Hughston Health Alert

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1989 - 2013 25 YEARS For A Healthier Lifestyle

Inside...

Advances in Treating the Spine

Advances in musculoskeletal medicine have been particularly noteworthy in the treatment of spinal disorders. Advances in imaging, instrumentation, and surgical technique have contributed to the successes in spinal treatment today.

Imaging

The advancements made in spinal imaging techniques, such as myelography, computed tomography (CT), and magnetic resonance imaging (MRI), have helped improve the diagnostic accuracy (**Fig. 1A**). Myelography imaging, which involves injecting contrast material, combined with a CT scan allows detailed examination of the spine in different anatomical planes, including 3-dimensional reconstructions. Myelography has a long-term satisfactory record of safety and patient tolerance using water-soluble contrast that is introduced into the space around the spinal cord and nerves. An MRI scan shows the bones, muscles, tendons, and ligaments, allowing a physician to assess the spine and its associated nerves and soft tissue. It is the only imaging study that shows the water content of the intervertebral disc (disc that provides cushioning between vertebrae) and can reveal early stages of disc degeneration. For patients who have had spine surgery before, an MRI with gadolinium (a contrast agent) distinguishes scar tissue from other spinal structures. This enhancement technique is especially useful in evaluating tumors of the spine.

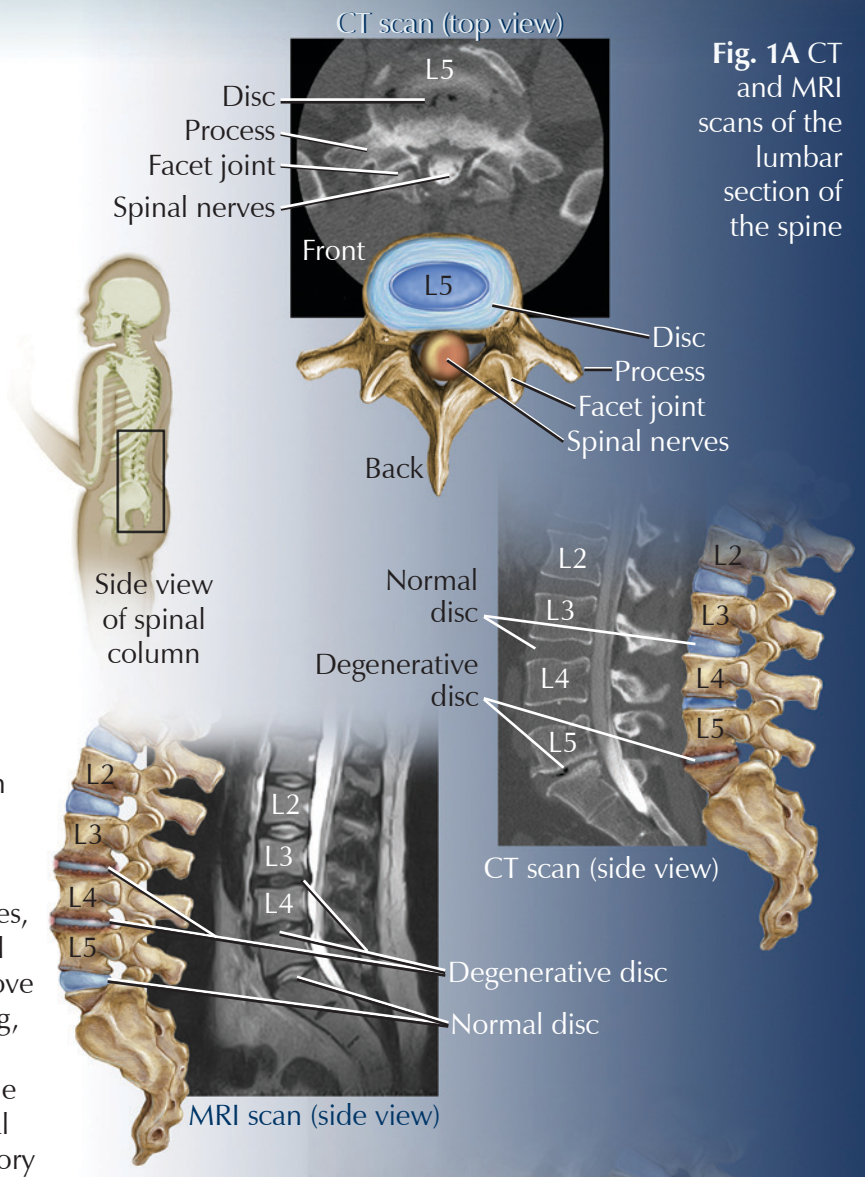

Fig. 1A CT and MRI scans of the lumbar section of the spine

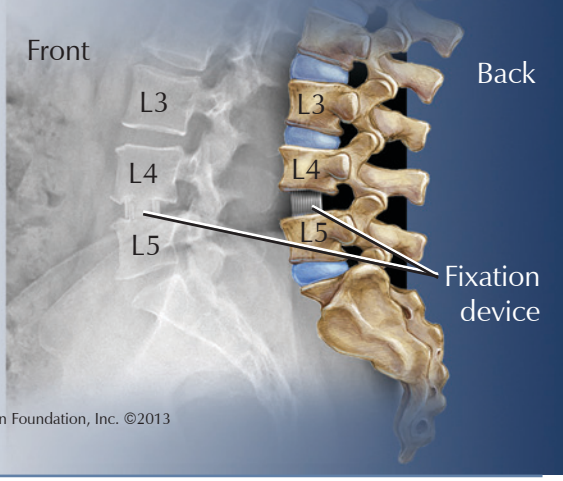

Fig. 1B X-ray of lumbar section of the spine shown in a side view with an internal fixation device in place

Instrumentation

During the past 25 years, the addition of new spinal instruments and implants have given spine surgeons the ability to tackle challenging surgical procedures. In pediatric spine surgery, the concept of using a rod to straighten a child's scoliotic spine was developed by Paul Harrington. The original procedure has been modified by using dual rods anchored to the spine at multiple points with hooks or screws. The rigid implants are stable enough that a patient undergoing surgery for scoliosis no longer needs to wear a back brace after surgery. In very young patients who have scoliosis, implants that have a telescoping mechanism can be inserted using minimally invasive techniques. The implants allow for continued correction of spine deformity while the child grows.

Internal fixation of vertebrae in an unstable spine continues to improve by using smaller and stronger implants that are safe for postoperative examination with MRI (**Fig. 1B**). Implantable screws coated with hydroxyapatite (a bone component) have been used to provide a better and more biological interface between the vertebra and the implants. There are various new interbody fusion devices, such as cages and spacers and expandable implants, that allow the surgeon to rigidly stabilize the spine, increasing the success of a solid spinal fusion.

Surgical techniques

