon Lik, a Chinese pharmacist who was trying to quit smoking, and as of 2015, most were still made in China. Also known as electronic nicotine delivery systems (ENDS) and personal vaporizers, electronic or e-cigarettes are handheld, electrical devices designed to deliver nicotine to users in the form of vapor instead of smoke. They come in a variety of shapes, sizes, and styles, including cigars, pipes, and cigarette or pen look-a-likes. Most e-cigarettes have 3 main components. First, is the power source, which is usually a battery. Next, is the heating device, called an atomizer or vaporizer, which turns the liquid into an aerosol or vapor. Lastly is a cartridge or tank which holds the e-liquid and has a mouthpiece on one end. Sometimes the atomizer and cartridge are combined into a single unit called a cartomizer. As the user breathes into the mouthpiece, the heating device activates, and he or she then inhales or “vapes.”

Pre-frontal cortex development deficit
 Impaired judgement
 Cognitive dysfunction
 Attention deficits
 Psychiatric and mood disorders
 Reduced impulse control
 Cancer



Heart attack
 Stroke

Bronchiolitis obliterans
 Permanent airway scarring
 Severe respiratory disease
 Lung cancer
 Second-hand emissions
 Emphysema



Stomach pain
 Nausea
 Acid reflux
 Cancer

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The e-liquid

The liquid in an e-cigarette cartridge contains 4 main ingredients: nicotine, flavoring, propylene glycol, and glycerin. While the amount of nicotine in e-cigarettes varies greatly, a low level generally corresponds to 6 to 12 mg of nicotine, a medium level to 18 mg, a high to 24 mg, and very high to 36 mg. E-cigarettes taste like conventional cigarettes, but also come in a variety of flavorings from menthol to mocha dream. Currently, there are as many as 7,700 flavors on the market.² Sweet flavors appeal particularly to young people.

Until August of 2016, the US Food and Drug Administration (FDA) did not regulate e-cigarettes, so there were no requirements for ingredient disclosure, warning labels, or youth access restriction. Partly as a consequence of FDA involvement, scientific research into the components of e-cigarette liquid as well as the health effects of e-cigarette use and exposure has increased. The findings reveal that the e-liquid usually contains not only nicotine, a highly addictive substance, but also benzene (which is found in car exhaust) and heavy metals, such as nickel, tin, and lead. Even an ingredient used in anti-freeze, diethylene glycol, has been identified in the e-liquid.³ Moreover, 75% of flavorings contain a chemical called diacetyl, which, when inhaled, has been linked to bronchiolitis obliterans, or permanent scarring of the airways in the lungs, and severe respiratory disease (**Fig**).¹⁻³

The e-vapor

The real danger of vaping, however, may derive from the process that turns the liquid into a vapor. At a temperature of about 100 to 250°C (212 to 482°F), the chemical compounds inside the fluid break down and are converted into other chemicals. Scientists have examined the resulting mix and found both formaldehyde (a carcinogen or cancer-causing substance) and formaldehyde-releasing agents.¹ Therefore, although traditional cigarettes contain over 4,000 chemicals—including 43 known cancer-causing compounds and 400 other toxins like arsenic, acetone (the active ingredient of nail polish remover), carbon monoxide, ammonia, and methanol (found in rocket fuel)—the risk of developing cancer from electronic cigarettes may be 15 times higher than from tobacco cigarettes, according to a report by Agence France-Presse. Moreover, like smoking, vaping can expose others to dangerous second-hand emissions (**Fig**).

Can e-cigarettes help me quit smoking?

