Hyperbaric Oxygen Therapy Helps Sports Injuries

Breathing Oxygen under increased pressure of more than 1ATA is referred to as hyperbaric oxygen therapy or HBOT. This should be considered an important adjunctive therapy in the management of acute trauma, which is seen in sports injuries.

Trauma is a multi disciplinary medical problem as it could affect many different systems of the body. Trauma, direct or indirect, in turn, can be classified as either minor (contusions, subluxations-ligamental injuries, etc) or major (fractures, spinal injuries, severe contusions, crush injuries - compartment syndrome, burns, etc).

Benefits of HBOT:

- Reduces swelling and pain
- Prevents Hypoxia of the traumatized tissues
- Speeds up the healing of tissues, ligaments and fractured bones
- Reduces scar tissue formation and damage
- .Helps return players to the game sooner

Ischemia and edema are parts of a vicious circle where Hypoxia is the major component in the changes that affect the injured tissues. Edema (swelling) of the tissues will compound the problem created by hypoxia as it increases the diffusion distance from the capillaries to the cell.

This also affects the micro-circulation or clumping of erythrocytes that in turn impede circulation in already compromised tissue. Although plasma still may go through the capillaries, it may not carry enough oxygen to sustain the life of cells. Here is where the oxygen under pressure proves its benefits (Henry's Law).

As the partial pressure of inspired oxygen increases, the plasma dissolved in oxygen increases proportionatelly. For each one millimetre of increased pressure of Oxygen, 0.003 millimetres of Oxygen is dissolved in plasma. This amount dissolved in plasma, is sufficient to oxygenate tissues without haemoglobin borne oxygen.

The usual treatment protocols are between 2- 3 ATA and at these pressures there is enough oxygen dissolved in plasma. At 3 ATA there is sufficient amounts of dissolved oxygen in the plasma to sustain life. (Boerema et al.1960)

Traumatized tissue's auto regulatory mechanism increases blood flow to compensate for hypoxia. In a damaged microcirculation this mechanism causes undesirable swelling.

The increases in the oxygen carrying-capacity of the plasma appears to have 2 important effects. Firstly, in-spite of the collapse of the microcirculation (Hargens&Akeson 1981) the plasma carry sufficient amounts of oxygen to avoid problems associated with hypoxia. Hyperbaric oxygen, with the treatment pressure (2 ATA) increases the diffusion distance by a factor of three (Pierce 1969).

Second effect; reduction of edema through vasoconstriction. Oxygen under pressure causes 20% reduction in blood flow (Bird&Telfer 1965, Nylander, Nordstrom and Erickson 1984; Sukoff&Ragatz 1982). Edema is reduced at the same time microcirculation improves and this enhances re-absorption of fluid and a further reduction of swelling. In addition HBOT appears to protect microcirculation by reducing venular leukocyte adherence and inhibiting progressive adjacent arteriolar vasoconstriction.

The important part of treatment and rehabilitation of any injury is physical therapy with the associated application of HBOT, using various protocols according to the type and origin of the injury.

In conclusion, data from many studies suggest that treatment should be instituted with in first 24-48 hours. Some studies indicate the first 12 hours is very important and the injury should be treated aggressively from 2.2 ATA to 2.8 ATA between 60-90 min.