Minimally invasive surgery using smaller incisions is routinely used in hip and knee joint replacement, and the same concept is now being applied to spine surgery. Spinal decompression, disc surgery, and insertion of spinal instrumentation can often be performed through smaller incisions and special surgical equipment that allows direct and indirect visualization of the surgical site.

According to published studies, some patients who have undergone spinal fusions have developed symptomatic degenerative disc disease or spinal stenosis immediately above the fused spinal segment. Efforts to identify and to reduce what is termed adjacent segment disease have been focused on reducing surgical trauma to adjacent spinal segments and, in the case of neck surgery, reducing the length of cervical plates. Early studies have shown that newer flexible implants that allow some micro-motion while providing adequate stability to the spine may reduce the incidence of adjacent segment disease.

Operating room advances

During the past 25 years, there have been continued refinements and improvements in patient positioning during surgery. Spinal frames with well-padded supports are used for patients undergoing prolonged procedures. Special supports for the head give added protection to the eyes and reduce pressure on the abdomen to minimize potential blood loss. Intraoperative monitoring of nerve function alerts the surgeon to abnormal changes in the patient's neurological status. The monitoring is especially important in surgery involving spinal implants and during spinal deformity surgery. Navigation systems have been developed to facilitate precise placement of implants during surgery. Biplane intraoperative fluoroscopy (a system that has 2 cameras to provide more detail) and intraoperative CT scanning have revolutionized the surgeon's ability to accurately see spine structures during operative procedures. These advances have improved the surgeon's ability to perform complex procedures while maintaining a high level of patient safety.

What has not changed

Accurately identifying the anatomical source of a patient's back or neck pain remains a great challenge. The need to obtain a thorough patient history and to perform a thorough physical examination has not changed during the past 25 years. This remains the first and basic step in evaluating patients who have musculoskeletal disorders.

Today, as in the past, nonsurgical treatment options should be considered before surgery. Most patients who have spinal conditions respond favorably to time and observation. Cautious use of medications, such as anti-inflammatory medications, physical therapy, lightweight back supports for the patient who has low back pain, and occasionally, spinal injections may be needed for the patient's recovery. In some patients, joint dysfunction responds well to chiropractic intervention.

After nonoperative methods fail to bring relief, to get the best results from surgery, an accurate diagnosis must be confirmed and the appropriate operation should be performed. Careful patient selection—taking into consideration the patient's overall state of health and psychosocial issues that can adversely affect his or her response to surgery—is essential.

