

THE UNIVERSITY OF TOLEDO MEDICAL CENTER

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THE UNIVERSITY OF TOLEDO MEDICAL CENTER

ORTHOPAEDIC MONTHLY

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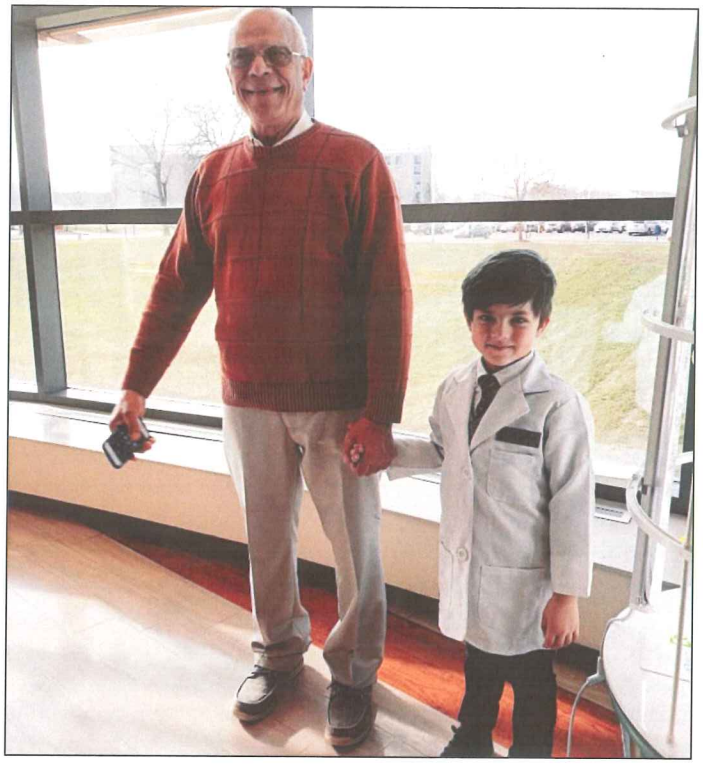
TO DOCTORS OF TOMORROW:

It Is Never Too Early To Start

By: Nabil Ebraheim, M.D.

What did you want to be when you grew up? For most people, they wanted to be a firefighter, a ballerina, an astronaut, or a pro-athlete. For 5 year old Kieran, his dream is to be an orthopedic surgeon. Ever since the age of 3, Kieran knew he wanted to be an orthopedic surgeon when he grew up. For a while, Kieran could not decide between being a doctor or a forklift driver. After deciding on doctor, he had to decide what to specialize in. His interest in orthopedics first started when he asked his mom what kind of doctor worked on bones. He then turned to YouTube and found Dr. Ebraheim's page. He is now subscribed to the channel and watches all the doctor's new videos when they are posted. His favorite videos are those about injections and about the femur. He remarked that the femur is his favorite bone because "it is the biggest and the strongest". He is always questioning his mother on very in depth topics in medicine, and she states that google and friends in the medical profession have been her biggest ally in answering such questions. His most recent question is in regards to joint replacements. He asks, "Why do they use an artificial joint in older patients, but not in younger people?" This question, and many more, filled Dr. Ebraheim's ears as Kieran visited the Orthopedic Center. Kieran is one of Dr. Ebraheim's biggest fans, and at the end of his visit, he exclaimed, "He is the most smartest surgeon in the whole world! This is the best day ever!" Kieran makes it clear that the future of orthopedic surgery is in good hands.



Femoral Neck Fracture Nonunion

Femoral neck fracture nonunion has multiple facets, and it is important to understand all aspects of this important problem. Intracapsular fractures of the proximal part of the femur are not common in adults younger than 50 years old, but they are associated with a high incidence of avascular necrosis and nonunion. About 10%-30% of femoral neck fractures go to nonunion after ORIF. It is usually the vertical fracture pattern, such as Type III in Pauwels Classification. These fractures are more prone to nonunion due to shear stress, rather than compression forces across the fracture site. In Garden Classification fracture Type IV, where the fracture is completely displaced, the greater the displacement, the higher the incidence of nonunion and reoperation rate after fixation of the femoral neck. The inverted triangle pattern of fixation of femoral neck fractures is one that is commonly used with inferior screw posterior to the midline and adjacent to the calcar. Achieving and maintaining anatomic reduction is important for femoral neck fracture fixation and healing. The femoral neck fractures are intracapsular. There will be no abundant callus formation during the healing (healing is intraosseous only). Sometimes it is difficult to know if the fracture healed or not.

