

THE UNIVERSITY OF TOLEDO MEDICAL CENTER

APPROVED FOR AMA PRA CATEGORY 1 CREDIT; SEE INSERT FOR DETAILS

THE UNIVERSITY OF TOLEDO MEDICAL CENTER

ORTHOPAEDIC MONTHLY

VOLUME 8, ISSUE 10 OCTOBER 2018

NABIL EBRAHEIM, M.D.

Giant Cell Tumor

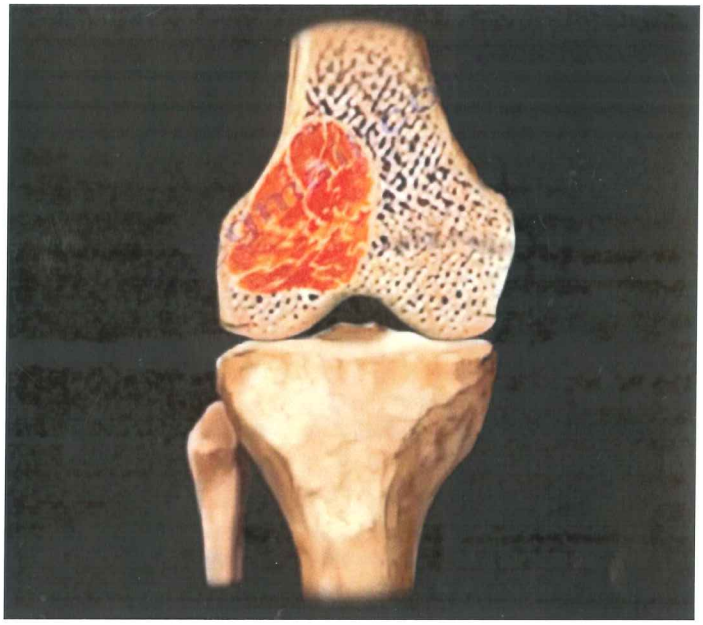
A giant cell tumor is a benign, locally aggressive tumor with bone destruction and with malignant potential. Giant cell tumors occur more in females and usually occur in skeletally mature patients. Giant cell tumors occur more in the distal femur, but they can occur in the proximal tibia, distal radius, proximal humerus, hand, spine (vertebral body), and the sacrum. When a giant cell tumor occurs in the sacrum, it occurs in the Ala, which is different from chordomas which occur in the midline of the sacrum. A giant cell tumor is an eccentric lesion that is lytic or radiolucent, and lies within the epiphysis/metaphysis area of the bone.

Plain x-rays are usually diagnostic and the lesion is usually geographic. This rumor rarely extends to the articular cartilage; however, it can break through the cortex into the surrounding tissues. Pulmonary metastases occurs in about 2% and theses lesions are usually benign. Get chest x-rays or a CT scan of the chest as part of the diagnostic workup.

In pathology, the giant cell tumor contains large multinucleated giant cells in addition to mononuclear stromal cells. The stroma cells look like the nuclei of the giant cells. The mononuclear stromal cells are the neoplastic cells. The giant cells are similar to osteoclasts and are directed through RANKL pathways to cause bone destruction. The tumor may have secondary Aneurysmal Bone Cyst (ABC) component.

The physician should rule out hyperparathyroidism or Brown Tumor. With multiple lesions (multiple giant cells) and in hyperparathyroidism, the serum calcium level is high. Giant cell tumors can appear in other pathological conditions, such as aneurysmal bone cysts, fractures, and chondroblastomas. If you see giant cells under the microscope, this does not mean that the patient has a giant cell tumor. Epiphyseal tumors such as chondroblastoma (young patients) and clear-cell chondrosarcoma (adult patients) should be ruled out as well. In the sacrum, you need to differentiate a Giant Cell Tumor from Chordoma. Chordoma will have a central location.

Primary malignant giant cell tumors have a greater chance of metastasis. This tumor behaves like an osteosarcoma with an abundance of giant cells (it is a different type of tumor). Metastasis