The future of spine care

Considering the advances in spinal medicine during the past 25 years, we are enthusiastic about the future. Minimally invasive spine procedures will surely continue to evolve. There is exciting ongoing research in bioengineering at the cellular and molecular level, which may allow, for example, regeneration of a degenerative spinal disc by injection of pluripotential cells (a type of stem cell). The same concept may also allow repair of the injured spinal cord and nerves.

Medicine began with the relationship between physician and patient, and this basic relationship is still fundamental for successful treatment of chronic, or long-standing, back or neck pain. The physician is expected to care for and to teach his or her patients; and, in return, physicians must learn from their patients.

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Assessing & Treating Osteoporosis:

SEPARATING MEDICAL KNOWLEDGE FROM COMMON NOTIONS

The treatments for low bone density fall into 4 categories: anti-resorptive drugs, accretive drugs, sex hormone replacement, and specific therapies to alleviate a defined cause. Each category has a specific set of effects on bone and there is no single treatment for everyone. In order to make the best decision about treatment, you should be evaluated to determine the possible causes of your low bone density and your treatment should be matched with that particular cause.

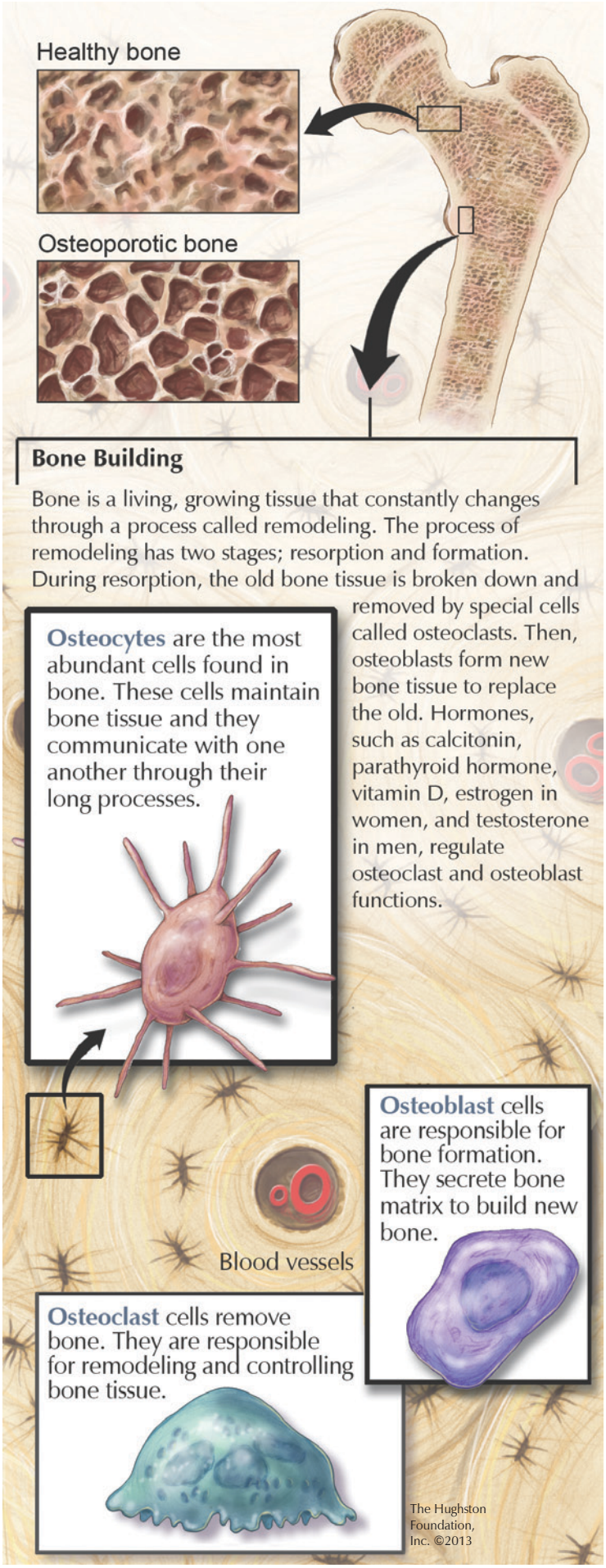
Bisphosphonates

Bisphosphonates is the class of drugs that includes alendronate (Fosamax). The drugs block the uptake and reconstruction of the older bone that needs to be remodeled. By blocking uptake and reconstruction, they increase the amount of bone per unit area because the body does not resorb the old bone as fast as it should. Up to a point, the process does improve bone density, quality and strength; however, bisphosphonates also inhibit the formation of healthy new bone. Over a long period of time, they render the existing bone stagnant and increase the percentage of old and poor quality bone. Overestimating the benefits of treatment can lead to pathological fractures, which are fractures that occur without substantial stress. With extended treatment, after a few years, the bone density does not reflect good bone strength or quality as it should. The same risks have been shown for all bisphosphonates; therefore, the current recommendation is that patients should take them for 5 years or less.