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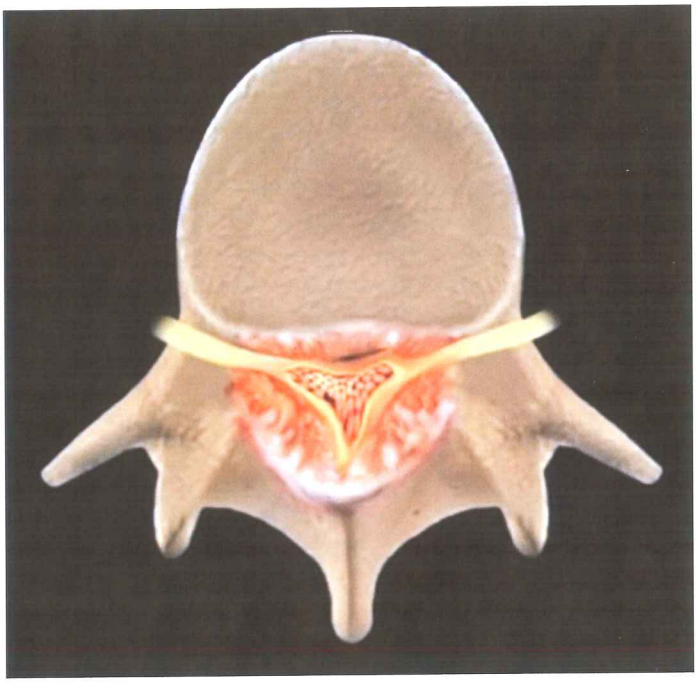
There is no correlation between age, gender, and rate of nonunion. Varus malreduction correlates with failure of fixation after reduction and cannulated screw fixation. Posterior comminution of the fracture does not allow stable fixation and can lead to nonunion. The comminution of the femoral neck is usually posteriorly and inferiorly. Some recommend adding a fourth screw in this situation. High energy fractures have a worse prognosis for healing, especially in patients with metabolic bone disease and nutritional deficiency. When you see a femoral neck nonunion after fixation, you need to get blood work and rule out infection (get sedimentation rate and CRP). For high angle femoral neck fracture, follow up closely with clinical exams and x-rays. There might be a Varus collapse on the x-rays. You may see a femoral neck nonunion or a failed internal fixation. In clinical examination, the patient walks with a limp, the limb is shortened, and the patient may have rotational deformity of the extremity. In a young patient with a femoral neck nonunion, arthroplasty is not a desirable option. Valgus intertrochanteric osteotomy with plate fixation produces a good result in the majority of cases. Valgus intertrochanteric osteotomy with plate fixation produces approximately 80% union rate, and the procedure makes a vertical fracture more horizontal, converting the shear forces into compressive forces. It is done in a healthy, young patient with no joint arthritis and when the femoral head is intact. This procedure corrects the Varus malalignment. A revision ORIF with or without a bone graft is another procedure that is rarely done in young patients. Free vascularized fibular graft is done in some patients, especially in young patients with a nonviable femoral head. Hemiarthroplasty is done in patients with low physical demands. The articular cartilage of the patient is preserved with no evidence of infection. A total hip arthroplasty is done in patients that are older, in patients that have hip arthritis, if the femoral head is not viable, or if the hardware is cut out. It can also be done in younger patients that are active, when the femoral head is not viable and the patient does not want a free vascularized fibular graft, or if the patient had collapse of the femoral head with nonunion.