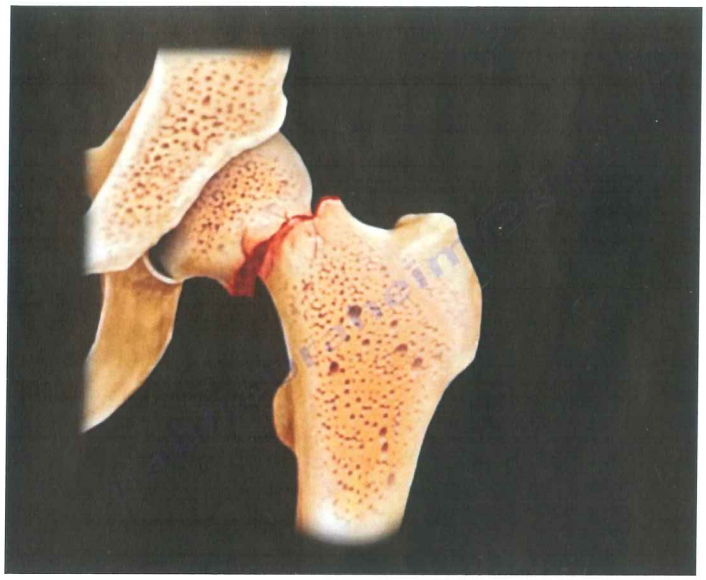
can occur in about 5% of cases. Secondary malignant giant cell tumors can occur following radiation or following unsuccessful attempts at removal of the giant cell tumor with recurrence. When there is recurrence of the tumor, you will see the radiolucent zone and then biopsy the tumor again.

Medical treatment consists of bisphosphonate and denosumab (will act on the RANK pathway). Denosumab is a human monoclonal antibody that is used in recurrent disease and when wide resection may cause significant morbidity. Denosumab is used in unresectable Giant Cell Tumors or when there is recurrence, or when the tumor is aggressive. Aggressive curettage and the use of the adjuvant (can be phenol, hydrogen peroxide, or cryotherapy) are additional treatment methods. The adjuvant decreases the microscopic disease and reduces the recurrence. After the aggressive curettage, the defect can be filled with bone graft or cement, plus or minus fixation. Resection and reconstruction is usually done in aggressive lesion if the tumor erodes or extends to the soft tissues, or in recurrent cases. Resection and reconstruction can also be done when there is involvement of the subchondral bone.

Femoral Neck Fracture in the Elderly Patient

Femoral neck fracture in the elderly patient is an important topic because it is connected to osteoporosis and to the high mortality rate in the elderly. In the hospital, the mortality rate is about 6%. The mortality rate in one year is about 25%. Surgery is usually needed to treat patients with femoral neck fractures. Very rarely the patient is treated without surgery and that can occur in patients with serious, significant medial issues. There is a consensus that surgery should be done early and the outcome is better when the surgery is done within 48 hours of admission. Surgery is usually done once the medical condition of the patient is optimized. Sicker patients are usually admitted under the medical service. Younger, healthier patients are usually admitted under orthopaedic care. Co-management is frequently done for these patients.

Sometimes, a screening Doppler is done in delayed presentation to the hospital to diagnose DVT and to document its presence on admission that it occurred before the patient came to the hospital and that it is not a hospital acquired condition. While it is a clear cut or straight forward decision to save the femoral head in the younger patient and to do reduction (closed or open), this decision is variable in the elderly patient. This decision usually depends on the displacement of the fracture and the physiologic condition of the patient. The physiologic age of the patient determines the treatment and the risk of complication. The pre-injury cognitive and physiologic age and function determines the optimal function after hip fracture treatment. There is a consensus that if the fracture is nondisplaced, complete or incomplete fracture, then you will treat the fracture with screw fixation. Usually, at least three screws are used. The surgery is a relatively small surgery. The physician should not use screws for displaced formal neck fractures in the elderly patient. The rate of failure and reoperation rate is high for this group of patients. The type of anesthesia given to the patient is variable; general or spinal anesthesia. If the fracture is displaced and unstable, then the physician should perform a hemiarthroplasty. A cementless procedure may cause intraoperative fractures. Unipolar or bipolar



procedures are controversial; however, they have similar outcomes. There is no difference between bipolar and unipolar procedures except the cost—a bipolar procedure is more expensive. This procedure (the prosthesis) is usually done in a patient that is physiologically old. However, a total hip arthroplasty can also be done in these patients. A total hip arthroplasty is usually done in a patient with a previous hip disease or it can also be done in the older patient that is active or physiologically young. A total hip will have an increased risk of dislocation. Which approach the physician will use to do the procedure is controversial. The anterolateral approach will give more fractures and abductor weakness. The posterior approach will give increased incidence of posterior dislocations and there is a need for excellent posterior capsular repair to reduce the incidence of dislocations. In general, the trend is to do a cemented hemiarthroplasty.

Distal Femur Fractures & Nonunion- Use of Fibular Graft

A physician may be faced with some complex distal femur fractures or nonunion where the bony stock is not adequate or the fixation may have failed. It may also be a situation where a bone graft cannot be obtained from the patient. An intramedullary fibular graft technique can be used in complicated cases, comminuted fractures with osteoporosis, failure of traditional method of fixation, complex nonunion, and complex supracondylar periprothetic fractures.

