

Rheumatoid Arthritis

Basic Considerations

Rheumatoid arthritis is a systemic inflammatory disease of a chronic nature that is characterized primarily by a pattern of involvement of the synovial joints. The inflammatory process may involve soft tissues such as tendons, ligaments, and muscle, and may invade the bone. The etiology of the disease remains uncertain; suspected causes include immunological disturbances and infectious agents.

McCarty (1981) reviewed the available evidence in search of a rationale for HBO in the management of rheumatoid arthritis. Hypoxia of the arthritic patient is evidenced by low synovial pO_2 levels but these are not specific to rheumatoid arthritis. The causes of hypoxia are:

- Increased metabolic demand for oxygen by an inflamed joint.
- Decrease of blood flow to the joint by raised intraarticular pressure.

There is a fall in the synovial fluid of a rheumatoid knee joint after exercise. The hypoxic condition of many inflamed joints may be responsible for microinfarction of particulate collagens in joint fluid that are qualitatively and quantitatively identical to the collagens of synovial membrane.

HBO can suppress sterile inflammation due either to immunologic factors or microbial infection. Thus, arthritis induced in rats by injections of adjuvant is suppressed if HBO is started within 2 days after injection. Moreover, daily HBO therapy suppresses the inflammatory response even if given when the arthritis is fully developed (Warren *et al* 1979). Shakbazyan *et al* (1988) studied the effect of HBO (1.5 ATA and 3 ATA) on the development of clinical, immunological, and morphological manifestations of adjuvant arthritis in C57BL/6 mice. In comparison with the control group, HBO was found to inhibit the development of clinico-morphological manifestations of adjuvant arthritis and hindered the development of the process. The treatment was more effective in the early stages of the disease. Pressure of 3 ATA was more effective than 1.5 ATA, but toxic manifestations were seen with 3 ATA in the pulmonary vessels.

Clinical Applications

Kamada (1985) carried out laboratory examination of patients with rheumatoid arthritis undergoing HBO therapy.

Under HBO therapy, serum superoxide dismutase values increased and lipid peroxidase activity decreased. At the same time ESR and Lansbury's index showed a remarkable recovery. From these results, the authors suggested that HBO therapy may be an effective treatment for patients with rheumatoid arthritis.

Saikovsky *et al* (1986) have used HBO in treatment of 20 patients with rheumatoid arthritis and recommend it as an appropriate therapy when systemic symptoms such as ischemic neuropathy, arteritis, or Raynaud's phenomenon are present.

Davis *et al* (1988) conducted a pilot study in 10 patients with rheumatoid arthritis of which 8 received HBO treatments (100% oxygen at 2.5 ATA, ten 90-min sessions once a day on alternate days) and 2 sham treatments (breathing air at normal pressure). There was no remission of the disease during treatment period and authors concluded that further large scale double-blind trials to assess efficacy of HBO in rheumatoid arthritis were not worthwhile.

Lukich *et al* (1991) treated 35 patients with rheumatoid arthritis by HBO. Each patient received 21 sessions of HBO under 1.7 ATA for 40 min. Good clinical results, both immediate and late, were obtained. The effect of HBO on the immune system of the patients intensified the suppressive function of T-lymphocytes (especially in those with systemic manifestations of the disease), normalized cell-bound immunity and decreased the serum concentration in immune complexes.

Rui-Chang (1994) reported on the results of HBO treatment of 37 patients with rheumatoid arthritis using relief of pain and swelling with improved mobility as criteria of success. Nine patients (24.3%) recovered completely 19 (51.4%) improved markedly, and 6 (16.2%) showed slight improvement. Only 3 (8.1%) patients failed to respond.

Conclusions

HBO has proven to be a useful adjunct to surgery in the treatment of trauma to the extremities, particularly crush injuries. Most of the benefit is obtained by counteracting the effects of ischemia and anoxia commonly found in such injuries. Plainly HBO would have an even more important role to play in patients with multiple trauma. There is already evidence for the beneficial effects of HBO in head injuries (cerebral edema) and acute spinal cord injuries. Every large trauma center should have a hyperbaric facility, as it is vital to institute HBO therapy as soon as possible.