Modalities in Sports Medicine

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Welcome. My name is Dr. Carlo Guadagno. I'm an Assistant Professor of Clinical Sciences at National University of the Health Sciences, located in St. Petersburg, Florida. Today, we'll talk a little bit about the various modalities utilized in sports medicine. In sports chiropractic, we have many interventions at our disposal that we use in the rehabilitative process. Therapeutic modalities are just one group of interventions. We will highlight select modalities that are the most common in sport.

So in the first phase of healing, we want to reduce pain. We want to limit edema. We want to limit hypoxic tissue injury. We want to limit muscle spasticity. So the therapy of choice here would be cryotherapy, which is the use of cold. This phase may last up to six days.

There are various clinical applications of cold modalities. We could use a cold pack. And cold packs could include plastic bags filled with crushed ice, chipped ice, or flaked ice. We can have reusable cold packs. We can utilize cold compression therapy units, which use chilled water to provide cold and compression. And there's also the instant cold packs that use a chemical reaction to produce cold.

In this slide, we see an Argentinean judo athlete that suffered a shoulder injury. And I had placed crushed ice with water wrapped around with plastic on his shoulder. Also, we have an athlete from New Zealand. She had an acute ankle injury. And we're utilizing a cold compression unit, which was the predecessor of today's Game Ready.

A cold compression unit known as the Normatec is one of the most popular nowadays. Athletes use it quite extensively. And this example is from a winter sport athlete at the Lake Placid Olympic Training Center. Some of the contraindications to cryotherapy are cardiac or respiratory involvement, uncovered, open wounds, circulatory insufficiency, loss of sensation on the skin, advanced diabetes, Raynaud's phenomenon, and a cold allergy or hypersensitivity, which could cause hives or urticaria.

The second phase of healing is the proliferative phase. And this follows the initial inflammatory phase. Sometimes it's hard to tell when we could actually start to apply heat, because if we did apply heat in the acute inflammatory stage, it could cause further tissue injury.

Well, these are some of the questions that one might ask, such as does the body area feel warm to the touch? Is the injured area still sensitive to light or moderate touch? Does the amount of swelling continue to increase over time? Does swelling increase during activity? Does pain limit the joint's range of motion?

Would you consider the acute inflammation process to still be active? And does the patient continued to display improvement with the use of cold modalities? So if the answers to these questions are no, heat may safely be used. As the number of answers are yes, so does the indication to stay with cold.

So we have many different options when it comes to thermotherapy. First, we have to decide if it's a deep heater that we need, or is it superficial heat? Deep heat would be beyond three centimeters of depth. And in this case, ultrasound or shortwave diathermy would be the best choice. Ultrasound is better for smaller areas, and shortwave diathermy is better for a larger area. Superficial heat, most commonly used are those moist hot packs from a hydrocollator. We also use the whirlpools and immersion pools.

So heat is good for subacute and chronic injuries. And we would like to reduce the swelling, edema, and ecchymosis. We may want to reduce muscle spasm, muscle guarding. We may want to increase blood flow in order to increase range of motion before some therapeutic activity. We may want to resolve a hematoma. Heat is great for facilitating tissue healing, because it vasodilates the blood vessels and brings more blood to the area. It's good to relieve joint contractures. It helps fight infection.

But with any modality, you need to be aware of the contraindications. So first of all, it's contraindicated in acute inflammation, contraindicated with impaired or poor circulation, impaired or poor sensation, and impaired dermal regulation.

Probably one of the most common heat modalities is the hot moist pack. This is kept in a hydrocollator unit at a temperature of 165 to 170 degrees Fahrenheit. Application of the hot moist pack-- first of all, you need to assure yourself and the patient that no contraindications are present. We must cover the pack with a terry cloth. And we would use five to six layers of toweling between the patient's skin and the hot moist pack.

After placing the pack on the patient, we're going to return and recheck five minutes later. Sometimes it might be too hot for the patient, and you might have to add another layer. The hot moist pack needs to be reheated 30 to 45 minutes before the next use. The time of this treatment is up to 30 minutes.

These silica-filled hot moist packs come in a variety of sizes. Standard size would be 10 by 12. We also have an oversized, which is 15 by 24 inches. The cervical pack is useful for extremities as well as the cervical spine, and this is 24 inches long.

Another common thermotherapy modality is contrast baths. If you were in an institutional setting, such as the university training room, you might have two large whirlpools or two large immersion tanks. Well, one could also use two smaller containers, even buckets, as long as you have hot water in one with a temperature of 100 to 111 degrees and cold water in the other container of 50 to 64 degrees Fahrenheit.

So one of the protocols is a four to one heat to cold. You would repeat the sequence five to six times. The total duration of this treatment would be about a half-hour. And this may provide a more vigorous effect than utilizing heat or cold by themselves.

Another common modality is therapeutic ultrasound. This utilizes acoustic energy to create mechanical vibration in the cells. Ultrasound has many indications, some of which are thermal, some of which are non-thermal. And one must also be aware of the contraindications.

Some of the indications for ultrasound include treating postacute myositis ossificans, decreasing joint adhesions and joint contractures, decreasing the pain of neuromas, increasing extensibility of collagen tissue, decreasing muscle spasm, inflammation, and increasing deep tissue heating.

Some of the contraindications that one must be aware of is never to use this in an acute or postacute hemorrhage, infection, thrombophlebitis, over suspected malignancies, over impaired areas of circulation or sensation, over stress fracture sites, over epiphyseal growth plates, over the eyes, heart, spine, or genitals.

Some of the coupling methods in ultrasound are direct coupling, subaqueous, pad or bladder method, combo, utilizing electrical muscle stim and the transducer unit as an active electrode, and also phonophoresis, which is utilizing the ultrasound unit to deliver medication through the surface of the skin.

In the direct coupling technique, one would use a gel which is approved. And we would use it quite liberally to maintain a good contact with the surface of the skin. When treating irregularly shaped areas, such as the hands and feet, the immersion technique or subaqueous technique may be the preferred method. The limb is immersed in a tub of water. And the output intensity would be increased by 0.5 watts per square centimeter. The transducer is held about one inch from the body part. And we would avoid the formation of air bubbles.

Some of the electrotherapy modalities utilized are neuromuscular electrical stimulation. The most common one of these type of electrical modalities is Russian Stim or biphasic waveform. And this is used for muscle strengthening, muscle re-education, and edema control. Also, the TENS units are very common and something a patient can utilize at home. And this is a biphasic alternating current which is used mainly to attenuate pain.

In our offices, many of us have an interferential unit. This is a comfortable, medium-frequency current produced in the body by criss-crossing two alternating currents. And this is used for muscle spasm decrease and also to decrease pain. Iontophoresis is a continuous, unidirectional flow of direct current. And this is used for delivery of a medication into the patient. It can also be used to reduce inflammation or reduce pain. High-volt pulse current can be used for acute and chronic edema and wound healing. In this slide, we see a patient being treated with a combo method of ultrasound and electrical stim. So theoretically, this combines the benefit of both treatments. So this can be used for muscle spasm or trigger points. Interferential current or IFC is utilized for acute pain, chronic pain, and muscle spasm. It's touted as one of the more comfortable waveforms. Russian Stim is probably the most famous neuromuscular electrical stim. It utilizes a sine wave at 2,500 pulses per second. And this is modulated in 50 pulses per second bursts.