It has been well established that cigarette smoking is harmful to nearly every system of the body and can cause a host of serious illnesses from emphysema and lung cancer to heart attack and stroke (**Fig**). Smoking is also a notoriously difficult habit to break: approximately 80% of would-be quitters will relapse within the first month. E-cigarettes have not only been promoted as safer than traditional cigarettes, but also as a means for smokers to quit. As there has been no evidence until recently that the devices can help traditional cigarette

smokers stop smoking or even cut back, the FDA has been trying to evaluate and regulate this claim. E-cigarettes that contain nicotine levels lower than the 1 mg of nicotine in tobacco cigarettes have been marketed with the idea that vaping small amounts of nicotine might help smokers quit. However, as consumers typically refill e-cigarette cartridges, they may offset any benefit from the reduced nicotine, exposing themselves to greater quantities than recommended.¹ On the other hand, in 2014, the first Cochrane review—an independent, non-profit collaboration of researchers from more than 130 countries who work to produce credible and accessible health information without commercial sponsorship and other conflicts of interests—reported that, based on 2 randomized, controlled trials of more than 660 individuals conducted in England, e-cigarettes could increase the chance of smokers quitting: 9% of those using such devices stopped smoking for at least 6 months, compared with only 4% of those using e-cigarettes without nicotine. In a larger survey, University College London Professor of Health Psychology Robert West estimated that for every 10,000 people who use e-cigarettes to help them quit smoking, approximately 580 will quit. In 2015 alone, e-cigarettes may have helped about 18,000 smokers quit who might not have otherwise. Other studies, however, have revealed more modest results, cautioning that only 1 out of every 5 of those who attempt to quit smoking permanently by substituting vaping succeed.³ Furthermore, debates about whether e-cigarettes are more effective or safer than nicotine patches or other aids to quit smoking continue. Unlike pills and patches, the devices offer the advantage of mimicking the behavioral and psychological aspects of smoking; they provide a substitute for hand-to-mouth action and a coping mechanism for conditioned smokers.

Smoking trends

According to both the US Centers for Disease Control and Prevention and the FDA, electronic cigarette use now exceeds that of conventional cigarettes.³ Everyday usage is common, and many vapers are middle-aged males who also smoke. Among teens, e-cigarettes, and even marijuana, are more popular than tobacco cigarettes. A survey performed by the CDC found that while the total number of teen cigarette smokers has declined over the past 2 decades to 1.6 million, 1.3 million youth have taken up vaping.¹ In fact, according to a recent FDA News Release on new tobacco regulation, between 2011 and 2015, e-cigarette use among high school students jumped from 1.5 to 16%, an increase of about 900%. This is a disturbing trend as e-cigarettes have not been proven to be healthier than regular cigarettes. Additionally, vaping can be a gateway to tobacco use for the younger generation. A study conducted by the National Center for Chronic Disease Prevention and Health Promotion revealed that US teens and young adults who have never smoked but have used e-cigarettes were 8.3 times more likely to begin smoking after just 1 year than those who have never vaped.³

Nicotine is not for teens

While nicotine is not a known carcinogen, it is a highly addictive substance that is lethal in high doses. In 2015, the American Association of Poison Control Centers reported 3,073 calls involving issues with e-cigarette devices and liquid nicotine. Moreover, nicotine can have long-term effects on brain development. This is largely because the brain's prefrontal cortex (PFC), which is responsible for executive functions and attention performance, is one of the last areas to mature, continuing to develop until age 25. Consequently, when young people smoke, they increase the risk of developing impaired judgment, cognitive dysfunction, and attention deficits, as well as psychiatric and mood disorders. Smoking can also reduce impulse control in youths and alter the way they will make decisions as adults. Furthermore, nicotine use can lead to an increased risk of cardiovascular, respiratory, and gastrointestinal disorders as well as a decrease in immune response, which can negatively impact reproductive health (Fig).

The verdict

On December 8, 2016, the Surgeon General's Office released "E-Cigarette Use Among Youth and Young Adults: A Report of the Surgeon General," which comprehensively reviewed the public health issue of e-cigarettes, particularly their impact on US teens and young adults. Surgeon General Vivek H. Murthy has dubbed the devices "a public health threat to America's youth" that is putting a whole new generation at risk for nicotine addiction. Fortunately, however, the upward trend in e-cigarette use among high school seniors has recently begun to reverse with just 12% saying they have used e-cigarettes compared with 16% in 2015.³ E-cigarettes may help some people quit smoking, and due to variable nicotine and chemical contents of the e-liquid, some controversy remains about whether they can be less harmful than tobacco cigarettes. Still the verdict on vaping, especially for teens, is simple: if you haven't started, don't; if you have, quit.

