CASE REPORT

COSMETIC OUTCOME OF AUTOGENOUS DERMIS FAT GRAFT AS AN ORBITAL IMPLANT AFTER ENUCLEATION

Zeeshan Kamil, Qirat Qurban
LRBT Teaching Tertiary Eye Hospital, Karachi Pakistan

The surgical method of removing the complete intact globe while leaving the extraocular muscles and orbital fat behind is called as enucleation. The intention behind this study is to share the experience of autogenous dermis fat graft as an orbital implant following enucleation and its cosmetic outcome. It was a prospective study conducted at the Orbit and Oculoplastic department of LRBT Tertiary Teaching Eye hospital from July 2018 to June 2019. **Methods:** Eighty-five patients were recruited for this study belonging to either gender with ages ranging from 20 to 50 years. None of the recruited patients had undergone prior enucleation or evisceration. All the patients were informed and counseled about the surgical modus operandi and the expected outcomes and verbal consent was taken from each patient along with approval from the hospital's ethical review committee before proceeding with the surgery. Every participant underwent primary enucleation followed by autogenous dermis fat graft orbital implant and followed up for duration of up to 3 months after the surgical procedure. **Results:** At ninety days after the procedure, 78.2% of patients had a very good cosmetic result. **Conclusion:** The placement of autogenous dermis fat graft as an orbital implant following primary enucleation has a good accomplishment rate with excellent cosmetic outcome.

Keywords: Anophthalmic socket; Dermis fat graft; Enucleation; Orbital implant

Citation: Kamil Z, Qurban Q. Cosmetic outcome of autogenous dermis fat graft as an orbital implant after enucleation. J Ayub Med Coll Abbottabad 2022;34(1):211–5.

INTRODUCTION

The surgical method of removing the complete intact globe while leaving the extraocular muscles and orbital fat behind is called as enucleation. It is usually suggested for individuals having malignancy limited to the globe, piercing ocular trauma with irreparable loss of vision, disfigured and sightless eye.[1] While performing the enucleation surgical procedure, it must be ensured that maximal amount of normal ocular tissue and orbital fat is conserved together with maintenance of adequate depth of fornices since they are crucial for the motility of the ocular prosthesis. Compared to a regular orbit, an anophthalmic socket has a special distinctiveness. Following exclusion of the globe, various, irrevocable orbital phenomena occur, which have a consequence on the long-term orbital socket appearance and outcome. Constricted anophthalmic orbital socket is an aesthetic distress for an individual rendering them unable to sport an ocular prosthesis. A vacant orbital socket also serves as a source of continual liberation of inflammatory discharge, irritation along with eyelid position abnormality such as inward or outward rotation of the eyelid resulting in entropion, ectropion, drooping of the eyelid, exposure or extrusion of the orbital implant, infectivity and migration of the orbital implant.[2] Orbital implants provide a superior cosmesis and volume substitution for an enucleated eye. An orbital implant should ideally be chemically and physically inert, simple to create and apply with no jagged margins, secure from migrating into or extruding from the orbit along with providing a good ocular movement.[3] Use of synthetically processed orbital implants lead to considerable morbidity among individuals undergoing enucleation due to the associated risk of extrusion and exposure which may form a basis for bacterial colonization ensuing in persistent inflammatory infiltrate.[4,5] Porous implants belong to the synthetically processed orbital implants and were used for majority of the cases following enucleation but cause a greater complication rate owing to exposure.[2] Dermis fat graft is usually a preference by oculoplastic surgeons for the reconstruction of an anophthalmic socket when the orbital deficit is very large.[6,7] The selection of dermis fat graft as an orbital implant relies on certain factors such as it being safe, biocompatible, ability to modify itself according to the conjunctival epithelial distinctiveness and providing a scaffold for conjunctival overgrowth during the integration course, does not necessitate any particular preparation, storage or transport thereby reducing any financial strain, maintains a stable orbital volume following enucleation and is autogenous in nature.[8,9]

Keeping the aforementioned in mind, this study was carried out with the aim to observe the aesthetic outcomes of autogenous dermis fat graft as an orbital implant among individuals undergoing primary enucleation.

MATERIAL AND METHODS

This study was conducted at LRBT Tertiary Teaching Eye Hospital from 1st July 2018 to 31st June 2019. Eighty-five patients who were scheduled to undergo primary enucleation at the Orbit and Oculoplastic Department were recruited in this study between the ages of 20–50 years old. Prior to the surgical procedure, individuals requiring enucleation (scheduled for ocular prosthetic procedure) were selected after corresponding with the inclusion and exclusion criteria. (Table-1) All the patients were counseled prior to surgery regarding the surgical technique, outcome, limitations and risks and informed consent was obtained from each. A thorough ocular and systemic history was taken from every patient and the following ocular assessment was performed and documented; clinical assessment of the presence of lagophthalmos, drooping of lid or lower eyelid laxity (checked via pinch method), slit lamp examination for orbital socket status with usual bone anatomy and absence of any socket fracture or contracture along with the status of the fornices and forniceal depth (measured using a metallic rule) along with pre and post operative photographs for comparison. Following the surgical procedure, the aesthetic result was assessed among patients as very good (90% to 100% with an axial length comparable to the fellow eye), good (80% to 90%), fair (70–80%) and poor (less than 70%) based on the appearance and size of autogenous dermis fat graft implant in socket with conformer in place. It was measured and compared by means of Hertel's exophthalmometer.