One particularly worrisome bisphosphonate, zoledronic acid, or Reclast, is given intravenously once a year and because of its convenience, it is attractive to patients. However, its intravenous route of administration exposes bone to a much stronger blast of drug than the oral medications; therefore, Reclast has been shown to cause pathological fractures as early as 3 years of treatment. In addition, its intravenous route of administration exposes patients to a risk for kidney problems that does not exist with the oral drugs.

Hormone replacement

Sex hormones have an important role in the treatment of low bone density when estrogen deficiency in women or testosterone deficiency in men is an issue. It is now thought that testosterone deficiency in men causes or contributes to low bone density, because in men, some testosterone is converted into estrogen, the primary sex hormone that affects bone. Where possible, in hormonally deficient patients, sex hormone replacement is the preferred first line of therapy.



Estrogen appears to help bone density in a few ways. First, it blocks a group of proteins, called inflammatory proteins, that destroy bone at an abnormally fast rate. No other treatment of osteoporosis, except a new drug called denosumab (Prolia), does this. Estrogen also enhances bone cells, which stimulate new bone formation. No other available treatment for osteoporosis does that. In men, replacing testosterone deficiency has a third benefit. Men with testosterone deficiency get profound muscle weakness. There is evidence that osteoporotic patients with weakness of the shoulder or hip girdle musculature cannot adequately stabilize the hip or shoulder joint during movement. This is especially important for the hip because there is concern that a hip fracture can result from a fall. Thus, in both men and women who have estrogen or testosterone deficiency, sex hormone replacement is an effective treatment.

There is a current fad that encourages women to take either testosterone or progesterone to treat osteoporosis. There is no evidence that either hormone increases bone density in women. Testosterone is not thought to benefit bone density, even in men. Its function in men is to provide the hormonal substrate for the man to form the estrogen, which helps his bones. In women, progesterone blocks the effects of estrogen on bone, so its effect is negative.

Specific hormonal or metabolic treatments

When a condition affects bone density, the treatment of that condition is often the same approach used to treat osteoporosis. This is true for any abnormality of calcium metabolism that increases parathyroid hormone levels. The same is true for hyperthyroidism, whether due to primary abnormality of the thyroid or the use of excessive amounts of thyroid hormone over a long period of time. Certain specific hormone diseases, such as inadequate or excess growth hormone production or excess cortisone production, affect bone density. The use of cortisone-like medications in high doses can affect bone, as well. Finally, certain nutritional issues, in addition to vitamin D deficiency, can affect bone density. Overall malnutrition, which reduces the formation of new bone protein, and vitamin C or zinc deficiency, which, among other issues, can reduce fibrous tissue formation.

Low bone density is a complicated condition that can involve multiple hormonal and metabolic abnormalities. Prescribing the same or similar drugs for most patients means the individual patient has not been given a detailed metabolic bone evaluation, something that should be done before any treatment is started. Simply having a bone density scan and then beginning a standard medical therapy, without a detailed evaluation of the possible causes is inadequate, as well. Believing that the use of calcium or vitamin D supplements will automatically help the condition is also inadequate, and, in a minority of cases, can make the patient ill from too much calcium absorption. The patient should understand why the drug is prescribed and what it is used for in his or her specific treatment.

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Hip Fractures in the Older Patient

The US Board of Health and Human Services reported that approximately 310,000 patients were hospitalized for hip fractures in 2009. The baby boomer generation is aging; as a result, researchers believe that the incidence of hip fractures will increase and the estimated cost could exceed $10 billion annually. Because they often occur during a fall and are a common cause of disability and death in older people, the American Academy of Orthopedic Surgeons has increased its focus on prevention and treatment of hip fractures.

Types of fractures

The hip joint is a ball-and-socket joint comprising the head and neck of the femur (thighbone) and the acetabulum of the pelvis (**Fig. 1**). Fractures of the hip usually occur within the joint capsule—an intracapsular fracture—or outside the joint capsule—an extracapsular fracture.

Fig. 1. Hip anatomy and fractures.