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References

1. National Institute on Drug Abuse. *Electronic Cigarettes (e-Cigarettes)*. <https://www.drugabuse.gov/publications/drugfacts/electronic-cigarettes-e-cigarettes>. Published May 2016. Accessed January 24, 2017.
2. Campaign for tobacco-free kids. *Electronic Cigarettes: An overview of Key Issues*. <https://www.tobaccofreekids.org/research/factsheets/pdf/0379.pdf>. November 10, 2016. Accessed January 24, 2017.
3. King BA. US Department of Health and Human Services. National Center for Chronic Disease Prevention and Health Promotion. *E-Cigarettes: An Emerging Public Health Challenge*. <https://www.cdc.gov/cdcgrandrounds/pdf/archives/2015/october2015.pdf>. CDC Public Health Grand Rounds: October 20, 2015. Accessed January 24, 2017.

I Have Scoliosis, Which Sports Can I Play?

If your spine curves toward the side and is shaped like a "C" or an "S," (Fig) you may have scoliosis. Scoliosis is defined as a curvature of the spine of more than 10 degrees combined with a rotation of the vertebrae, the small bones that form the spine and through which the spinal cord passes. The 2 most common locations for this abnormal curvature are the thoracic (upper to mid) and lumbar (lower) spine. The thoracic portion of the spine is made up of 12 vertebrae and the lumbar portion of 5. The signs and symptoms of scoliosis include uneven hips, musculature that is uneven from one side of the body to the other, a rotating spine, back pains, and possibly chest pain. If as an athlete you have scoliosis, you may be wondering which sports you can play without experiencing discomfort or worsening your condition.

Fig. X-ray showing scoliosis (abnormal curvature) of the spine



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How do I know whether I'm at risk?

Most forms of scoliosis (about 65%) are idiopathic, meaning that the cause is unknown, and current research reports that the disease is most likely caused by several factors. While anyone can have idiopathic scoliosis, it is most often seen in children between the ages of 10 and 13; in fact, it is the most common spinal disorder in pre- and early teens. Additionally, studies have shown that females are more susceptible to the condition than males, though no definitive reasons have been found to explain this greater risk. A popular theory is that altered sensitivity to leptin, a hormone involved in the regulation of bone and energy metabolism in children and the initiation of puberty in girls, may result in increased sympathetic nervous system activity and a consequent disorder in skeletal growth, such as asymmetry of the spine. Apart from gender, the most significant factor contributing to scoliosis is genetics. Therefore, if someone in your immediate family, such as parent or sibling, has the condition, you should get checked regularly.

Can I be diagnosed as an adult?

Adults are often diagnosed with either idiopathic or degenerative scoliosis. If you are diagnosed with idiopathic scoliosis as an adult, chances are that the condition began in your adolescent to teenage years. If, on the other hand, as an adult you suffer from degenerative scoliosis, then a degenerating vertebral disc (the cushioning fibrocartilaginous pad between vertebrae) is the cause of the problem. As this disc degenerates, gravity can place too much pressure on one side of it, causing your spine to bend and curve. Your symptoms will depend on the degree of curvature, and may include back pain, shortness of breath with activity, lumbar stenosis (compression of the spinal nerve roots in the lower back), or poor posture.

How will my scoliosis be treated?

Through regular checkups with doctors, a treatment plan can be established for you as a scoliosis sufferer. The type of treatment depends on several factors such as your age or pubertal status, the degree and location of the curvature, gender, and associated symptoms. Once the doctor has assessed all the factors in your case, he or she can determine the best course of treatment. This could consist of getting fitted for a brace and attending physical therapy or could mean having a surgical procedure. A combination of bracing and spinal casting may be prescribed as a way to avoid surgery.

