



THE UNIVERSITY OF TOLEDO MEDICAL CENTER

ORTHOPAEDIC MONTHLY

VOLUME 3, ISSUE 6 SEPTEMBER 2009

Orthopaedic Center Expands Hours- Will Open from 7 a.m. to 7 p.m.

To provide easier access to orthopaedic care, the UT Orthopaedic Center will offer appointments from 7 a.m. to 7 p.m.

At the UT Orthopaedic Center, we understand that orthopaedic conditions are usually painful and require immediate attention and treatment so we've expanded our hours to provide timely care. This expansion supplements our current pledge of providing patients an appointment with an orthopaedic specialist within 24 hours of calling the Center, and emergent situations, we'll see patients immediately.

In addition to the available care on Saturdays, we felt the additional weekday hours would help patients who may have difficulty getting time off from work for an appointment. Now, patients have the benefit of having even easier access to orthopaedic care. "We are in the process of developing 24-hour service with consultations, new patient appointments and patient transfers, even from out of state. This process will be completed when the renovation of the orthopaedic unit on the 6th floor is finished."

The UT Orthopaedic Center has several orthopaedic surgeons on staff ready to treat injuries and conditions from neck to toe.

Our state-of-the-art facility has all services in one convenient location for patients. They can arrive and have their car valet parked. Patients are greeted at the door by a Team Ortho member to guide them through the rest of the appointment.

The Orthopaedic Center houses registration, a coffee and snack bar, large waiting rooms with flat panel televisions, examination rooms, soft good and cast rooms, a procedure room, a dexa scan, digital imaging including x-ray and MRI, a laboratory, a patient education center, and financial counseling.

With the expanded hours of service, we hope all patients will have easy and timely access to orthopaedic care. It's been our goal to provide a patient-centered experience, and we will continue striving to reach that goal.

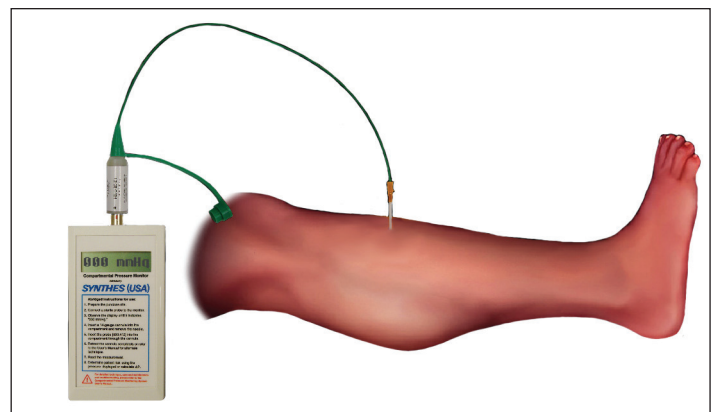


Measuring Compartment Pressure

In the June 2009 edition of the Orthopaedic Monthly we looked at a condition called compartment syndrome, an acute medical condition where increased pressure within a closed space compromises circulation and blood supply to tissues within the space. In this issue, we'll be looking at methods of measuring compartment pressure.

Compartment pressure at rest is +/- 4 mm of Hg. An increase of pressure to 30 mm of Hg (or within 30 mm of HG of diastolic blood pressure) will lead to an impending compartment syndrome. If the elevated pressure persists and blood supply is restricted for eight hours, irreversible changes occur in the muscle. Since the earliest pathogenic factor for compartment syndrome is raised tissue pressure, it is important to monitor and measure compartment pressure.

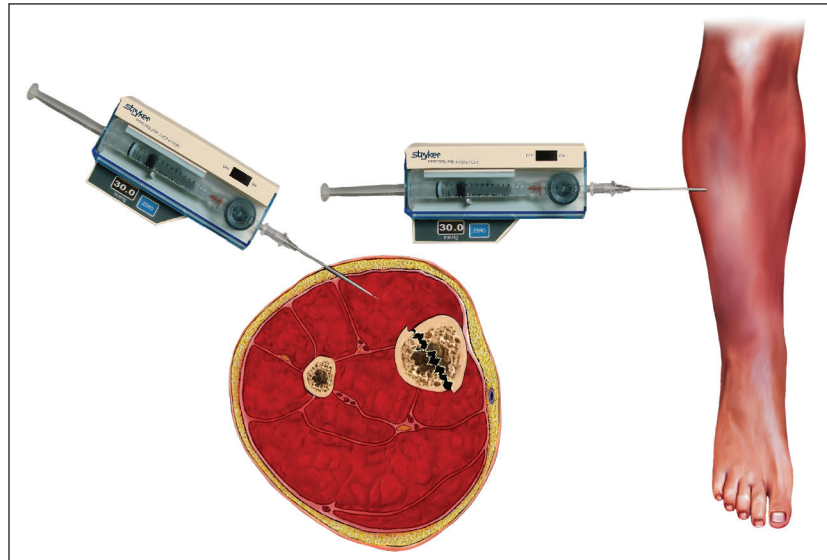
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Depiction of the Synthes compartmental pressure monitoring system