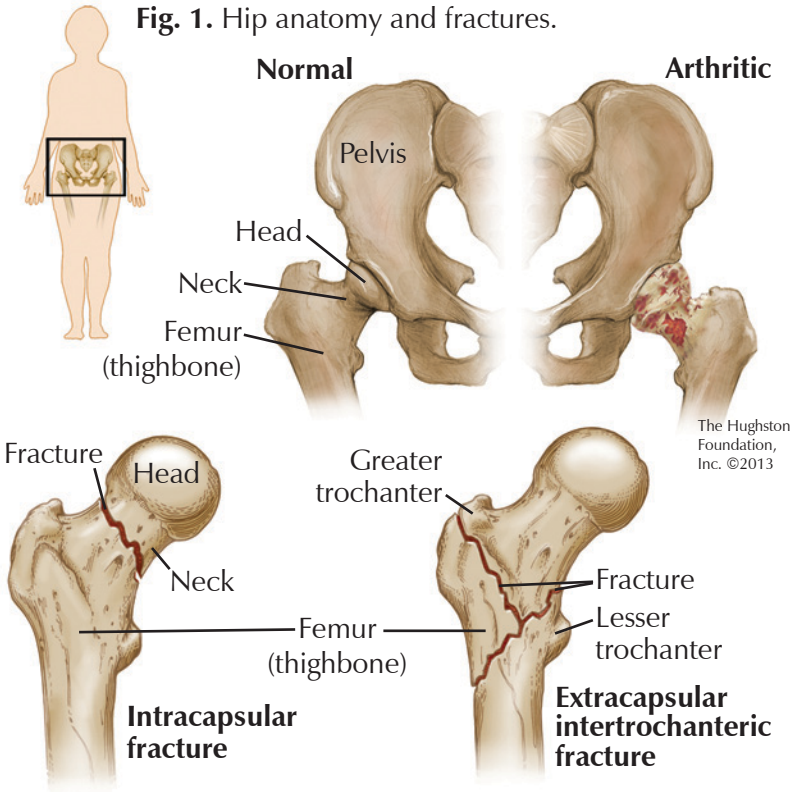
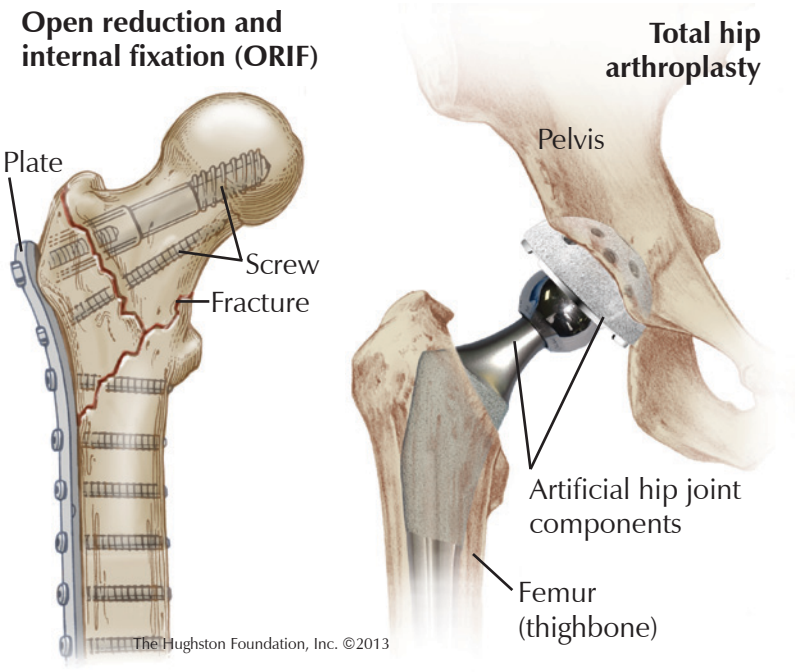


Fig. 2. Treatment options for hip fractures.



Treatment

The overall goal of treatment is to help patients return to their pre-injury levels of activity. The short-term goal is to stabilize the hip fracture enough to allow the patient to begin early mobilization and weightbearing. Patients with hip fractures are evaluated in the emergency room using x-rays of the hip and the pelvis. Often, to better delineate the fracture pattern, a computed tomography (CT) scan is ordered for surgical planning. Treatment for hip fractures is aimed at matching the treatment with the patient's age, activity level, functional abilities, and health status. The presence of osteoarthritis in the hip joint is also considered.

Extracapsular fractures, such as the intertrochanteric fracture that occurs between the lesser and greater trochanters of the femur (**Fig. 1**), are often treated with a procedure called open reduction and internal fixation (ORIF). ORIF involves open surgery to reduce the fracture (put the bones together) and to stabilize the neck and ball of the hip joint with internal fixation using plates and screws or intramedullary rods (**Fig. 2**). The fixation devices provide stability to the fracture and allow early limited or full weightbearing. Older patients who continue to work and who have minimal arthritis in the hip joint are often good candidates for ORIF. However, there have been discussions as to whether these patients may be better candidates for total hip replacement in the long term.