Progressively worsening scoliosis may require surgical intervention. As a very young patient, your options may include the implantation of growing rods as a way to straighten the spine without damaging growing tissues. Using hooks or screws, these rods are attached to the spine, or sometimes to the ribs, both above and below

the spinal curvature. For children with early onset scoliosis there are also magnetic growing rods which, once surgically implanted, can be controlled and lengthened remotely as the child grows.

If you are an older teenager or adult, your condition may warrant spinal fusion. This is a surgical procedure to correct problems with the vertebrae and prevent any deformity from worsening. It may also improve the appearance of the spine. The procedure fuses together the painful vertebrae so they heal into a single, solid bone. This usually involves the placement of screws, hooks, and rods. The majority of patients are able to resume their normal activities, including athletics, a few months after spinal surgery.

Which sports can I play?

When you hear that you have a disease of the spine, you may be worried that playing a sport is out of the question. This is not true. Having scoliosis does not dictate whether you can play sports, though it may limit which sports you can play. Sports such as gymnastics, football, and heavy weight lifting that put a great deal of stress on the bones in the lower back are discouraged for athletes with scoliosis. On the other hand, sports which are low-impact, such as swimming and certain types of cycling, are encouraged. Moreover, these sports rely on a strong core. Your core includes not only your abdominal muscles, but also the muscles in your lower back and hips. When these muscles are conditioned and equal in strength, they work together to align and stabilize your spine, creating an anatomical brace. If, however, these core muscles are weak and imbalanced, they cannot support your spine and the result is poor posture. Your physician or physical therapist may prescribe an appropriate stretching and strengthening routine that targets your core to help with your condition. You may also benefit from structured activities such as yoga.

Carrying on with scoliosis

Scoliosis is a curvature of the spine that calls for regular monitoring visits with a spinal specialist or an orthopaedist with spinal expertise. While anyone can have scoliosis, statistics show that it is more prevalent in young females. How your scoliosis is treated and which sports you can participate in will ultimately depend on the severity of your condition. With the proper oversight, care, and attitude, you can carry on an active lifestyle and play a variety of sports despite having scoliosis.

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Chest Muscle Injuries: Strains and Tears of the Pectoralis Major

Once rare, injuries to the chest muscles, particularly the pectoralis major muscle, are becoming more common. In fact, a recent study noted that of the 365 cases of pectoralis major ruptures reported in the medical literature from 1822 to 2010, 76% occurred over the past 20 years.¹ Pectoralis major injuries can range from contusions (bruises) and inflammation to complete tears and frequently result in pain, weakness, deformity in the contour of the chest, and, ultimately, a decline in overall shoulder function. These injuries most often occur in active individuals who participate in sports or perform heavy labor and can be the result of either an acute traumatic event or chronic overuse. Pectoralis major tears are common in younger males who lift weights² and in older athletes who do not warm-up adequately; however, these kinds of tears have even been reported in the elderly.³ When pectoralis major injuries occur, they can be disabling, especially to athletes.

The chest muscles

The 2 pectoralis muscles, the pectoralis major and the pectoralis minor (the larger and smaller muscles of the chest) connect the front of the chest wall with the humerus (upper arm bone) and shoulder (**Fig**). The pectoralis major is a thick, fan-shaped muscle consisting of 2 heads or portions, the clavicular and the sternal. The clavicular head originates from the anterior border of the medial half of the clavicle (collar bone) while the sternal head arises from the sternum (breast bone) and first through sixth ribs. The 2 portions of the muscle then converge on the outer side of the chest with the subclavius muscle (the small, triangular muscle between the clavicle and first rib) to form the axilla or armpit. The multiple origins and insertions of the pectoralis major muscle allow it to initiate a wide range of actions on the arm, enabling it to adduct (draw toward the body), flex (bend), extend (straighten), and internally rotate (turn toward the body).