Measuring Compartment Pressure *continued from page 1*

While there are several methods to measure compartment syndrome, Stryker's STIC catheter system, Synthes Compartmental pressure monitoring system and arterial transducer measurement system are most commonly used. It's important to note that compartment pressure is measured only after thorough clinical



Depiction of the Stryker STIC catheter compartment pressure measurement system

assessment. For this, the most important symptom of an impending compartment syndrome is pain disproportionate to the patient's injuries. However, if patients are unconscious or have taken drugs that

may interfere with history taking and assessment, pressure may need to be taken to diagnose the condition.

A very popular method of measuring compartment pressure is using Stryker's STIC catheter system. This hand-held device utilizes a syringe pre-loaded with fluid connected to the measuring instrument with a disposable needle at the other end. After the system frees some fluid, the monitor is zeroed and the needle is inserted through the fascia. The pressure is then seen on the hand-held monitor.

Another method of measuring compartment pressure is Synthes' compartmental pressure monitoring system. Here, pressure is detected by the uniaxial piezoelectric semiconductor embedded at the end of the probe, which creates an electric signal that is sent to the hand-held monitor and displayed.

A third form of measuring compartment pressure is by arterial transducer measurement. Here, a 16-gauge catheter is flooded with saline and connected to a pressure monitor. Next, the catheter is inserted into the compartment and a measurement is taken from the arterial line monitor adjusted to the level of the measured compartment.

If there is more than 30 mm of Hg, physicians should perform a fasciotomy, a surgical procedure where the fascia (soft tissue component of connective tissue) is cut to relieve tension or pressure. If compartment syndrome is not treated, permanent paralysis and/or necrosis may result. The end stage is called Volkmann's ischemic contracture. ■

EMG and Nerve Conduction Studies

For patients having problems with muscles or nerves, doctors may order Electromyogram (EMG) and nerve conduction studies. These tests, usually performed in conjunction, measure the electrical activity of muscles at rest and during contraction and also measure how quickly nerves send electrical signals.

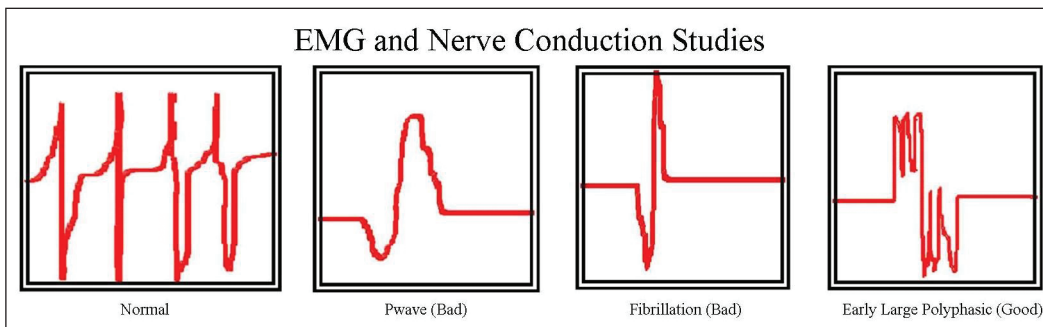
The goal of an EMG is to find diseases that cause damage to muscle, nerves or the junction between the two. To perform the exam, physicians insert a needle electrode attached to a recording machine (similar to a desktop/laptop computer) into different muscles of an extremity. The muscle's electrical activity is then recorded at rest and in contraction. Electrical activity is depicted as waves and lines on an oscilloscope (video monitor) and may be accompanied by sound relating to the examination. An electrode may be moved to several different areas of the muscle, in different muscles, or on the opposite extremity for purposes of comparison. An EMG is normal in peripheral nerve injury until 10-14 days after the injury. The earliest time after an injury to obtain a reliable EMG is three weeks.

Positive sharp waves (P-waves) and fibrillation are indicative of acute denervation. Both result from muscle cell instability. They are

referred to as spontaneous activity and denervation potentials. A positive sharp wave is spontaneous electrical activity generated by single muscle fibers. They are present when a muscle is denervated. Positive waves are di-phasic with initial phase positive. Fibrillation potentials are di or triphasic with initial phase positive. Re-innervation is indicated by the return of motor units, which are polyphasic waves with low amplitude, which gradually increase. This is due to collateral sprouting of the axons that survived. The nascent (just born) polyphasic motor unit activity represents the early evidence of nerve regeneration. When the injury is complete, there will be no motor potentials when muscle contraction is attempted.