In order to perform the technique, the physician must first find the starting point, which is the center of the intercondylar notch just superior to the Blumensaat's Line. You will insert a guide wire after reduction of the fracture. Then you will ream over the guide wire to the appropriate size of the fibular graft, which you may need to fashion slightly. Make sure you change the beaded guide wire to a smooth one and put the fibular graft through the guide wire into the medullary canal across the fracture of the nonunion. If the medullary canal of the fibula is small and it will not go through the guide wire, then place the fibular graft free hand. Make sure that the fibular graft is not prominent through the joint. Next, fix the fracture or the nonunion with a plate, preferably a locking plate. You can augment the fixation with bone graft, allograft, or bone graft substitute. This procedure can also be helpful in periprosthetic fractures of the distal femur. If the prosthesis is stable, you will do fixation of the fracture or the nonunion.

Continued on page 3

Distal Femur Fractures & Nonunion- Use of Fibular Graft continued

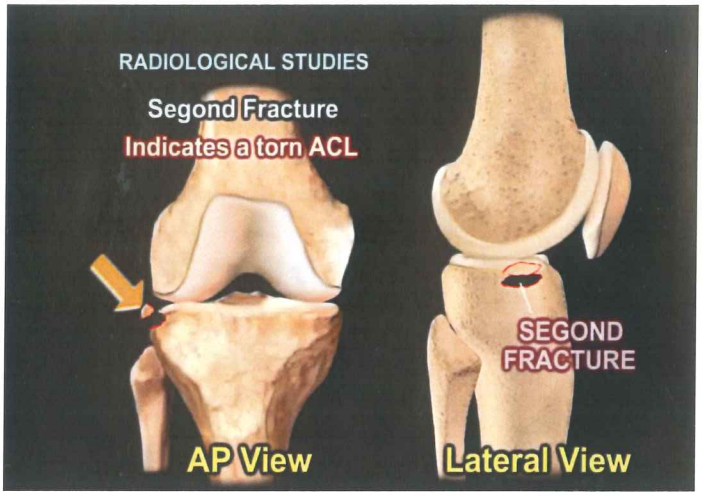
It is ideal to use a plate fixation after insertion of an intramedullary fibular graft, especially if the bony stock is very poor and if you can pass the fibular graft through the femoral component.

ACL Tears- Radiological Diagnosis

The Anterior Cruciate Ligament (ACL) is a strong band of tissue in the center of the knee that prevents anterior translation of the tibia on the femur. The mechanism of injury to the ACL is usually a noncontact, pivoting injury. As the ACL tears, the patient feels a "POP" and deep pain in the knee. The patient usually feels immediate swelling and the knee is usually filled with blood. This occurs due to tear of the middle genicular artery. On examination, the patient will have a quadriceps avoidance gait.

The Lachman's Test is the most sensitive test to diagnose tear of the ACL. During the Lachman's Test, the knee should be bent to about 20-30 degrees. One hand should be used to stabilize the femur and the other hand should pull the tibia anteriorly and posteriorly, against the femur. If the ACL is ruptured, the ACL will be lax and the examination will feel softer with no end point. The tibia can be pulled forward more than normal (anterior translation).

On x-ray, you can see Anterior Cruciate Ligament (ACL) avulsion. Avulsion of a piece of bone from the tibial eminence anteriorly. Avulsion of a piece of bone can be seen on the AP and lateral x-rays. An ACL avulsion fracture may be an isolated injury or it may sometimes be associated with other injuries and fractures such as tibial plateau fractures. Tibial spine fractures in children mimics ACL avulsion fractures in adults. An axial view MRI is used to evaluate the proximal ACL. This "Empty Notch Sign" or "Empty Wall Sign" indicates a torn ACL. The "Empty Notch Sign" means that there is an avulsion of the proximal femoral attachment of the ACL. A sagittal view MRI will show disruption of the ACL fibers. An MRI may show nonvisible and noncontinuous fibers. MRI will show the proximal ACL fibers to be dangled and the distal fibers to be dropped due to complete disruption of the ACL. ACL tears may cause bone bruises laterally on the middle of the femoral condyle and on the posterior aspect of the tibia laterally. In order to determine if a bone bruise is lateral, look at the fibula. The fibula is lateral. Check for the fibula on MRI. The pattern of bone marrow edema seen of lateral view and AP view MRI that will indicate an ACL tear. Suspect



impaction fracture and ACL tears when the lateral sulcus depth is greater than 2mm. A fibular head avulsion, or arcuate sign, is a horizontally oriented fracture of the fibular styloid process, the attachment site of the arcuate ligament complex. It can be associated with injury of the ACL, the PCL, and the posterolateral corner (probably more associated with the PCL than the ACL). A fibular head avulsion fracture will indicate that the posterolateral corner is involved. The arcuate sign should be recognized as a significant injury. Sometimes the avulsed piece of bone is too small and the injury can be missed. Failure to diagnose a fibular head avulsion may result in failure of future fixation of the cruciate ligaments, because the posterolateral corner instability was not diagnosed and treated properly.