Causes

Over time, repetitive or prolonged activity may cause the tendons of the pectoralis major muscle to degenerate, resulting in a strain. Chronic muscle imbalances, weaknesses,

tightness, and abnormal biomechanics, especially when combined with excessive training, can also contribute to the development of a pectoral strain. By contrast, acute strains or tears to the pectoralis muscle happen when a force goes through the muscle and tendon that is greater than they can withstand. This can occur while weight training, especially when performing a bench press, chest press, or pectoral fly, and is more likely to happen when using free weights than machines. For example, if too great an external force is applied when the muscle is at its maximal stretch point, as during the downward movement of a bench press, it will rupture at the tendon juncture.

When this occurs patients typically report a sharp pain with a pop.

Classification

Tears to the pectoralis major muscle may be small and partial or may constitute a complete rupture. Additionally, they can be classified as 1 of 3 grades, based on the number of muscle fibers torn and how much function has been lost, with grade 3 representing the most extensive damage. The majority of tears are grade 2.

Symptoms

Following a pectoralis major tear, the patient may have bruising, swelling, and deformity of the chest and upper arm. In addition, he or she may report pain and loss of strength when pushing with the extremity. The pain is localized to the chest and front of the shoulder

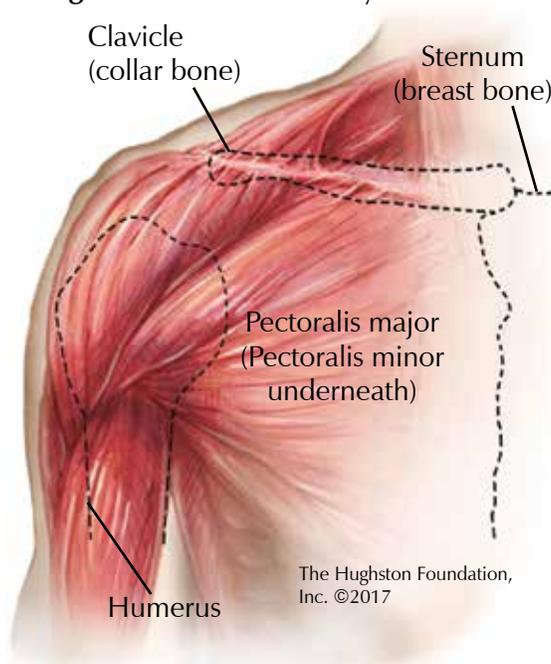
or armpit, but may radiate into the upper arm or neck and may increase from an ache to a sharper pain with activity.

Diagnosis and assessment

In the acute phase of injury, a physical exam may be difficult to perform because swelling from the injury can distort the shoulder and pain can affect strength and motion testing. Once the swelling has resolved, the contour of the chest and shoulder may appear abnormal. The strength of the muscle can be tested by having the patient adduct while internally rotating (moving toward the body) the arm and adding resistance (pulling away from the body). The results can then be compared with results from the opposite arm.

Imaging is used to differentiate a pectoralis injury from other types of disorders and to determine its extent. X-rays should be taken to look for a possible bone fragment on the tendon or other associated fracture or dislocation. CT (computed tomography) can be used to evaluate fractures

Fig. Normal chest anatomy



identified on x-rays for surgical fixation. Ultrasound is an inexpensive modality that can be used to assess the presence of a tear or retraction of the tendon while an MRI (magnetic resonance imaging) can be performed to determine the site and extent of injury.

