

Dysbaric Osteonecrosis

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Diving Medicine Online

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Definition

Death of a portion of the bone that is thought to be caused by nitrogen embolization "blockage" of the blood vessels in divers. Although the definitive pathologic process is poorly understood, there are several hypotheses:

- **Intra- or extravascular nitrogen in bones, "nitrogen embolization".**
 - **Osmotic gas effects due to intramedullary pressure effects.**
 - **fat embolization**
 - **hemoconcentration and increased coagulability.**
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Process

The lesion begins as a random finding on x-ray without symptoms. Symptomatic lesions usually involve joint surfaces and fracture with attempted healing occurs. This process takes place over months to years and eventually causes disabling arthritis, particularly of the femoral head (hip).

Where it Occurs

In a study of bone lesions in 281 compressed air workers done by Walder in 1969, 29% of the lesions were in the humeral head (shoulder), 16% in the femoral head (hip), 40% in the lower end of the femur(lower thigh at the knee) and 15% in the upper tibia (knee below the knee cap).

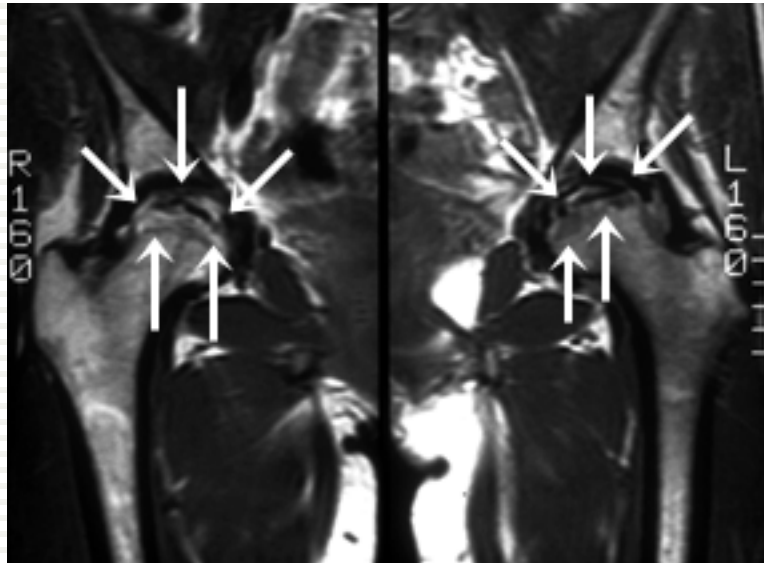
Why It's Important

It is a significant occupational hazard, occurring in 50% of commercial Japanese divers, 65% of Hawaiian fishermen and 16% of commercial and caisson divers in the U.K. It's relationship to compressed air is strong in that it may follow a single exposure to compressed air, may occur with

no history of DCS but is usually associated with significant compressed air exposure. The distribution of lesions differs with the type of exposure-the juxta-articular lesions being more common in caisson workers than in divers. There is a definite relationship between length of time exposed to extreme depths and the percentage of divers with bone lesions.

Diagnosis

The diagnosis is made by x-ray/MRI appearance and has five juxta-articular classifications and four head, neck and shaft classifications indicating early radiological signs.



Pathology

Early on there is flattening of articular surfaces, thinning of cartilage with osteophyte (spur) formation. In juxta-articular lesions without symptoms, there is dead bone and marrow separated from living bone by a line of dense collagen. Microscopic cysts form, fill with necrotic material and there is massive necrosis with replacement by cancellous bone with collapse of the lesions.

Treatment

The treatment is less than successful, often requiring a joint replacement. Spontaneous improvement occasionally happens and some juxta-articular lesions don't progress to collapse. Other treatments include immobilization and osteotomy of the femur. Cancellous bone grafts are

of little help.

The best treatment is prevention by using the safest decompression table possible. Because of the high relationship with DCS, all DCS symptoms should be treated with Recompression and HBO.

*Adapted from David Elliott, Medical Seminars, 1996

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