Original Article

Study of primary orbital implant after enucleation

Dongre M B[*], Belnekar R E[**]

[*]Associate Professor, [**]PG Student, Department of Ophthalmology, S.R.T.R Government Medical College, Ambajogai, Maharashtra, INDIA.
Email: dr.mbd@rediffmail.com

Abstract

Introduction: Enucleation means excision of the eye. The indications for the excision of an eye are intraocular malignant neoplasm's; penetrating wounds with intraocular inflammation liable to cause damaged by injury so that no useful vision can be regained; and totally blind, painful and unsightly eyes. A simple enucleation results in an unsuitable socket for filling with any type of ocular prosthesis. A new operation for removal of the eye was reported in the mid-nineteenth century. The use of an orbital implant was a major breakthrough in ophthalmic socket surgery. The basic principal in surgery is to avoid this "Post-enucleation socket syndrome". Orbital implantation is possible after enucleation and evisceration also. But nowadays most accepted method is primary orbital implantation after enucleation. **Aims and Objectives:** The present study was carried out to study the various indications and complications of enucleation. To evluate the efficacy of primary orbital implant after enucleation **Material and Methods:** The present study was carried out at the S. R. T. R. Government Medical College, Ambajogai in Department of Ophthalmology from January 2010 to December 2013. The patients were selected on following criteria: Blind eye, Painful blind eye, Disfiguring eye, Dangerous eye. The artificial eye shell applied at the end of one week. **Results:** In the present study Males were 19(54.28%) and females were 16(45.71%).The maximum number of cases were 21 (59%) between the age group 16 to 45 years. In majority of cases 16(45.71%) left eye was involved while in 19 (54.28%) left eye was involved. In majority of cases 10(28.57%) anterior staphyloma was indication, followed by Perforating injury 9(25.71%). Extrusion was the only major complication and was seen in 2(5.71%) patients. Overall success rate was 94.28%. Out of 35 only 2 cases had extrusion of the implant. **Conclusion:** It was concluded that Primary orbital implant after enucleation, is a simple, safe and less time consuming procedure which can be done in all age group and corrects volume deficit and avoids "Post enucleation socket syndrome".

Keywords: enucleation.

[*]**Address for Correspondence:**
Dr. Dongre M B, Associate Professor, Department of Ophthalmology, S.R.T.R Government Medical College, Ambajogai, Maharashtra, INDIA.
Email: dr.mbd@rediffmail.com

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INTRODUCTION

Removal of an eye for treatment of ocular disease was first described by Bartisch in 1583. The modern form of this operation was introduced in 1841 by Farrel and Bonnet and in 1885, Mules placed the first orbital implant. Use of completely buried integrated implants began in the 1950s bringing improved cosmosis but relatively poor motility[1].Enucleation means excision of the eye. It is affected by opening Tenon's capsule and dividing all structures passing through it. The plane of this surgical work lies inside the Tenon's capsule. The indications for the excision of an eye are intraocular malignant neoplasm's; penetrating wounds with intraocular inflammation liable to cause damaged by injury so that no useful vision can be regained; and totally blind, painful and unsightly eyes.[2] A simple enucleation results in an unsuitable socket for filling with any type of ocular prosthesis. A new operation for removal of the eye was reported in the mid-nineteenth century. The use of an orbital implant was a major breakthrough in ophthalmic socket surgery.[1] A volume deficit occurs when an eye is enucleated. This can be partially corrected with a large implant at the time of enucleation. The remaining volume loss must be corrected with prosthesis. If initially no implant or only a small one is positioned after enucleation, the prosthesis needs to be large to makeup the deficit. The prosthesis is supported by lower lid, which will stretch if prosthesis is large. This will reduce