Patients who are candidates for hip replacement have the option of hemiarthroplasty or total hip arthroplasty (**Fig. 2**). Hemiarthroplasty refers to replacing only the ball of the femur, and total hip arthroplasty involves replacing the ball of the femur and the cup of the hip joint. Decisions regarding which surgical technique and implant to use are based on the patient's fracture and activity level. Patients who have limited mobility or 2 or more medical conditions or disease in addition to the hip fracture are often good candidates for hemiarthroplasty. The surgery helps to relieve pain and allows weightbearing the day after surgery. Hemiarthroplasty also tends to be a shorter surgery, thereby exposing the patient to less anesthesia.

Total hip arthroplasty has been shown to be a good treatment choice for some carefully selected patients. Active, older patients who have good mental function often have better mobility, lower revision rates, and lower pain scores after joint replacement than patients who undergo ORIF. Total hip replacement has generally been regarded as the best treatment for patients who have signs of arthritis and have a displaced femoral neck fracture.

When to do surgery

No matter what type treatment is undertaken for hip fractures in older adults, the goal remains the same—to get the patient up and moving as early as possible. Early mobility with weightbearing of the affected leg can help decrease the risk of complications from the fracture. Early mobilization also aids in pulmonary health and prevention of deep vein thrombosis and bedsores.

The timing of treatment for a hip fracture has changed. In the past, the fracture was treated as a surgical emergency and was often performed as soon as possible after the patient's arrival to the emergency room. Studies have shown that this timing does not affect the outcome for the patient. The patient's surgery may be delayed until his or her medical issues have been appropriately addressed. In the case of hip fracture, physicians are asked to evaluate and prepare the patient for surgery medically because older patients may have other conditions, such as heart disease, diabetes, and poor pulmonary function, that can complicate surgery. The goal is to address any health concerns and to stabilize the patient to ensure that risk factors of surgery are decreased as much as possible.

After surgery

After surgery, the focus is on early mobilization, pain control, and deep vein thrombosis prevention, which involves medication and devices on the legs to prevent blood clots. Physical therapy is started as soon as possible to help the patient become mobile.

Following a daily strength and balance exercise regimen can help improve stamina and reduce the risk of a fall. The American Arthritis Foundation recommends several good strength and balance exercise programs that can help to reduce the risk of a hip fracture from a fall.

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Supracondylar Fractures of the Humerus in Children

For a child, one of the most enjoyable outdoor activities is playing on the jungle gym. The careless feel of going down a slide and the joy of flying on a favorite swing bring out the best in a summer afternoon. But inevitably, adventurous children find their way to the monkey bars, and, unfortunately, there is nothing else on the play set that causes more injuries.

A supracondylar humeral fracture of the elbow is one of the most common fractures in children. The supracondylar region refers to the area of the elbow just above the joint line. The condylar region refers to the lateral (outer) and medial (inner) condyles, which are the bony prominences felt at the outer and inner aspect of the elbow. Depending on various factors, the injury can be minor or severe.

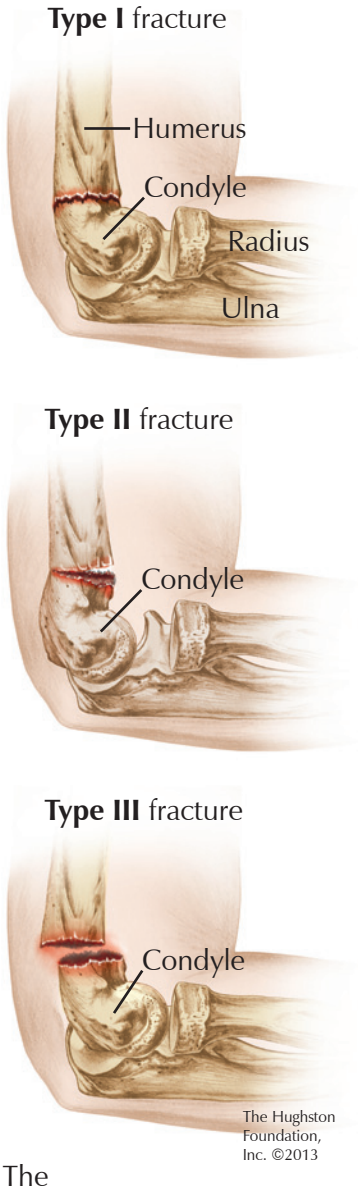

Fig. Three major types of humeral fracture patterns.

How the injury occurs

Often, the injury occurs when the child reaches out to brace himself or herself during a fall and lands on an outstretched hand. The hyperextension causes stress at the elbow. The supracondylar region is recognized as the weakest part of not only the elbow but of the entire arm.

