Hydroxyapatite

- Micro/Nanofibrous Polycaprolactone Scaffolds Loaded with Gentamicin for Improved Antimicrobial Activities under Seawater Immersion
- Effectiveness of biportal endoscopic lumbar interbody fusion using the multi-layer bone grafting technique: a retrospective study from Vietnam
- Dual-imaging nanoparticles based on surface-modified magnetic nanoparticles and biodegradable photoluminescent polymers
- Comparison of the Lumbar Drain and the Hydroxyapatite Methods for Cerebrospinal Fluid Leakage after Endoscopic Skull Base Surgery
- Bone Bridge Formation in Hydroxyapatite Spacers Following Cervical Laminoplasty: A Comparative Study of Spondylotic Myelopathy and Ossification of the Posterior Longitudinal Ligament
- Physicochemical Properties and Biocompatibility of Injectable Hydroxyapatite Cement and Its Application in Compressive Tibial Plateau Fractures
- Comparison of bone ingrowth and clinical outcome of a collagen-hydroxyapatite bone graft substitute versus autologous bone graft in posterior lumbar interbody fusion
- Long-Term Series of Custom-Bone Hydroxyapatite Cranioplasty: Outcomes and Survival at 15 Years

Hydroxylapatite, also called hydroxyapatite (HA), is a naturally occurring mineral form of calcium apatite with the formula Ca5(PO4)3(OH), but is usually written Ca10(PO4)6(OH)2 to denote that the crystal unit cell comprises two entities. Hydroxylapatite is the hydroxyl endmember of the complex apatite group. The OH- ion can be replaced by fluoride, chloride, or carbonate, producing fluorapatite or chlorapatite. It crystallizes in the hexagonal crystal system. Pure hydroxylapatite powder is white. Naturally occurring apatites can, however, also have brown, yellow, or green colorations, comparable to the discolorations of dental fluorosis.

Up to 50% by volume and 7% by weight is a modified form of hydroxylapatite (known as bone mineral).

Carbonated calcium-deficient hydroxylapatite is the main mineral of which dental enamel and dentin are composed. Hydroxylapatite crystals are also found in the small calcifications (within the pineal gland and other structures) known as corpora arenacea or 'brain sand'.

Indications

Cranioplasty

Hydroxyapatite cranioplasty.

Pedicle screw augmentation

Hydroxyapatite and calcium phosphate augmentation in osteoporotic vertebrae showed a trend toward increased pedicle screw pull-out strength over controls. Pedicle screw pull-out force of polymethylmethacrylate in the insertion stage was higher than that of hydroxyapatite. However,

hydroxyapatite is likely a better clinical alternative to polymethylmethacrylate, as hydroxyapatite augmentation, unlike polymethylmethacrylate augmentation, stimulates bone growth and can be revised [1)].

Cerebrospinal fluid fistula prevention

Cerebrospinal fluid fistula prevention

Case series

Twenty cases of retrosigmoid craniotomy repaired with hydroxyapatite cement were identified. Median length of follow up was 9.8months. No cases of cerebrospinal fluid leak were identified. One patient developed a wound infection which was thought to be related to a chronic inflammatory response to the implanted dural substitute. No other major complications were noted.

CONCLUSIONS: A method and case series of suboccipital retrosigmoid cranioplasty using hydroxyapatite cement and a are reported. Hydroxyapatite cement cranioplasty is a safe and effective technique for repair of retrosigmoid craniotomy defects [2)].

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Yi S, Rim DC, Park SW, Murovic JA, Lim J, Park J. Biomechanical comparisons of pull-out strengths after pedicle screw augmentation with hydroxyapatite, calcium phosphate or polymethylmethacrylate in the cadaveric spine. World Neurosurg. 2015 Mar 10. pii: S1878-8750(15)00125-4. doi: 10.1016/j.wneu.2015.01.056. [Epub ahead of print] PubMed PMID: 25769482.

2)
Luryi AL, Bulsara KR, Michaelides EM. Hydroxyapatite bone cement for suboccipital retrosigmoid cranioplasty: A single institution case series. Am J Otolaryngol. 2017 Jul - Aug;38(4):390-393. doi: 10.1016/j.amjoto.2017.03.007. Epub 2017 Mar 31. PubMed PMID: 28390811.