Eye loss in children can be caused by trauma, glaucoma, or cancer, and may result in anxiety and depression. Recovery after eye loss involves a replacement with a custom-made eye prosthesis, but, as the patient ages, changes in the size and shape of the eye socket can result in a sunken appearance of the child’s prosthetic eye. This article describes the fabrication of a custom-made eye and the necessity of changing ocular prostheses for a growing child, with a 5-year follow-up. (J Prosthet Dent 2014;111:346-348)

The frequency of eye injuries among children is remarkably high, and the damage often is serious. These injuries may result in enucleation of the eye. In addition, eye loss in children can be caused by congenital glaucoma or can be the outcome of treatment for cancer. The loss of an eye can cause anxiety, stress, and depression at an early age, and radiation treatment can hinder normal growth processes and further retard development.

In congenital deformities, the treatment should start within the first 4 weeks of birth by placing a small ocular prosthesis (conformer) in the conjunctival socket. The replacement of an eye lost because of glaucoma, cancer, or trauma should start as soon as possible after healing because an ocular prosthesis fills the ocular cavity, enhances facial growth, and restores symmetry. The esthetic, anatomic, and physiologic improvement of the face allows the child to integrate into society and avoid discrimination. However, as a child’s face grows and changes, the prosthesis must frequently be modified to aid in the normal development of the eyelids and the soft-tissue lining the orbital bone.

The following clinical report describes the treatment and 5-year follow-up of a child with the enucleation of 1 eye. The procedure for fabricating the ocular prosthesis also is described.

**CLINICAL REPORT**

A 2-year-old girl reported to the department of prosthodontics with the loss of her left eye (Fig. 1). Her history revealed enucleation of the left eye because of retinoblastoma. No history of radiation or chemotherapy was noted. The eye socket was thoroughly examined to ensure proper healing, and the absence of edema and inflammation was noted. The child was to be rehabilitated with a custom-made ocular prosthesis (Fig. 2). After insertion of the prosthesis, weekly follow-up was done for the first few weeks. Later, the patient was recalled every year. At 7 years of age, with the growth of the ocular socket, the prosthesis looked small and sunken, which caused sagging of the lower eyelid (Fig. 3). The prosthesis also provided inadequate support to the eyelid, which resulted in ptosis. Therefore, a new custom-made ocular prosthesis was fabricated (Fig. 4).

The first step was to make an impression of the anophthalmic eye with a stock acrylic resin tray (DP RR Cold Cure; Dental Products of India) and low viscosity elastomeric impression material (Aquasil Ultra LV; Dentsply Caulk). Material was injected into the defect under the eyelids to completely fill the socket without trapping air while the patient gazed directly forward at a fixed point at least 6 feet away. This allowed an impression of the defect site to be made with the muscles captured in a neutral gaze position.

The impression was poured to make a 3-piece mold. White pattern wax (Maarc; Shiva Products) was poured into the mold, and a wax sclera pattern was retrieved. Sharp ridges and undesirable irregularities were removed, and the pattern was inserted into the defect. The pattern fit was evaluated by lifting the eyelids and observing the extension into the fornices. The pattern was evaluated to check the eye socket contours and eyelid configuration with the patient’s eyes open and with bimanual palpation with the eyes closed.
The wax pattern was sculpted until the palpebral tissue resembled the natural eye. The posterior surface of the wax sclera pattern reflected the topography of the tissue bed of the eye socket.\(^7\) The wax pattern was then processed in white heat polymerizing acrylic resin (DPI Tooth Moulding Powder; Dental Products of India) to form the scleral portion. The acrylic resin sclera was then inserted, and the contours and eyelid opening was verified again.

The patient was relaxed and asked to look straight ahead at a distant point. Measurements were made of the natural eye from the center of the pupil to the medial and lateral canthus of the eye. The center of the pupil of the prosthesis was located and marked. By using an architect’s compass at the center of the pupil, a circle was scribed on the acrylic resin sclera with the diameter approximately similar to the size of the natural iris. This area corresponded to the iris position. A cylindrical recess was made in this area to incorporate the iris. The anterior scleral curvature of the prosthesis also was reduced approximately 2 mm to allow for sclera characterization and for application of clear heat-polymerizing acrylic resin to regain the contours of the finished prosthesis. The color of the natural iris was noted, and an appropriately matching acrylic resin stock eye shell was selected. The scleral portion of the prefabricated eye shell was trimmed to the same size as marked on the custom-made acrylic resin sclera (Fig. 5). The iris was sealed into its position with clear autopolymerizing acrylic resin (DPI-RR Cold Cure; Dental Products of India).

Monopoly syrup was made by warming 10 parts monomer and 1 part polymer of autopolymerizing acrylic resin (DPI-RR Cold Cure; Dental Products of India) to characterize the sclera. Red nylon threads were added to represent veins. The prosthesis was reprocessed with clear heat-polymerizing acrylic resin (Acralyn-H; Asian Acrylates). The patient was taught the correct method of removing and inserting the prosthesis. Follow-up evaluation was performed at regular intervals to evaluate the prosthesis and adjust as necessary.

**DISCUSSION**

The loss of an eye, whether as a result of surgical enucleation or evisceration, is often followed by contraction of tissues around the socket, which may be accompanied by eyelid constriction, reduced eye socket size and depth, eyelid incompetence, and decreased residual muscle movement.\(^8\) Infants who are missing an eye should be treated with a custom-made ocular prosthesis to minimize changes in the socket size and conformation, and to prevent scar tissue formation.
contractures from distorting the socket bed, which will help ensure symmetry with the other eye as the child’s facial structures change during growth. The child’s prosthesis is made as large as possible to stimulate normal development. The parents should be informed that a slightly exophthalmic appearance will result but is necessary. Prosthetic rehabilitation is enhanced if an implant can be placed in the enucleated orbit to provide an attachment for the rectus muscles, which can impart motion coordinated with the natural eye. However, the placement of an ocular implant is not always possible. In this patient, ocular implant placement was planned after completion of the growth of the child.

With increasing age, the ocular prosthesis requires replacement or modification. The indications include prosthesis rotation within the socket, loose fit, decentration of the cornea, cosmetically significant ptosis, or discoloration of the prosthesis. The size of the prosthesis is gradually increased to keep pace with the child’s growth over a period of years until the socket is fully developed. Adjunctive chemotherapy and radiation deteriorate the growth and development of the child, and further necessitate the modification of the ocular prosthesis. Periodic modifications of the prosthesis help to stimulate the growth of the bones and soft tissues of the eye socket. A prosthesis of the correct size approximates closely to the tissues in the socket, which stimulates the eyelid muscles to move, thus, exercising them. The socket grows up to the age of 12 years. The soft tissues stretch during this period of growth and thus enhance the development of the fornices, which gives a more natural appearance. Over a period of 12 years, the prosthesis needs to be changed, depending upon the symptoms present and in coordination with facial growth to aid in the development of the soft and hard tissues of the eye socket.

SUMMARY

Early rehabilitation of ocular defects is necessary, especially in growing children. Custom-made ocular prostheses help the eye socket to grow and develop appropriately and also prevent the psychologic stress of eye loss. Regular modifications of the ocular prosthesis are essential to allow the eye socket to develop normally.

REFERENCES


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