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Ocular Prosthesis - For Beginners

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Abstract

Background: The Ocular Prosthesis device is very important to provide the best possible functional & cosmetic results. It is important to have a firm understanding of management of the anophthalmic socket & when to make appropriate referrals to the Ophtahlmic Surgeon. The Objectives In this review, the author will discuss about one of the component of Ocular Prosthesis ie. Orbital implants. **Material & Methods:** The patients who requires ocular prosthesis are selected as per the need & requirement, also on the basis of types of available implants. **Results:** One should follow the components & scenario for optimal outcome. **Conclusions:** An eye care professional should be aware of the entire structure & all the recent development involved in it. They also have to be empathetic and have a creative oulook in management of such conditions by using all the available resources.

Keywords:- Ocular Prosthesis / Orbital Implants.

INTRODUCTION

Eyes, undoubtedly, are the most precious gift of God to mankind. Not only they enhance the basic senses of an individual but also the beauty of a person.

The loss of an eye can be very traumatic event in a person's life, medically as well as emotionally.

Though the vision cannot be compensated like the natural one, it is the responsibility of eye care providers, as they journey with patients through the process of eye removal and artificial eye placement, to provide the best possible functional and "almost" natural cosmetic results.

History- a tour to the past

Artificial eyes have been in existence for thousands of years. Ancient Egyptian tombs suggest that eye replacement with precious stones, bronze, copper and gold was common practice for the wealthy class. In the 16th Century, Pare, an army surgeon that time, used artificial eyes made of gold, silver and later, glass. Vulcanite and celluloid were used in the 19th Century, and around that time, the glass eye were improved by using sand with low iron oxide content.

It was not World War I that glass eyes were used by the general population, and glass remained the most popular material used in the fabrication of artificial eyes until the Second

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World War. At that time, glass became very difficult to come as Germany was the main supplier. Consequently, a material used by dentists to produce dentures, methyl methacrylate began to be used in the manufacturing of orbital implants.

Indications of orbital implants.[1]

Orbital implants are used in the ophthalmic arena in the treatment of anophthalmia, enucleation or evisceration.

-Anophthalmia i.e. the absence of eyeball is often a congenital condition that can be used caused by genetic mutations or abnormal chromosomes.[2] It can also be due to trauma incurred through accidents and tumours.

-Evisceration is a surgical procedure in which the intraocular contents of the eye are removed leaving the sclera,[3] Tenon's capsule, conjunctiva, extraocular muscles and the optic nerve intact.

-Enucleation is the surgical procedure in which the entire eyeball is removed from the orbital socket.[4] The conjunctiva, Tenon's capsule and extraocular muscles are spared as in evisceration but the sclera and a portion of optic nerve are removed.

Note: Children should be fitted for a prosthetic (artificial) eye to promote socket growth and facial symmetry. By using conformers and tissue expanders to help support the facial structure and encourage the eye socket to grow, children can experience a normal development. Once a child is fully developed a prosthetic eye can be placed for cosmetic purpose.

MATERIAL AND METHODS

The patients who requires ocular prosthesis are selected as per the need & requirement also on the basis of types of available implants.

RESULTS AND DISCUSSION

Components of ocular prosthesis

Today ocular prosthesis are constructed using two components the first is the orbital implant, which is placed at the time of enucleation or evisceration and fills the anophthalmic socket.

The second component of modern ocular prosthesis is the artificial eye, which is what makes the artificial eye appear life-like with iris colour and conjunctival vessel markings. It is placed 6-8 weeks after enucleation/ evisceration.

Orbital implants.[5]

An orbital implant is a spherical device approximately 18-20mm in diameter. Products currently in use for the fabrication of orbital implants include silicone, hydroxyapatite and porous polyethylene out of which the two most common are porous polyethylene and hydroxyapatite. During the surgical procedure to remove an eye, the orbital implant is inserted to replace the lost volume. when an prosthetic eye is fit over the implant 5-6 weeks following surgery, the movement of the orbital implant is transferred to the prosthetic eye.

For increased prosthetic eye movement there is an optional motility peg attachment system.