Type of fracture

There are 3 major types of fracture patterns related to a hyperextended supracondylar fracture of the humerus (**Fig**.). The type, or classification, is important in understanding the severity of the fracture as well as in helping to guide the treatment of the fracture. To determine the type of pattern, an x-ray must be taken. A type I fracture is a nondisplaced fracture line leaving the bone in its natural position. A type II fracture, often distinguished by a buckle pattern in the posterior, or back side, of the bone can have either a slight rotational component or a slight angular deformity. A type III pattern often has a severe amount of angulation and can be completely displaced; there can also be a laceration in the skin from the fractured bone fragments.

Presentation

Regardless of the internal severity of the fracture pattern, children with supracondylar humeral fractures guard against using the affected arm and hold it against the body. Swelling and bruising at the elbow region often appears immediately after the injury. Other associated injuries can include nerve or vascular injury and a fractured wrist.

Treatment

At the time of injury, ice can be applied to reduce swelling and the child's arm should be secured in a position of comfort during transport to the hospital. If the fracture is nondisplaced or is minimally displaced, it can be treated in a long-arm splint or cast for a month. If there is clear displacement or angulation, as is often seen in a type II or a type III fracture pattern, the child may require surgery. The operation often requires sedating the child and resetting the bone. The fractured bone is held in place using a combination of pins that pass through the skin and into the bone and is further secured with a cast or splint. Sometimes, a small incision is required to assist in resetting the bone or to protect the nerves during insertion of the pins. The pins are often removed in 3 to 4 weeks after the bone has healed.

Aftercare and complications

If surgical treatment was necessary, the child can begin normal use of the elbow after the pins have been removed and the cast or splint treatment has ended. Sometimes full range of motion does not return right away, but it often resolves after a couple of months. Parents often worry about a possible defect or problem with the child's growth at the elbow. A supracondylar humeral fracture does not involve the growth plates at the elbow; therefore, growth is not disturbed. However, given its proximity to the growth plate, there is concern for malalignment or deformity if the fracture is not reset to the proper position. In rare circumstances, the child may need to be followed by a doctor on a long-term basis to identify any deformity at the elbow.

The monkey bars are not the only item to blame for these types of injuries. They can occur as a result of any accident or fall that would lead to the child's falling onto an outstretched hand. Because you can't wrap your child in bubble wrap to prevent all injuries, it is important to be aware of the potential for injuries and how to best handle them. Chances are if you have children, a trip to the emergency room is an inevitable rite of passage.

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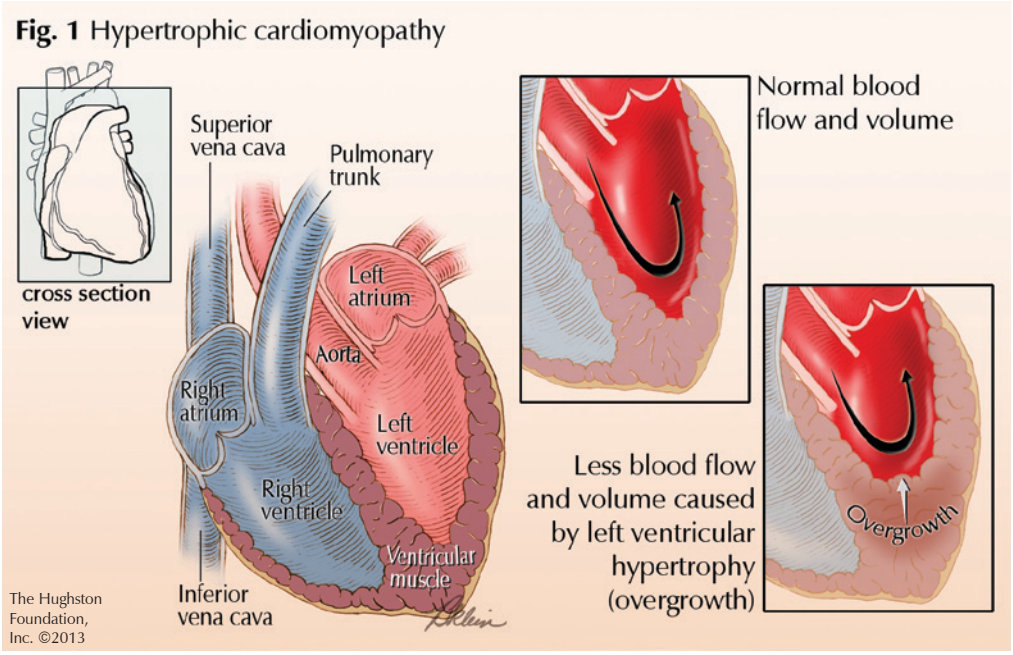
Sudden Cardiac Death



