

Hydroxyapatite Cranioplasty

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Among [alloplastic](#) materials, [bioceramics](#) such as microporous and macroporous hydroxyapatite (HA) have been extensively used as a [bone graft](#) substitute because the crystalline phase of HA is similar to the [bone mineral](#) component.

Morbidity is high following [cranioplasty](#), with over a tenth requiring explantation. Hydroxyapatite and [acrylic](#) were associated with reduced risk of all-cause [explantation](#) and explantation due to [infection](#). Cranioplasty insertion at three to six months was associated with increased risk of explantation due to infection ¹⁾.

Custom made cranioplasty of porous hydroxyapatite

see [Custom made cranioplasty of porous hydroxyapatite](#).

Case series

A retrospective study of patients with a hydroxyapatite implant from 2010 to 2014 at our neurosurgical department was conducted. Demographic, surgical and radiological data were studied. A senior neuroradiologist, a staff member neurosurgeon and a resident neurosurgeon independently performed the radiological evaluation. A new software analysis technique was developed to objectively quantify the degree of osteointegration.

Seventeen implants were evaluated with an average patient age of 39 years and a mean follow-up of 155 weeks. Through radiologic evaluation, osseous bridging was deemed higher than 50% in six prostheses and higher than 75% in three. In five patients, no osteointegration could be seen. The remaining patients exhibited sparse signs of osteointegration, estimated between 10 and 50%. Software analysis showed an average osteointegration ratio of 37.4% with a 400-HU filter and 27.3% with a 700-HU filter.

In this small retrospective study of cranial hydroxyapatite implants, osteointegration did occur and to a degree of more than 50% in 1/3 of the patients ²⁾.

1)

Millward CP, Doherty JA, Mustafa MA, Humphries TJ, Islim AI, Richardson GE, Clynch AL, Gillespie CS, Keshwara SM, Kolamunnage-Dona R, Brodbelt AR, Jenkinson MD, Duncan C, Sinha A, McMahon CJ. Cranioplasty with hydroxyapatite or acrylic is associated with a reduced risk of all-cause and infection-associated explantation. Br J Neurosurg. 2022 May 24;1-9. doi: 10.1080/02688697.2022.2077311. Epub ahead of print. PMID: 35608052.

2)

Maenhoudt W, Hallaert G, Kalala JP, Baert E, Dewaele F, Bauters W, Van Roost D. Hydroxyapatite cranioplasty: a retrospective evaluation of osteointegration in 17 cases. Acta Neurochir (Wien). 2018 Nov;160(11):2117-2124. doi: 10.1007/s00701-018-3694-6. Epub 2018 Oct 2. PMID: 30276548.

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