Blood Flow Restriction Therapy

Blood flow restriction therapy (BFR) is a form of training that involves fully occluding the venus flow while partially occluding the arterial flow to promote hypertrophy, strength, and prevent disuse atrophy of muscles.

By combining BFR with Low Impact resistance (LI) of approximately 25% to 40% of one-rep max (1RM) patients and athletes can achieve results similar to high-intensity interval training (HIIT) with the high mechanical loads that can tear muscle fiber and cause deterioration in joints.

The resulting metabolic crisis causes a switch from slow-twitch to fast-twitch Type I and activate the natural muscle recovery mechanism that releases HGH, IGF-1, and down-regulates Myostatin in addition to activating the protein synthesis chain.

Fast-twitch fibers produce strength and power, so building up these fibers during training allows for an improved training environment with a decreased mechanical load on the body.

Indications for use include, but are not limited to, post-operative rehabilitation, prolonged immobilization, muscle wasting, geriatric, recurring sprains/strains, and severe osteoarthritis.

BFR has been shown to reduce atrophy that accompanies injury and can serve in strength and conditioning programs to increase speed, strength, Vo2 Max and VE Max.

Precautions/Contraindications Post Surgery – See the attached Patient Intake guideline and DVT Questionnaire.

Precautions/Contraindications Non- Surgery – history of DVT, pregnancy to 6 months post-partum, varicose veins, untreated high or low blood pressure, cardiac disease, previous cerebral hemorrhage/stroke, severe pain during treatment, increasing/worsening numbness and tingling during treatment.

Side Effects – Studies have shown that site bruising, pain, numbness, tingling, and delayed muscle onset soreness (DOMS) may result from treatment.

Patient Guidelines – Pre Treatment – patients should be adequately hydrated before treatment drinking at least 16 oz of water within 30 minutes. If possible, the use of high concentrations of caffeine should be avoided pre-treatment (caffeine results in vasoconstriction).

**PROCEDURE:**

**Equipment Preparation**

• Ensure that the cuffs have been cleaned

• Release the Tab on the Dial and pull the strap entirely out

• Close the Tab and rotate ¾ rotation

**Patient Preparation**

* Instruct the patient on what they can expect from the treatment and what is expected of them. Communicate to the patient that the procedure can be stopped at any time.
* Establish the patients 1RM or refer to the guidelines provided by their surgeon/doctor. If 1RM is unknown err on the conservative side. Since BFR is a combination of BFR and LI, you should observe for a condition of fatigue during the routine. Patients should begin to fail ½ way through the final set. If they fail earlier, either reduce the pressure of the cuff or reduce the load.
* Determine the proper pressure by referring to the tightness chart. The pressure is based on the total reduction of the circumference of the limb. During leg training, you may choose to tighten the cuff as the patient’s body adapts to the cuff. Leg cuffs will require more rotations to tighten because of the leg circumference and additional pressure necessary for the legs to occlude.
* At any time in the treatment, you can reduce pressure b lifting the tab and having the patient flex their muscle. The dial will de-rotate naturally. Additional slack can be created by pulling the strap from the tunnel with the tab lifted.
* When the cuff is tightened initially, ask the patient if they feel any numbness or tingling. If they do, lift the tab and let the cuff expand naturally. Then close the tab and click 2-3 clicks (2-3 mm).

**Upper extremity application**

* Prepare the cuff and then pull up over the arm. Position the cuff above the bicep as high as it will go. Be sure that the gel is under the arm to provide additional protection and comfort. The gel should extend 2mm beyond the edge of the cuff.
* Tighten the cuff using the grid guideline. Alternately, after the first application, patients will give you accurate feedback as to the tightness of the cuff. You may find that one arm is tightened more than the other to achieve the same “feel.”
* Ask the patient if they feel any numbness or tightening. If they do, loosen the cuff.
* Check for a radial pulse. You can also perform a capillary refill test by pressing your thumb to the heel of the hand. The skin should return to normal color in less than 5 seconds.
* Perform the workout. Check pulse or refill several times and ask if the patient is experiencing numbness or tightening. If they do, loosen the cuff immediately. Then redial to continue.

**Lower extremity application:**

* Thread the cuff or tighten the cuff to “snug” around the greater trochanter and ensure that it is as high as possible. The gel should be between the legs protecting the femoral artery.
* Tighten the cuff using the dial and the chart. When fully tightened, ask the patient if they feel any numbness or tingling. If they do loosen the cuff. Find the dorsal pedal/posterior tibial pulse and verify. If no pulse, loosen the cuff. Check often during exercise.
* Verify tightness during exercise. Because of the mass of the leg, the initial compression may be inadequate to maintain proper occlusion. Tighten during exercise while obtaining feedback from the patient.
* If the patient transitions from a sitting to a standing position, the cuffs will need to be tightened because of the difference in sitting and standing systolic pressure.

Cuffs should stay on and fully tightened up to 25 minutes. However, you may loosen the cuff mid-exercise, then retighten to go for more extended periods.

**Rate of perceived fatigue (RPF)©:**

Because BFR is a combination of blood flow restriction and low-intensity resistance, fatigue, not pressure is the most accurate sign of effectiveness. An analysis of multiple studies showed that occlusion rates between 20% and 70% delivered similar results with the significant modifier being resistance.

Fast-twitch Type II fibers are built around power and speed and as such, will begin to fail quickly. When occluding, you are causing the slow-twitch, typically highly efficient, to fail more rapidly than can be achieved in regular exercise.

Causing fatigue too early in the exercise means that the pressure or resistance was too high. Likewise, not failing indicates too little pressure or resistance.

Similar to the rate of perceived exertion (RPE) in fitness, RPF can be used in a wide variety of patients where pressure alone is only partially accurate.