Postoperative Rotation of Hydroxyapatite Enucleation Implants

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**Objective:** To determine the incidence of postoperative rotation of flattened hydroxyapatite enucleation implants.

**Methods:** A retrospective review of patients receiving flattened hydroxyapatite enucleation implants was performed to determine the incidence and severity of postoperative implant misalignment.

**Results:** Flattened hydroxyapatite implants had been placed in 16 patients. Five were noted to have postoperative implant rotation, which was detected between 11 and 60.3 months following enucleation. The misalignment was mild, inconsistent, and clinically insignificant in 2 patients. The remaining 3 patients demonstrated marked implant misalignment, which likely would have been functionally significant had motility pegs been placed.

**Conclusions:** Postoperative rotation of flattened hydroxyapatite implants may occur late after enucleation. Such implant modification should not be performed in patients with preexisting strabismus, who have a higher incidence of this complication.


Unlike traditional alloplastic implants, the shape of porous enucleation implants may be modified at the time of enucleation. Several authors have advocated truncating the anterior surface of hydroxyapatite implants.\(^1,^2\) The flattened surface may facilitate implant coupling to the prosthesis, enhancing prosthetic motility. Implant modification also provides additional space for prosthetic fitting and subsequent placement of a motility peg. However, there have been several reports describing postoperative misalignment of flattened hydroxyapatite implants.\(^3,^4\) Peg and prosthetic function may be compromised should the modified implant become rotated so that the flattened surface is no longer anteriorly oriented. A retrospective review was performed to determine the risks of hydroxyapatite implant modification and the incidence of postoperative implant rotation.

**RESULTS**

Flattened hydroxyapatite implants were inserted in 16 patients between July 9, 1992, and August 23, 1995. Nine eyes were enucleated because of intraocular malignant neoplasms and 7 patients underwent removal of blind, painful, or phthisical eyes. Four patients demonstrated preoperative strabismus with manifest deviation of the eye to be enucleated (esotropia 1, exotropia 3). Thirteen patients received 20-mm implants and 3 received 22-mm implants. There were no intraoperative complications. All prostheses were fitted without difficulty.

Implant rotation developed in 5 of the 16 patients. Two implants exhibited mild medial rotation on isolated examinations performed 23.7 and 60.3 months postoperatively, respectively. Noticeable, persistent implant rotation developed in 3 patients. A patient with preoperative exotropia was first noted to have temporal implant rotation 35.3 months after enucleation. The postoperative follow-up was inconsistent in this patient. The implant was well-centered during the previous examination performed 1 year after enucleation. Medial implant rotation was detected 11 months after enucleation in the single patient with preoperative esotropia. One month earlier, the implant appeared to be properly positioned. This patient’s prosthesis repeatedly became misdirected, despite multiple prosthetic modifications. The third
MATERIALS AND METHODS

A standardized enucleation procedure was used in all patients. A conjunctival peritomy is performed at the corneal limbus, followed by division of Tenon’s fascia. The 6 extraocular muscles are disinserted, the optic nerve divided, and the globe removed. The presence of coexisting ocular disease, patient age, and patient preference are considered when choosing an implant type. I have primarily used hydroxyapatite in younger, cosmetics-oriented patients who express an interest in possible motility peg insertion. The anterior surface of hydroxyapatite implants may be truncated with a surgical scalpel (Figure 1). The implant is soaked in antibiotic solution prior to being covered with donor sclera. The sclera-covered implant is placed within Tenon’s fascia with the flattened surface anteriorly positioned. The 6 extraocular muscles are attached with 6-0 polyglactin sutures at positions mimicking their normal insertion sites. Anterior Tenon’s fascia is closed in 2 layers (6-0 polyglactin sutures), prior to suturing conjunctiva (7-0 chromic sutures). Prosthesis fitting is typically performed 5 weeks after enucleation. Routine follow-up evaluations are performed every 6 to 12 months after prosthesis fitting, at which time the prosthesis is removed and the socket is visually examined. The presence of implant rotation is detected by determining the orientation of the flattened implant surface while the patient looks in primary gaze.

This study was approved by the institutional review board of Washington University, St Louis, Mo. A retrospective medical record review was performed to identify patients who had undergone enucleation with placement of flattened hydroxyapatite implants. These cases were studied to determine the incidence and severity of subsequent implant rotation.

Figure 1. The anterior surface of hydroxyapatite implants may be flattened with a surgical scalpel. The implant is placed within the socket with the truncated surface facing anteriorly.

Figure 2. Postoperative deviation of a flattened hydroxyapatite implant in a patient without preexisting strabismus. A circular piece of paper has been used to mark the flattened surface.

COMMENT

Hydroxyapatite and porous polyethylene enucleation implants differ from traditional alloplastic implants in their ability to become “integrated” with the orbital tissue. Fibrovascular ingrowth allows subsequent implant drill-
Flattening the enucleation implant likely does not predispose a patient to implant misalignment, but instead gives the physician a “point of reference” to determine when rotation has occurred. Rotation of spherical implants may be difficult to detect, since a round surface is always presented anteriorly. Implant rotation developing after peg insertion may compromise coupling of the peg to the prosthesis, requiring either modification of the prosthesis or redrilling and placement of a new peg.

Implant rotation was detected in 5 of the 16 patients described in this study. Two cases of medial rotation were mild, inconsistently present, and not clinically important. Three patients demonstrated dramatic implant rotation that likely would have been functionally significant had motility pegs been present. It is impossible to determine the exact onset of this complication, because implant rotation may develop slowly and not be detected when mild. In this study, recognition of implant rotation was not apparent until at least 11 months (range, 11-60.3 months) after enucleation. Additional information regarding the incidence and timing of implant misalignment could be obtained by following up a large series of patients who received motility pegs 6 months after enucleation.

Postoperative enucleation implant misalignment may have a variety of causes. Preexisting strabismus seems to predispose patients to develop this complication. Implants rotated in the same direction as the preoperatively manifested deviation in 2 of 4 patients included in this study. Only 1 of the 12 patients without preoperative strabismus developed significant implant misdirection. Preoperative esotropia had been present in 1 of the 2 cases reported by Kaltreider and Newman. The incidence of this complication in patients with strabismus could perhaps be reduced by recessing the involved rectus muscle at the time of enucleation. Additional potential causes of postoperative implant rotation include misalignment of extraocular muscle attachment to the implant, postoperative orbital fibrosis, or deviation secondary to sensory deprivation.

The true benefits of inserting flattened porous implants are unclear. There have been no studies confirming improved prosthetic movement in patients receiving these implants. The coupling of the implant to the prosthesis may actually be compromised in patients who develop postoperative implant rotation, owing to difficulty contouring the prosthesis to match the misdirected implant. The need to provide additional space for a motility peg has been reduced by the recent introduction of smaller titanium pegs. Implant modification does not seem to reduce the risk of postoperative implant exposure.

In summary, surgeons should be cautious in placing flattened porous implants in patients with preoperative strabismus, owing to the high incidence of implant rotation in these individuals. It may also be reasonable to delay implant drilling in patients with prior strabismus, ensuring that implant orientation has stabilized before peg placement. I no longer modify the anterior surface of porous implants, and I believe that implants with a spherical anterior surface are most ideal for all patients requiring enucleation or evisceration.

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REFERENCES