Treatment

The treatment for a pectoralis major injury depends upon the severity of the injury, the extent of muscle function, and the patient's health and general activity level. Nonsurgical treatment must be considered in patients who have low demand, are elderly, or have either partial tears or tears in the muscle belly. Initial management with immobilization, rest, and cold therapy followed by strengthening and stretching can offer a satisfactory to excellent functional result. Shoulder motion returns and patients can resume daily activities.⁴ In those patients who either need to return to full strength and function or are concerned with cosmetic appearance, surgical repair is recommended. In a recent study, patients were highly satisfied with surgical repair of the pectoralis major, reporting a return of strength, structure, and overall function.⁵ The need for rehabilitation after surgery varies depending on how the muscle was repaired. In general, patients can return to normal activities 4 to 6 months after their procedure.

Outcomes

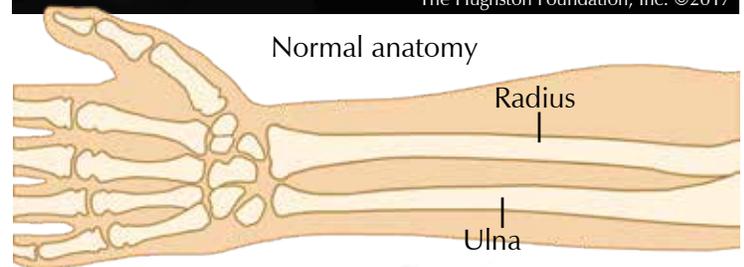
The management of pectoralis major injuries is patient specific. In sedentary or low-demand individuals with partial or complete tears, nonsurgical management can provide acceptable to excellent results. In those who demand function and form, surgical treatment may be the best option. While complications such as failure of repair, infection, and stiffness can occur, they are fairly rare. Generally, full return to activity and improved appearance can be expected following surgical repair and rehabilitation.

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References

1. ElMaraghy AW, Devereaux MW. A systematic review and comprehensive classification of pectoralis major tears. *J Shoulder Elbow Surg.* 2012;21:412-22.
2. Bak K, Cameron EA, Henderson IJ. Rupture of the pectoralis major: a meta-analysis of 112 cases. *Knee Surg Sports Traumatol Arthrosc.* 2000;8(2):113-9.
3. Beloosesky Y, Hendel D, Weiss A, et al. Rupture of the pectoralis major muscle in nursing home residents. *Am J Med.* 2001;111(3):233-5.
4. Rijnberg WJ, van Linge B. Rupture of the pectoralis major muscle in body-builders. *Arch Orthop Trauma Surg.* 1993;112(2):104-5.
5. Mooers BR, Westermann RW, Wolf BR. Outcomes following suture-anchor repair of pectoralis major tears: a case series and review of the literature. *Iowa Orthop J.* 2015;35:8-12.

Pediatric Forearm Fractures: When Both Bones Break



Pediatric forearm fractures account for approximately 50% of all pediatric fractures with an incidence of about 1 in 100 children. A common type of fracture involves both forearm bones, the radius, or bone on the thumb side, and the ulna, or bone on the little finger side (**Fig**). This fracture type is often referred to as a “both-bone forearm fracture” and can occur when a child falls on an outstretched hand, or, less commonly, when there is a direct trauma to the forearm. Pediatric forearm fractures are also typically described as being in the proximal (upper), middle, or distal (lower) portion of the forearm and can be angulated (deviating from a straight line), rotated (turned away from the midline of the body), displaced, or non-displaced. The severity of these characteristics will determine treatment. Additionally, pediatric forearm fractures can be either complete fractures, where the break goes through the cortex or hard outer surface of the bone, or greenstick fractures where the cortex remains intact. Greenstick fractures are common because children's bones are pliable and often bend, but don't completely break.

Diagnosis

A child who sustains a forearm fracture will usually present with immediate onset of pain, unwillingness to use the arm, and obvious deformity of the forearm. The orthopaedist will carefully inspect the arm for swelling and deformity, as well as for open wounds that could indicate an open fracture where the bone has actually come out of the skin. In order to assess the neurological and vascular status of the hand, a thorough neurovascular exam is performed. To determine the full scope of injury, the joints above and below the fracture, namely the wrist and elbow, are also assessed. Finally, x-rays should be taken to determine the pattern and severity of the fracture.