Types of orbital implants.[6]

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There are different points to classify orbital implants on as follows:

- Shape (spherical versus oval)
- Stock versus custom
- Porous versus non-porous
- Specific chemical make up

The presence or absence of a peg(motility post)

Of these the most basic simplification can be to divide implant types in two main groups: non-integrated(non porous) and integrated(porous)

Nonintegrated implants.[7]

Non integrated implants contain no special apparatus for attachments to the extraocular muscles and do not allow in-growth of organic tissue into their inorganic substance. Such implants have no direct attachment to the ocular prosthesis. Usually, these implants are covered with a material that permits fixation of the extraocular recti muscles such as donor sclera or polyster gauze which improve implant motility, but does not allow for direct mechanical coupling between the implant and the artificial eye. Non-integrated implants include the acrylic (PMMA), glass and silicone spheres.

Integrated implants.[8]

The porous nature for integrated implants allows fibrovascular ingrowth throughout the implant and thus also insertion of pegs or posts. becausedirect mechanical coupling is thought to improve artificial eye motility, attempts have been made to develop so-called 'integrated implants' that are directly connected to the artificial eye.

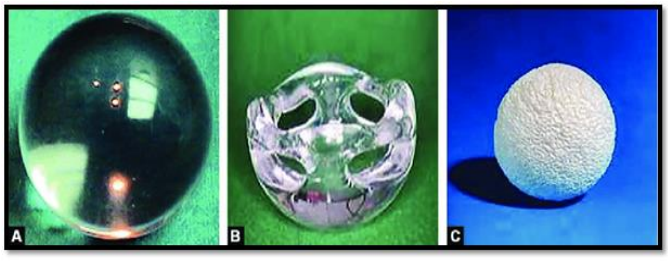
The surgeon can alter the contours of porous implants before insertion, and it is also possible to modify the contour in-situ, although this is sometimes difficult.

In both of these groups, there are a variety of orbital implants available, the choice is based on the individual needs of the patient and the preference of the surgeon. Depending upon the position after being placed, implants may either be free-floating, attached to the surrounding muscles or pegged within the socket.

Free floating implants such as acrylic and silicone are used when severe trauma has compromised the surrounding muscles.[9] In these cases the implant is placed in the orbit and the conjunctiva is sewn over the top.

Many implants have the option of such a mesh wrap or outer shell that can be affixed to the surrounding tissues to improve the motility of the implant within the socket.

Pegging essentially 'snaps' the implant into place. Used with porous implants, it is employed to improve the motility of the implant by allowing the surface to fit into a corresponding groove.



11 Common types of orbital implants: (A) Non-integrated (PMMA implant); (B) Semi-integrated (Allen implant); (C) Integrated (hydroxyapatite implant).

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Orbital tissue expander.[10]

The revolutionary orbital tissue expander is a flexible balloon, held in place by a plate that is anchored to the lateral orbital wall. This implant can be easily expanded in the socket as it grows by inflating it with sterile saline inserted through an injection port.

This simple method of implant expansion removes the need for multiple surgeries and offers the ability to incrementally increase the size of the implant.

Bio-ceramic orbital implants.[11]

These implants allow for vascularisation and integration into the eye socket. Used primarily in enucleation and evisceration procedures, these implants are light weight, easy to insert, strong, nontoxic, bioinert, biocompatible and non allergic. Commonly well-received by the patients, these implants are more stable than any other implant options.

Mesh wrapped Bio-ceramic orbital implants.[12]

A common problem with these implants is the "stickiness" that occurs when the implant clings to the surrounding tissue. Models that include a vinyl mesh wrapping allow the muscles to be sutured to the implant and enhance the movement of the implant within the socket. Mesh-wrapped bio-ceramic orbital implants include a vicryl mesh wrapping and a silicone band. The pore system included in this implant enhances fibrovascular ingrowth which helps prevent implant migration and improves implant motility. This implant can be coupled with the peg system to allow the surgeon to choose a solution that best mimics natural eye movement.[13]

Silicone orbital implants.[14]

These are another option post enucleation and evisceration procedures. Silicone implants are more pliable than acrylic and are also non porous. This type of implant is best used when severe trauma has made the surrounding muscles unidentifiable and therefore unusable for attaching to the implant.

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Acrylic orbital implants.[15]

The acrylic sphere is the simplest type of implant. Much like the silicone orbital implant, the acrylic implant is also non-porous, but less pliable than its silicone counterpart.

CONCLUSIONS

Any abnormality on the face leads to physical as well as emotional trauma to the patient, also hampering social interactions and destroying a persons self confidence. An eye care professional should be aware of the entire structure & all the recent development involved in it. They also have to be empathetic and have a creative oulook in management of such conditions by using all the available resources.

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