

Hydroxyapatite based bio-ocular implants

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An orbital implant, by definition, is the replacement of an absent natural eye, following an evisceration, enucleation or orbital exenteration. An orbital implant may be alloplastic or autologous, integrated or non-integrated. The shapes of the implants are usually spherical and the diameter size ranges from 12 to 24 mm. The wrapping material acts as a buffer to shield the conjunctiva. It also acts as a conductive material for the attachment of the extraocular muscles. Studies and various operative analyses have shown that integrated ocular implants are much more feasible and provide long term bio functionality than an ocular prosthesis. Over years, ocular materials have been redesigned to improve their aesthetics, biofunctionality, biocompatibility and adaptability. Additionally, the redesigned ocular materials have shown reduced toxicity among patients, hence minimising postoperative complications. A number of ocular materials are widely being used today, namely poly(methyl methacrylate) (PMMA), hydroxyapatite (HA), polyethylene and aluminium oxide. PMMA and polyethylene have been used as intraocular implant lenses (IOLs) due to their value for cost, differed rigidity, transparency to visible light and excellent biocompatibility with ocular tissues. On the other hand, aluminium oxide was primitively used as a counter material for HA. However, this has been a debatable topic in medical society, suggesting that the material causes overexposure. In addition, low-cost versions of these materials have been introduced in the field but medical experts usually recommended the usage of HA for placement in orbital space. Therefore, HA is an accepted standard and is a widely used ocular implant material due to its porous nature and rapid fibrovascular ingrowth. It has been shown that the majority of the exposed HA implants can be successfully treated by using patch grafts of different origins (e.g. oral mucosa graft and dermis graft) without the need for implant removal. This improves and minimises the need for highly invasive postoperative correctional procedures. Hydroxyapatite orbital implants are naturally expensive due to their advantages over other synthetic materials. In conclusion, such ingenious medical advancements allow the restoration of sight and can continue to improve the lives of many over time.

Keywords: Eye, Lens, Hydroxyapatite, Ocular implants, Bio-ocular restoration

Citation:

Imaad Abdullah. Hydroxyapatite based bio-ocular implants. The Torch. 2022. 3(23). Available from: <https://www.styvalley.com/pub/magazines/torch/read/hydroxyapatite-based-bio-ocular-implants>.