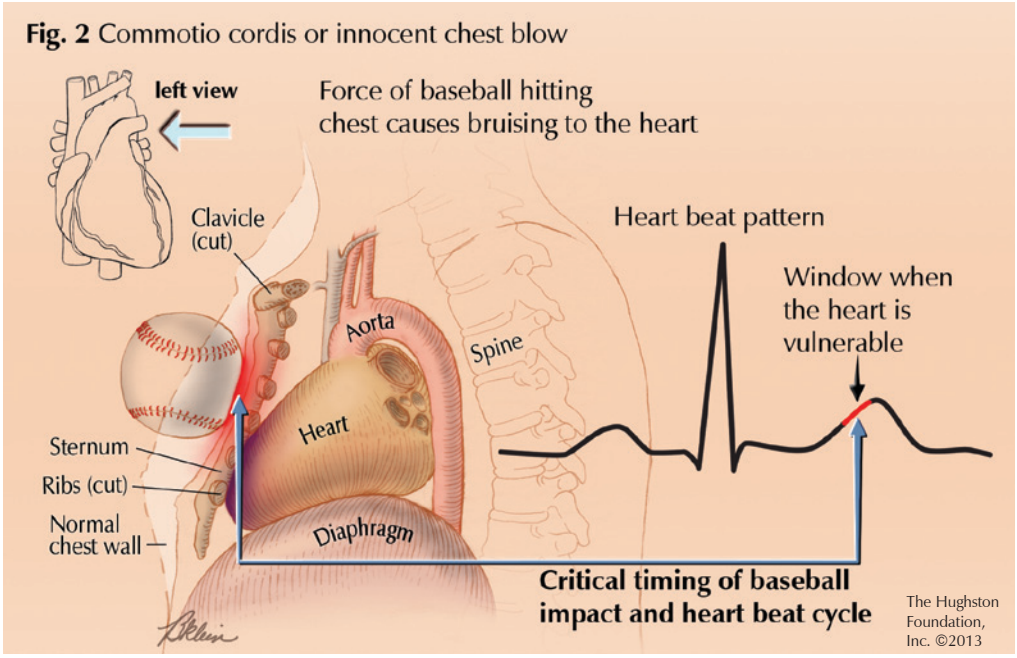
Participation in physical activity and sports usually brings about positive health benefits, but there are still risks of injury during participation. Even when an individual has a pre-participation physical, some conditions can go unnoted. One such condition, known as the "silent killer," is sudden cardiac death (SCD), which accounts for 25,000 deaths in the United States each year with most due to coronary artery disease.

In general, the heart sends oxygen-filled blood to the brain and throughout the body. If the heart stops, breathing can stop and tissues are deprived of oxygen, thus causing damage. SCD is defined as an unexpected death caused by sudden cardiac arrest within 6 hours of an otherwise normal clinical healthy state. SCD occurs when the heart stops beating, breathing stops, and the victim becomes unconscious. It should not to be confused with a heart attack (myocardial infarction) that occurs when there is a blockage of 1 or more arteries.

SCD can occur for many reasons and without any signs or symptoms. SCD can be due to arrhythmias of the heart. When the heart cannot effectively organize the electrical impulses that coordinate pumping, the heart muscle contractions become erratic, usually resulting in useless quivering of the muscle (ventricular fibrillation) and blood not being delivered to the body. The most common type of cardiovascular condition that can cause SCD is known as hypertrophic cardiomyopathy (abnormal thickening of the left ventricle wall that develops before the age of 20) (**Fig. 1**). Other noncardiac causes of SCD include commotio cordis (**Fig. 2**), heat stroke, pulmonary complications, and drug abuse.

Although it is rare (since 2001 only 128 cases have been recorded according to the US Commotio Cordis Registry), commotio cordis can occur during sporting activities. Commotio cordis is cardiac arrest that occurs after a blunt blow to the chest. The blow to the chest must occur at a precise moment of the heart-beat cycle to trigger ventricular fibrillation. Commotio cordis can be prevented by wearing protective equipment during sports in which a ball or object can be projected into or at an athlete's chest.

Administering a shock from an automated external defibrillator (AED) at the onset of SCD can increase a person's chance of survival. If resuscitative measures are taken within the first 10 minutes of the attack, the chances of survival are greatly increased.



SCD can occur with or without diagnosed heart conditions and diseases. Athletes should have an examination by a physician prior to any participation in physical activity. If there is any sign of a cardiac abnormality or previously undiscovered heart disease, precautions, including further testing, should be taken prior to participation in any sporting event or physical activity.

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