There is a good prognosis for the patient when there are no P-waves, no fibrillation in three weeks following the injury. In addition, there is a good prognosis if there are large polyphasic motor units three to four weeks following the injury. However, the prognosis for the patient is poor if there are small polyphasic motor units six months after an injury.

Nerve conduction studies are utilized to find damage to the peripheral nervous system including nerves from the brain, spinal



cord, and nerves that branch out from those nerves. To perform the exam, physicians place an electrode over the nerve and an electrode over the muscle associated with that nerve. After the electrodes are placed, electric pulses are given to the nerve to measure how quickly the muscle contracts. They are helpful in determining the site of entrapment of the peripheral nerves and also in determining the severity of the injury. Immediately following a nerve injury, the nerve still responds to distal stimulation with normal muscle contraction. However, after 18-72 hours, this will no longer be the case.

EMG and nerve conduction studies can be used in determining the site of entrapment of the peripheral nerve, as well as in determining the severity of nerve injuries. They are also helpful in diagnosing the following disorders: focal disorders of the nerves; nerve root disorders; neuromuscular disorders; disorders of the muscle; and diffuse nerve disorders. Patients experiencing tingling or numbness in their extremities, weakness or fatigue of the muscles, nerve injuries or pinched nerves often have EMG and nerve conduction studies ordered. The test does not require hospitalization and can take anywhere from 30 minutes to two hours to perform. ■

Ultrasound-Guided Platelet-Rich Plasma Therapy

To understand the benefit of ultrasound-guided platelet-rich plasma injections, it is important to understand what platelet-rich plasma is. Blood is comprised of red (carries oxygen to the cells) and white blood cells (fights infection), plasma (acts as a transporter), and platelets (helps form clots). Platelet-rich plasma refers to blood plasma with a high concentration of platelets containing pivotal growth factors and tools for repair and regeneration.

To create platelet-rich plasma, blood is taken from the patient and filtered and separated through a process called centrifugation. When complete, the concentration of platelets and growth factors can be increased to roughly 400 percent. Typically, platelets represent 6 percent of blood's composition. However, following the process of centrifugation, platelets represent 94 percent of the composition.



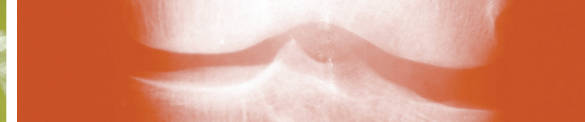
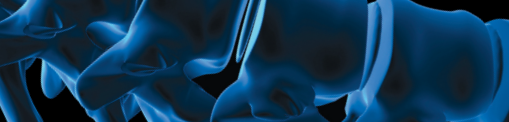
Ultrasound image of an ultrasound-guided platelet-rich plasma injection in the left shoulder

Platelets are essential for the body as they contain healing and growth aspects. The idea behind platelet-rich plasma therapy, therefore, is to extract blood from a healthy part of the body, increase the platelet count through centrifugation, and then re-inject the platelet-rich plasma into an injured area. Here, the body utilizes its ability to heal itself by stimulating growth factors and promoting healing.

The goal of platelet-rich plasma therapy, therefore, is to eliminate the need for possible surgical and/or aggressive treatments and medications. An effective way to inject the platelet-rich plasma into an injured area is with the use of ultrasound-guidance. This provides real-time guidance for a physician while they are injecting the needle into a target area. Here, ultrasounds provide an excellent visual tool as they can identify soft tissue, nerves, tendons and bones. The major benefit of using ultrasound-guidance for these injections is that they are much more accurate than typical "blind" injections. Other physiologic benefits include:

- ♦ Increased tissue regeneration
- ♦ Decreased inflammation
- ♦ Decreased pain
- ♦ Increased bone density
- ♦ Increased development of new blood cells

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Ultrasound-Guided Platelet-Rich Plasma Therapy *continued from page 3*

While ultrasound-guided platelet-rich plasma injections are relatively new, they are being used for several orthopaedic injuries with early success. These injuries and conditions include:

- ♦ Achilles tendinitis
- ♦ Patellar tendinitis
- ♦ Plantar fasciitis
- ♦ Hip bursitis
- ♦ Lateral epicondylitis
- ♦ Tendon and muscle tears
- ♦ Non-healing tendinitis and bursitis

Platelet-rich plasma therapy offers a plausible means of providing long-lasting relief and true healing. ■

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Editors:

Dr. Nabil Ebraheim, department chairman and professor of orthopaedics

Dave Kubacki, assistant to the chairman.

Neither Dr. Ebraheim nor Dave Kubacki have any relationships with industry to disclose.

For medical questions you would like to see addressed in this newsletter, please e-mail Dave at david.kubacki@utoledo.edu.

Department of Orthopaedic Surgery
3000 Arlington Ave
Toledo, Ohio 43614
For appointments, call 419.383.3761.

UTMC 432 909 25C

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

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