Extracorporeal shockwaves show regenerative effect in osteonecrosis of the femoral head

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Device and producing company:
Ossatron (SANUWAVE, USA)

Introduction:
Extracorporeal shockwave treatment was shown effective in early osteonecrosis of the femoral head (ONFH). However, the effect of shockwave in ONFH is poorly understood. This study investigated the regenerative effect of shockwaves in ONFH.

Methods:
This study consisted of 14 femoral heads removed from 14 patients undergoing total hip surgery. The study group included 7 patients with 7 hips that received shockwave treatment prior to surgery, whereas, the control group included 7 patients with 7 hips that did not receive shockwave treatment. Both groups showed similar demographic characteristics. The investigations included histomorphological examination for tissue distributions and immunohistochemical analyses for angiogenesis-related growth indicators including VEGF, CD 31, VCAM, and PCNA.

Results:
In histomorphological examination, the study group showed significantly more viable bone and less necrotic bone, and more cell activity and phagocytosis than the control group ($P < 0.05$). In immunohistochemical analysis, the study group showed significantly higher expressions of VEGF ($P = 0.0012$), CD31 ($P = 0.0023$), and PCNA ($P = 0.0011$) and less VCAM ($P = 0.0013$) than the control group.

Discussion:
In early ONFH, core decompression is performed with the rationale of decreasing the intra-osseous pressure and regeneration of the femoral head. Reparative effects of the femoral head were also reported after hyperbaric oxygen therapy, oral alendronate and shockwave therapy. The current study demonstrated that shockwaves promoted new vessel formation and cell proliferation similar to that observed in animal experiments.

Conclusion:
Application of extracorporeal shockwaves results in a regenerative effect in hips with ONFH.