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the effect of prosthesis in correcting the volume deficit and in providing a fulcrum for the action of levator muscle. If the prosthesis is made in an attempt to compensate for these defect, the lower lid will stretch more and enophthalmos, deep upper lid sulcus, which together constitute the: "Post-enucleation socket syndrome". It can be avoided with the help of implant, and so any volume deficit must be corrected.[1] The basic principal in surgery is to avoid this "Post-enucleation socket syndrome". Orbital implantation is possible after enucleation and evisceration also. But nowadays most accepted method is primary orbital implantation after enucleation. Variety of material including cechaloid, sponge, peat, mass, agar, vaseline, rubber, paraffin silver, ivory, vitallium, aluminum, wool, silk, fat, fascia lata were tried.[3] The present study deals with an alloplastic spherical implant. These implants not only restore the volume, but also create little motility. After enucleation and assessing the approximate size of implant, the implant is put in the orbital cavity, Tenon's capsule and conjunctiva is sutured without tension over the implant. Tenon's capsule and conjunctiva closed in layers. After proper wound healing permanent prosthesis is applied.[4] Enucleation presents a big psychological problem for the patient. Implants improve the patients postoperative appearance and helps the patient in overcoming his "Post-enucleation socket syndrome" by providing volume replacement and base for better artificial eye prosthesis.

MATERIAL AND METHODS

The present study was carried out at the S. R. T. R. Government Medical College, Ambajogai in Department of Ophthalmology from January 2010 to December 2013. The patients were selected from those attending the ophthalmic outpatient department. Any patient irrespective of age and sex with different socioeconomic status were selected. The patients were selected on following criteria: Blind eye, Painful blind eye, Disfiguring eye, Dangerous eye. All the patients were examined, preoperative photographs taken and after surgical evaluation, selected patients then underwent enucleation and primary orbital implantation.

Operative techniques

The purpose of a Alloplastic implant is to effect a mobile base for the prosthesis to pivot upon and also to prevent bony deformity of the orbital wall, such as failure to develop to its full size in children and adolescents and maintain this in adults.

Instruments

5 ml syringe with 5 cm needle. 2 ml syringe with 2 5 cm needle, speculum, Jayle's forceps, disposable knife No 15. blade, plain forceps, curved spring scissors, chavasses strabismus hook. Four curved mosquito pressure forceps squint scissors, and straight excision scissors Fixation forceps 2 into 3 teeth. One suture of 1 metric chromic collagen on an eyeless 10 mm needle.

Pre-operative medicine

Each patient given injection fortwin (Pentazocine) 30 mg + phenargan 25 mg and atropine 0.6 mg intramuscular/ half hour before operation. Dose varied accordingly to age group.

Anaesthesia

General anesthesia is given to the children and nervous patients. Peribulbar Anaesthesia given in adults. Out of 35 patients peribulbar anaesthesia given in 33 patients and general anaesthesia in 2 patients. Even when a general anaesthetic is administered a retroocular injection may be helpful. Haemostasis is assisted and the proptosis resulting from the injection slightly aids surgical access.

Surgical technique (Steps)

- Conjunctival limbal incision:
- Tenotomy of the extraocular muscle:
- Division of the optic nerve:
- Assessment of the size of implant:
- The size of the implant should not exceed 18 mm in length, Its volume should be 6.5 ml, its center of gravity within the muscle cone and 8 mm behind the anterior orbital plane. It must be completely covered by Tenon's capsule and conjunctiva.
- Tenon's capsule must be able to close easily and without tension over the implant.
- Insertion of implant into Tenon's capsule:
- After the achievement of complete haemostasis and proper assessment of the implant is inserted into the fat behind the both layers of capsule for better retention insert into the fat.
- Closure of the incision:
- Postoperative follow-up (Early):
- Patients were kept in the ward post operatively up to 8 days. Every patient was given following treatment for 7 days (Doses depending upon age of patients). Dressing was changed on the third day after 48 hours and daily dressing up to one week.

The prosthesis

The artificial eye shell applied at the end of one week. The wound should be well healed before application of permanent artificial eye shell. Artificial eye shell having the colour and pattern of iris and of conjunctiva perfectly matching with that of the patients other eye selected very carefully. This selected artificial eye shell is then implanted into the patients eye.

Follow-up study: Subsequently patients were called for follow up

- Weekly upto one month
- Monthly upto one year.
- Six monthly upto next one year.

During one month, weekly patient observed for

- Lid oedema, Chemosis, Wound gaping, Infection, Extrusion of implant

OBSERVATIONS

In this present series 35 patients underwent enucleation and primary orbital implantation. The results are tabulated as follows.

