



Australasian Hyperbaric & Diving Medicine Research Trust

Title:

EFFECTS OF HYPERBARIC OXYGEN AND AMINOGUANIDINE TREATMENT ON FEMORAL HEAD MORPHOLOGY IN A RAT MODEL OF OSTEONECROSIS

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Introduction:

Non-traumatic osteonecrosis is a devastating disease with unclear pathophysiology hitherto. The Micro CT scan has been used to assess bone morphology of femoral head osteonecrosis (FHN). We investigated the effect of hyperbaric oxygen and Aminoguanidine (iNOS suppressor) in prevention of FHN in spontaneous hypertensive rats (SHRs).

Methods:

After animal ethic approval 34 spontaneous hypertensive rats (SHRs) divided into four groups and commenced on following treatments at 5th weeks of life: Hyperbaric oxygen (HBO) 250 Kpa for 30 days, Aminoguanidine (AMG) 1mg/ml of drinking water for 12 weeks in combination with or without HBO treatment, and control group without any treatment. Rats were sacrificed and femurs were analysed for evidence of osteonecrosis using Micro CT scan. Statistical analysis was carried out by SPSS 16.0 software using ANOVA and Post hoc tests.

Results:

The subchondral bone quality of the femur head was analysed by μ CT. It was found that significantly lower fractional trabecular bone volume in untreated SHRs compared with treatments of HBO, HBO+AMG and AMG groups ($P < 0.02$). The ratio of bone surface to volume was 1.871 ± 0.67 in the control group, which did not revealed significant difference compared to that in HBO group (2.073 ± 0.37 of HO, $p < 0.53$). It was noticed that the ratio of bone surface to volume was significantly increased in the groups of HBO+AMG and AMG alone (2.084 ± 0.66 of HBO+AMG, $p < 0.042$, 2.1136 ± 0.37 of AMG, $p < 0.013$). Interestingly, trabecular numbers and thickness only improved by AMG treatment ($P < 0.003$, $P < 0.04$), while trabecular separation improved by both AMG and HBO+AMG treatment ($P < 0.000$, $P < 0.007$).

Conclusion:

Trabecular bone quality of SHRs has been improved with both AMG and HBO treatment, which indicates that both AMG and HBO can prevent osteonecrosis process in SHRs.

References:

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