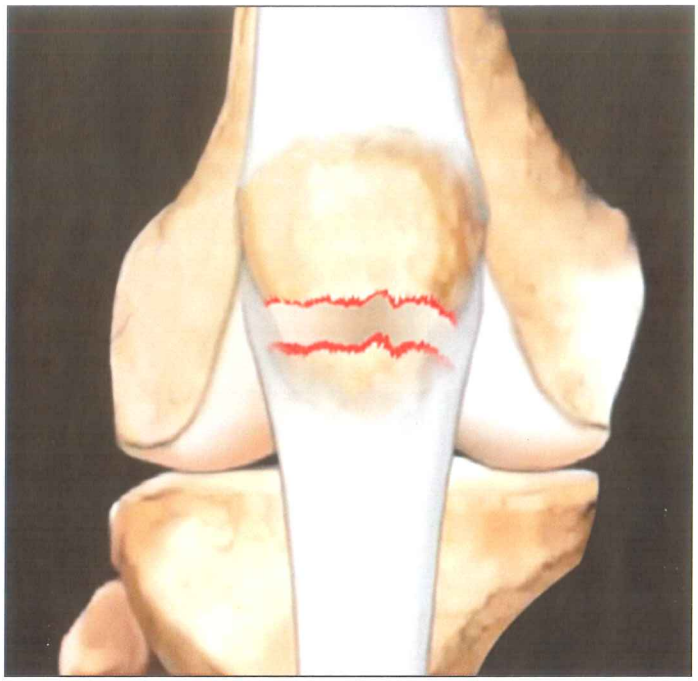
Lumbar Spinal Stenosis

Lumbar spinal stenosis is a narrowing of the spinal canal and narrowing of the intervertebral foramen (nerve root canal). There are two types of lumbar spinal stenosis- central and lateral. Patients with lumbar spinal stenosis will have back pain that is better with flexion, or leaning forward over a shopping cart. The pain will be worse with extension of the back. Leaning forward increases the foramen size by about 12%. Leaning backwards reduces the foramen size by about 20%. Central canal stenosis is responsible for giving neurogenic claudication. Patients may have leg pain, back pain, buttock pain, weakness, cramps of the calf, and a heavy sensation. They will exhibit the grocery cart sign (flexion of the back). Lateral recess stenosis will give radicular symptoms and can occur in the nerve root. Neural foraminal stenosis occurs in the intervertebral foramen. When examining, you should look for other conditions such as hip problems, metastatic tumors, or vascular condition, and always examine the pulses. Neurogenic claudication and vascular claudication may coexist. Walking is bad for both neurogenic and vascular claudication. Sitting will relieve the symptoms in both neurogenic and vascular claudication. Using a stationary bicycle will relieve symptoms of lumbar spinal stenosis; however, it will aggravate the symptoms in vascular claudication. In vascular claudication, pain starts within the calf and leg. In neurogenic claudication, pain starts proximally and then spreads distally. It seems like postural changes of the spine will make the neurogenic claudication worse; however, this will not affect the vascular claudication. Vascular claudication will be affected by muscle movement or muscle function, such as walking or riding a bicycle. In neurogenic claudication, leaning over while riding the bicycle will relieve the symptoms in the same way as the shopping cart sign. Spinal stenosis can be treated operatively. For central canal stenosis, you can do decompression by laminectomy. For lateral recess stenosis, you can do medial facetectomy. You can add fusion for instability or if more than 50% of the bilateral facets are removed. You should look at the x-rays or MRI. If there is a slip of the vertebrae, do fusion in addition to the laminectomy. Patients who are treated surgically have a better outcome than those treated conservatively. The most common reason for failed surgery is recurrence of the disease (residual foraminal stenosis). If you have a patient with low back pain and gait disturbance (hyperreflexia), then you have an upper motor neuron lesion. You should think about the cervical spine, and you need to get an MRI of the cervical spine after you examine the patient. Think of cervical spine myelopathy because lumbar stenosis does not give these findings. A patient with spinal stenosis, spondylolisthesis, or facet disease will have pain with extension of the lumbar spine. Pain with lumbar spine flexion will suggest a disc related disorder.



Patellar Fractures

The patella is a large sesamoid bone. The quadriceps muscle is inserted at the proximal pole, and the distal pole gives attachment to the patellar tendon. The patella is triangular in shape. The proximal 75% of the patella is covered with cartilage, and the distal 25% of the patella is not covered with cartilage. The patella increases the power of the extensor mechanism by about 50% because it displaces the extensor mechanism anteriorly, and that will increase the moment arm. There are different classes of patellar fractures. In a displaced transverse patellar fracture, the patella can be pulled apart by the attached quadriceps tendon. The patient will be unable to do active extension of the knee. An upper or lower pole fracture is a fracture of the site of attachment of the patellar tendon. A comminuted fracture is a fracture in multiple pieces; it can be non-displaced or displaced. Comminuted fractures are very unstable and difficult to fix. A vertical fracture is the most common and is stable and non-displaced. An osteochondral fracture is a small fracture of the patella usually associated with acute dislocation of the patella. When examining a patellar fracture, you may feel a palpable gap. The area of the knee is usually swollen. The patient will be unable to do straight leg raise. The lateral view of the knee is the best view to see the fracture in x-ray, and 2-3 mm of displacement will probably mean that the patient will need surgery. The treatment for a patellar fracture will depend on what type of a fracture it is. If you think that the patient's extensor mechanism is intact, the patient is able to do straight leg raise, and the fracture is non-displaced or minimally displaced, it is usually a transverse fracture. In this situation, immobilize the knee straight in a hinged knee brace for 4-6 weeks with weight bearing as tolerated. Sometimes the patient cannot move the knee because of the pain, and injection of lidocaine inside the knee can help to assess the integrity of the extensor mechanism. If the patient has a total knee with 2mm displacement of the patella, and the extensor mechanism is intact, then the patient will be treated conservatively in a brace or in a knee immobilizer (no surgery). Indication for surgery is a displaced patellar fracture and the inability to do straight leg raising. The tension band fixation technique is the gold standard for the treatment of displaced patellar fractures (the fracture is usually a transverse fracture). To perform the tension band fixation technique, you must first reduce the fracture (hold the reduction with reduction clamps), then place at least two K-wires across the fracture, and apply an anterior tension band organized in a figure-8 pattern. A second wire may be placed circumferentially around the patella. Bending the k-wires from both ends may decrease migration of the wires and decrease the complications. The tension band fixation technique may be done with k-wires or also cannulated screws (through the cannulated screws, you place the wires). When you place k-wires, it means symptomatic hardware, and it means a secondary reoperation. It was found that the longitudinal screws and the tension band wires are a more superior fixation. The tension band construct, when performed correctly, will provide absolute stability and will convert the tension forces from the muscle pull into compression forces at the articular surface. You want to have anatomic reduction and stable fixation, do not judge the reduction by what you see at the surface of the fracture. Try to see and feel the joint if you can. Check the x-rays carefully. After you