Treatment

Once the nature of the forearm fracture has been pinpointed, treatment can be discussed. The primary treatment goal for pediatric forearm fractures is to restore the length, alignment, and rotation of the bones so they will heal in a position where the arm can function normally. While most of these fractures can be treated non-surgically, some will require surgery.

Non-surgical

Fractures that are displaced, angulated, or rotated can often be closed reduced, or brought into proper alignment without surgery, and then immobilized in either a cast or splint. This is usually done in the emergency room with the patient sedated and on pain medicine. The physician may use fluoroscopy, a type of medical imaging that shows a continuous x-ray image on a monitor, to guide the reduction.

The age of the patient dictates how much rotational and angular deformity is acceptable for both-bone forearm fractures. Younger children can tolerate more deformity as their bones have a greater potential to remodel and heal in correct anatomic alignment. Thus in children less than 10 years of age, up to 15° of angulation and up to 45° of rotation is acceptable while in older children, only up to 10° of angulation and 30° of rotation is acceptable.

Both-bone forearm fractures are initially immobilized in a long arm cast or in a splint that can later be converted, or overwrapped with fiberglass, into a cast. Within the coming week, an orthopaedist follows-up with the patient and x-rays are repeated to ensure that the reduction has been maintained. As long as the reduction and alignment remain within the acceptable parameters, the only treatment needed is 6 to 8 weeks of immobilization.

Surgical

While most pediatric fractures can be treated without surgery, some will require surgery. Surgical indications for both-bone forearm fractures include open fractures, unstable or irreducible fractures that fail initial attempts at closed (nonsurgical) reduction, floating elbow injuries (where there is a break both below and above the elbow joint), and soft tissue swelling about the forearm that will not allow the safe application of a cast. Additionally, up to 30% of patients may experience an early loss of reduction. Risk factors that contribute to this include older age, a fracture that is more proximal, and greater initial displacement. Children with less than 1 to 2 years of growth left who suffer both-bone forearm fractures are usually treated as adults and require surgical intervention.

When surgery is necessary, the 2 most common options for internal fixation

are intramedullary nails (metal rods set into the medullary cavity or inner canal of a bone) and plate and screw constructs. Intramedullary nails are placed through small incisions down the intramedullary canal of both the radius and the ulna in order to restore length, alignment, and rotation. They are left in place until several months after the fracture has healed and then removed. Plate and screw construct fixation is achieved with open techniques similar to those used for adults. Whether the construct should be removed once the fracture has healed is controversial.

Complications

In most children, forearm fractures heal with full return of function. Refracture occurs in 5 to 10% of patients. Malunion, where the bones fail to heal or are not aligned correctly, is rare as the potential for remodeling and aligning fractured bones is greater in children than adults. Malunion can result in a loss of range of motion and of arm function. Risk factors for malunion include poor reduction or casting technique, incomplete surgical correction, and failure to monitor the fracture with x-rays after the initial reduction. Additionally, compartment syndrome, one of the most serious complications in both-bone forearm fractures, can occur in either surgical or nonsurgical cases. Compartment syndrome happens when the swelling under the fascia or membrane that surrounds the muscles of the forearm becomes severe enough to compromise the blood flow to these muscles, which can lead to muscle necrosis (death). Compartment syndrome constitutes an emergency and must be treated immediately with fasciotomy (releasing the fascia) or, in some cases, a fasciectomy (excising strips of fascia) to decompress the compartment and prevent the limb from being permanently compromised.

Positive outcomes

Both-bone forearm fractures are common in the pediatric population. Most of the time, they can be treated nonsurgically with closed reduction and cast immobilization. Almost all fractures heal with appropriate length, alignment, and rotation; the patient suffers no lasting deformity and has full function of the limb. A small percentage of pediatric forearm fractures require surgical fixation, but the complication rate is low and the outcome overwhelmingly positive.

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