Table 1: Distribution of cases according to the age and sex (35 cases)

Age group (Years)	Male	Female	Total
5 - 15	5 (14.28%)	1(2.85%)	6(17.14%)
16 - 30	4(11.42%)	6(17.14%)	10(28.57%)
31 – 45	7(20%)	4(11.42%)	11(31.42%)
46 – 60	2(5.71%)	4(11.42%)	6(17.14%)
65 – 75	1(2.85%)	1(2.85%)	2(5.71%)
Total	**19(54.28%)**	**16(45.71%)**	**35(100%)**

In the present study Male were 19(54.28%) and females were 16(45.71%), no significant sex differences. The maximum number of cases were 21 (59%) between the age group 16 to 45 years

Table 2: Distribution of cases according to the side affected in relation to gender

Side affected	Male	Female	Total
Right	9(25.71%)	7(20%)	16(45.71%)
Left	10(28.57%)	9(25.71%)	19(54.28%)
Total	**19(54.28%)**	**16(45.71%)**	**35(100%)**

In majority of cases 16(45.71%) left eye was involved while in 19 (54.28%) left eye was involved.

Table 3: Distribution of patients according to the indication for surgery

Indications	No. of patients
Anterior staphyloma	10(28.57%)
Perforating injury	9(25.71%)
Absolute glaucoma	8(22.85%)
Phthisis Bulbi	5(14.28%)
Aphakic bullous keratopathy	2(5.71%)
Congenital cystic eye ball	1(2.85%)
Total	**35(100%)**

The table shows that in majority of cases 10(28.57%) anterior staphyloma was indication, followed by Perforating injury 9(25.71%) and Absolute glaucoma 8(22.85%).

Table 4: Distribution of patients according to the complications of surgery

Complications	No. of Patients
Lid Oedema	2(5.71%)
Chemosis	5(14.28%)
Wound gaping	4(11.42%)
Infection	1(2.85%)
Extrusion	2(5.71%)

The table shows that Extrusion is the only major complication and was seen in 2 (5.71%) patients. Minor complications like lid oedema 2 (5.71%), conjunctival chemosis 2 (5.71%), wound gapping 4 (11.42%) and postoperative infection 1(2.85%) was observed.

Table 5: Analysis of complications

Particulars	No. of cases
Wound gaping: Inadequate conjunctiva for closure of the implant mainly in phthisis eyes as atropic conjunctiva	4
Infection: Perforating injury with foreign body. Material mainly whole eye coats involved by infective foci	1
Extrusion: After wound gaping resuturing done but in two cases as inadequate conjunctiva reported again and extrusion of implant.	2

Table 6: Success rate in various indications for enucleation and orbital implantation

Indication for surgery	No. of cases operated	No. of Successful cases	Percentage of success
Anterior staphyloma	10	10	100%
Absolute glaucoma	8	8	100%
Perforating injury	9	7	77.77%
Others	8	8	100%
Total	**35**	**33**	**94.28%**

Overall success rate was 94.28%. Out of 35 cases only 2 cases had extrusion of the implant.

DISCUSSION

The present series consisted of 35 patients attending regular ophthalmic OPD were selected for the study carried out from January 2010 to December 2013. All patients underwent primary orbital implantation after enucleation.

Age incidence

It is seen that out of 35 cases studied. The youngest patient operated was 8 years and the oldest was 70 years old. The majority of patients belong to fourth decade 11 cases (31.42%) and third decade 10 cases (28.55%) of life. Our age incidence was similar to those noted by other workers.

Sex incidence

In the present study out of 35 patients 19 (54.28%) were male and 16 (46.72%) were female.

The side affected

In the present study it is seen that out of 35 cases in 16 patients (46.72%) right eye affected and in 19 patients (54.28%) left eye affected.