Acute ACL injury may be associated with lateral meniscus injury. Chronic ACL injury may be associated with medial meniscus injury. In the ACL deficient knee, the posterior horn of the medial meniscus provides the secondary restraint to the anterior tibial translation. This added stress on the posterior horn of the medial meniscus may cause the medial meniscus to become injured.

Anatomy of the Popliteal Fossa

The area of depression located at the back of the knee joint is called the popliteal fossa. The popliteal fossa is a closely-packed space. It is bounded by the biceps femoris laterally, as well as the semitendinosus and semimembranosus medially. The lower part of the space is formed by the two heads of the gastrocnemius muscle.

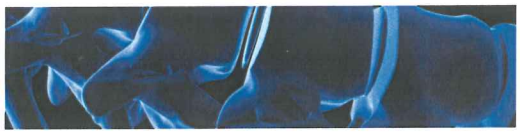
Four common conditions involving the popliteal fossa include: Baker's Cyst, Popliteal Artery Entrapment Syndrome, Posterior Knee Dislocation, and Posterior Cruciate Ligament (PCL) Injury.

A Baker's cyst is a benign swelling found behind the knee that lies between the semimembranosus and the medial gastrocnemius muscles. A Baker's cyst is also known as a popliteal cyst which lies posterior to the medial femoral condyle. The cyst is connected to the knee joint through a valvular opening. Knee effusion from intra-articular pathology allows the fluid to go through the valve to the cyst in one direction. Popliteal artery entrapment syndrome is a rare condition involving extrinsic compression of the popliteal artery behind the knee due to the anomalous relationship of the muscle and artery in the popliteal fossa.

Continued on back page

THE UNIVERSITY OF TOLEDO
MEDICAL CENTER

Department of Orthopaedic Surgery
The University of Toledo
3000 Arlington Ave., MS 1094
Toledo, Ohio 43614



Anatomy of the Popliteal Fossa continued

It may also be caused by fibrous tissue constricting the artery. This condition usually affects younger athletes who present with calf claudication. The blood flow will be decreased. The patient will complain of swelling, foot numbness and paresthesia, tingling of the toes, and cramping of the muscles. Plantar flexion of the ankle and hyperextension of the knee will decrease the pulses. An arteriogram is probably the best study showing the compression and condition of the artery. Treatment consists of observation and activity modification. Surgery may be necessary to release the muscle and relieve the pressure on the artery.

Posterior knee dislocation occurs as a result of violent trauma. The most common mechanism of injury includes exaggerated hyperextension of the knee and dashboard injuries. Posterior knee dislocation may be associated with a high incidence of popliteal artery injury.

Posterior translation of the tibia will occur with rupture of the posterior cruciate ligament. A common cause of this injury is a bent knee hitting a dashboard during a car accident; however, it occurs more frequently in sports from forced hyperflexion of the knee.

The quadriceps active test is conducted to test the quadriceps muscle. The examiner stabilizes the leg of the patient and then the patient is asked to actively contract the quadriceps muscle. The tibia is seen being actively reduced from the posterior subluxed position. The Lachman's Test is another test used to examine the knee. When performing the Lachman's test, the knee is bent at 20-30°. The examiner provides posterior force to the tibia while applying anterior pressure to the femur in order to access the posterior translation of the tibia. The posterior drawer test is carried out while the patient is in a supine position and the knee is flexed to 90°. The amount of translation of the tibia relative to the femur is observed. The dial test is performed while the patient is in the supine or prone position and both knees are in 90° (it shows the PCL injury) and 30° of flexion (will show the posterolateral corner injury). More than 10 degrees of external rotation indicates significant injury.

THE UNIVERSITY OF TOLEDO MEDICAL CENTER
ORTHOPAEDIC MONTHLY

Editors:
Dr. Nabil Ebraheim, Professor and Department Chairman of Orthopaedic Surgery;
Amanda Critton; and Lauren Corba

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

Department of Orthopaedic Surgery
The University of Toledo
3000 Arlington Ave., MS 1094
Toledo, Ohio 43614

For appointments, call 419.383.3761