fix the patella, you will do range of motion of the knee before closure and give the patient a hinged knee brace, locked into extension with weight-bearing as tolerated. A cane may be helpful to the patient. You will begin active flexion at 2-3 weeks (patient will lie prone, flexing and extending the knee). When the patient is prone, it avoids active knee extension and avoids excessive stress on the fracture site. At 6 weeks, you can unlock the brace and start moving the knee, gradually increasing the flexion. If the patellar fracture is comminuted, you can use the peripatellar circumferential wire loop fixation, which is commonly used as an addition to other methods of fixation. You can use a plate fixation utilizing a low profile implant and providing stable fixation. You can also excise the patella partially or completely. You can do partial patellectomy if the distal pole is extra-articular, and if it is severely comminuted and less than 40% of the patella, then you can excise it (in general, you would like to preserve the patella). If you cannot preserve the patella and ORIF is not possible, then you should do partial patellectomy and preserve the largest piece. Partial patellectomy may be necessary, but open reduction and internal fixation (if possible) is associated with a better outcome. You will do the partial patellectomy in severely comminuted inferior pole fractures. You will do medial and lateral retinacular repair, and a poor outcome may occur with removal of more than 40% of the patella. Total patellectomy will be done when the fractured patella cannot be fixed. Total patellectomy can cause extensor lag and loss of the extensor strength. The quadriceps torque is reduced by about 50%. Symptomatic hardware and knee pain is the most common complications after patella fracture fixation, especially if you use the tension band technique. It requires implant removal in about 50% of the cases. This complication will include hardware migration. Failure after patellar fracture fixation occurs in about 20% of the cases due to increasing age, fixation with wires, technical errors, and noncompliance.

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Elbow Dislocation in Adults

Recognize the terrible triad: elbow dislocation, radial head fracture, and coronoid fracture. The terrible triad is not a simple elbow dislocation; it is a complex elbow dislocation. In addition to these three injuries of the elbow, there is always a tear of the lateral ulnar collateral ligament. The treatment usually is reduction and splinting of the elbow. If no surgery is done, you will have recurrent dislocation of the elbow. You need to do surgery for reduction and fixation of the fractures and also to restore the elbow stability. This injury is unstable. Simple reduction and splinting is not going to work for this injury. You have to recognize the terrible triad because this means surgery. There are multiple types of elbow dislocation based on the position of the olecranon relative to the humerus. The most common type of elbow dislocation is the posterolateral type. There are two basic types of elbow dislocations: simple and complex. Simple elbow dislocations have no fractures seen and are usually a ligamentous injury. Complex elbow dislocations have associated fractures in addition to the ligamentous injury. When you have a simple dislocation of the elbow, you need to reduce it and then check the range of stability of the elbow. If you find that the elbow is stable with range of motion, then you will do a short period of immobilization with a posterior splint for approximately one week with the elbow in about 90 degrees of flexion. Then start active range of motion of the elbow. Recurrence of the dislocation is rare (less than 1%). If you keep the elbow immobilized more than 3 weeks, there will be severe stiffness of the elbow. You should do surgery if the dislocation is irreducible, if there is associated fracture, or if you are unable to maintain the stability of the elbow. After immobilization and early range of motion of the elbow, you will see the patient and do follow up x-rays to check joint congruity and to make sure that the elbow reduction is maintained. To treat the terrible triad, initially do closed reduction. Next, do open reduction and internal fixation of the coronoid (if possible), of the radial head or excise the radial head with radial head arthroplasty if the radial head is unreconstructable.

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Dr. Ebraheim, Amanda Critton and Sara Bell do not have any relationships with industry to disclose.

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