Indications for Surgery

In all patients, selection criteria were blind, painful, dangerous and disfiguring eye. Out of 35 patients majority patients had anterior staphyloma[10] as major indication followed by, perforating injury[9] absolute glaucoma[8] cases. Our indication matches with the other workers. Nancy J *et al*[5] found that Thirty-one eyes (25%) had undergone earlier ocular treatment before enucleation: 2 eyes received plaque radiotherapy, 11 were treated with external-beam radiation, 2 had ruptured globe repair, and 16 received a spectrum of other ophthalmic surgical procedures. Final histopathologic diagnoses included retinoblastoma, history of ruptured globe, atrophi bulbi, phthisis bulbi, medulloepithelioma, congenital glaucoma, buphthalmos, and persistent hyperplastic primary vitreous.

COMPLICATIONS

In the present study complications found were chemosis seen in 5 patients which responded well to antibiotics. Wound gaping was seen in 4 patients. After resuturing, out of four two eyes had wound gaping as inadequate conjunctiva for closure of wound. Infection was found only in one case as all coats of eyeball heavily infected due to the perforating injury which responded to higher antibiotics. Extrusion was found in 2 patients as wound gaping and not responded to resuturing, as conjunctival thinning present and implant become infected later on, chronic exposure of implant leads to extrusion. Orbital implant extrusion is also a complication of enucleation surgery. Risk of implant extrusion is increased with prior irradiation treatment of the eye and orbit, severe traumatic injuries to the eye and orbit, and severe eye and orbital infections[2]. Jordan BR[6] reported complication in 100 patients of hydroxyapatite implant. Discharge occurred in 21 (10 0%), implant exposure 3 (2.8%), conjunctival thinning and Implant extrusion in 0 93% Christmas NJ[7] carried out study in 342 patients by using various type of implant after enucleation. In 7 patient complication observed, 4 patients had exposure of Implant, 1 patient develop infection and later on extrusion. Lin *et al*[8] also reported discharge as the most common complication. Higher temperature of subtropical climates and the difficulties in postoperative wound care might result in increased discharge in some cases. Exposure and discharge (20.8%) was the next common complication followed by implant exposure (12.5%). Implant exposure rate reported to range from 10% to 22% of patients.

Failure of primary orbital implant after enucleation

Out of 35 cases, only in two cases extrusion was found, which was the only major complication seen in implant surgery. Lee V *et al*[9] studied 109 patients of retinoblastoma. The rate of non tumour exposure was 28%. Christmas NS[10] carried out study on 120 patients complications were observed in 7 (5.7%) eyes, implant exposure 1 (0.5%), implant extrusion 0%, implant migration in 3 (2.4%). Out of 120 patients 118 (96%) showed good cosmosis and good motility.

Su, Grant W[11] The most frequent complications encountered for unpegged implants were exposure (3.2%) and infection (0.4%). For pegged implants, the most common complications reported were pyogenic granuloma (13.7%), exposure (5.7%), and discharge (5.7%).

Overall success rate

The overall success rate achieved was 94.28% in the cases of enucleation through primary orbital implant. The criteria for claiming the success rate was avoidance of 'Post-enucleation socket syndrome'. Other criteria is the good results in respect of cosmosis and motility 15° to 25° in all recti direction with alloplastic spherical implant. Robin PA[12] study on 45 patients using conical orbital implant showed 96.45% success rate. Christmas NJ[10] evaluated efficacy of primary orbital implant in 120 patients, 7 patients showed complication so overall success rate 95.3%.

SUMMARY AND CONCLUSION

The present study of 35 patients, who underwent enucleation and primary orbital implant was carried out at S. R. T. R. Medical College, Ambajogai during the period January 2010 to January 2013.

- Out of 35 patient's majority were males. No significant gender difference was observed.
- The maximum number of patients was between 16 years to 45 years (59.99%).
- Left eye was affected more than the left eye.
- The indication for the surgery were anterior staphyloma, Absolute glaucoma, Perforating injury and others.
- Majority of the patients were operated under local anaesthesia .
- Enucleation was done and spherical orbital implant was implanted in all cases. Eye shell was advised after one week.
- Minor postoperative complications were observed in 15 cases and were managed by adequate medical treatment.

CONCLUSION

Primary orbital implant after enucleation, is a simple, safe and less time consuming procedure. It can be done in all age group. It corrects volume deficit and avoids "Post enucleation socket syndrome". It gives excellent results in respect of cosmosis and motility to some extent.

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