Surgery was performed by a single oculoplastic surgeon (ZK). Adhering to the aseptic measures, enucleation was performed by making an opening in the conjunctiva and the tenon capsule all around the corneal limbus (360 degrees) using Wescott scissors. Wet field cautery was utilized for the preservation of homeostasis. All four quadrants were opened with Steven's scissors. Each of the four rectus muscles were secluded with the help of a muscle hook, contiguous tenon attachments were cleaned and secured via 6-0 double armed absorbable suture followed by disinsertion from the globe. The superior and inferior oblique muscles were dissected from the globe. Optic nerve was excised deep within the orbit by Foster enucleation snare or with long Metzenbaum scissors ensuing detachment of the globe which was sent for histopathological evaluation in each case. Harvestation of the dermis fat graft was done from the gluteal area and placed into the orbit. The four recti muscles were sutured onto the dermis fat implant individually. The Tenon capsule was closed in a double layered fashion using interrupted 6-0 absorbable sutures. The conjunctiva was closed with running 6-0 polyglactin sutures. An ophthalmic antibiotic ointment was applied and a conformer was inserted followed by application of a pressure pad.

Socket evaluation was done at each post operative visit with the final evaluation after three months of the surgery. Cosmetic outcome was measured by an oculoplastic surgeon (QQ) as very good, good, fair and poor.

Table-1: Schedule for ocular prosthetic procedure

Inclusion criteria	Exclusion criteria
Age 20 – 50 years	Previous history of socket surgery
Both genders	History of coagulopathy
Patients undergoing primary enucleation	History of radiation
Patients with choroidal melanoma or any intraocular tumor confined to the eyeball with no metastasis	Patients with metastatic tumors
Patients with blind eyes	Patients who lost to follow up

RESULTS

A total of 85 patients scheduled for primary enucleation were recruited in this study with ages ranging from 20 to 50 years. The mean age of the patients was 30.8±6.56 years. Out of the 85 patients, 32 (37.64%) were males and 53 (62.35%) were females. Left eye was operated in 44 (51.76%) patients whereas 41 (48.24%) had their right eyes operated.

The aesthetic outcome of primary autogenous dermis fat graft as an orbital implant after enucleation by the conclusion of the initial week was good with 69%, (Table-2) which improved at the end of one month to 75.2%. At the end of three months, 78.2% had a very good cosmetic result. (Figure 1 and 2) Out of the 85 patients, 3 cases ended up in fat atrophy and three patients developed suture abscess at the donor site which was treated conservatively with medical therapy. Data analysis was done on statistical package for social services (SPSS) 25.0. Chi square test applied and no statistical significance seen in cosmetic outcome with regards to gender (*p*-value=0.567) or age (*p*-value=0.324).

Table-2: The aesthetic outcome of primary autogenous dermis fat graft

	Very good	Good	Fair	Poor
First week	16 (18.8%)	59 (69.4%)	10 (11.76%)	-
One month	64 (75.2%)	13 (15.2%)	7 (8.2%)	1 (1.17%)
Three months	67 (78.2%)	10 (11.76%)	5 (5.88%)	3 (3.52%)

Figure-1: Pre and post operative after enucleation with Dermis Fat Graft in place followed by ocular prosthesis

Figure-2: Pre and post operative after enucleation with dermis fat graft in place followed by ocular prosthesis

DISCUSSION

In recent times, oculoplastic surgeons have developed a noteworthy inclination towards using dermis fat grafts as an orbital implant for the anophthalmic socket following enucleation or extrusion of a synthetic implant as a successful substitute for the maintenance of orbital volume. Its superiority over other implants is owing to the fact that it preserves the surface of the conjunctiva as well as retaining motility of the ocular prosthesis along with an aesthetically acceptable outcome. In 1978, orbital implants were originally used by Smith and Petrelli encompassing the dermis and subcutaneous tissue to be implanted with the epithelium removed. Vascularization within the dermis lowers the likelihood of subcutaneous fat atrophy.[10] The utilization of dermis fat graft as one of the alternatives for orbital volume amplification in an anophthalmic socket has its own exclusive advantage of having a bigger surface area within the orbital socket along with the capability to grow among pediatric population.[11]

For the harvestation of dermis fat graft, gluteal area is mostly preferred, apart from abdomen d periumbilical area, due to the abundance of subcutaneous fatty tissue present there. The viability of the dermis fat graft is principally reliant upon the vascular supply and demands integration with the orbital fat; therefore, an orbit with a compromised vascular supply such as post trauma, chemical injury, exposure to radiation or presence of concurrent vascular disease may lead to degeneration of the dermis fat graft and subsequent graft failure. Several other factors are accountable for the failure of a dermis fat graft; disproportionate graft size with the orbit, excessive handling of the graft, unnecessary cauterization of the graft bed, undue stress on the graft and insufficient suturing.[12] It was observed by Sihota that a dermis fat graft thickness of 20 mm drastically reduces the occurrence of enophthalmos and upper sulcus deformity together with fine motility and careful suturing.[13] In order to eliminate the drooping of lid and concealing the superior sulcus deficit, surgeons have tried enlarging and constructing a superior bulge to the prosthesis.[14] For such instances, synthetic implants and autogenous dermis fat graft implants have been found to be valuable in making the orbital socket conducive to receiving an ocular prosthesis. It is also made certain that an adequate fornix depth is maintained alongside ensuring that there is minimal possibility of spread of any infection and extrusion or exposure of the implant given that the conjunctiva partially covers the implanted dermis fat graft, leaving the bare dermis the size of cornea. Underestimation of a suitable harvested graft size and scarring at the donor location are a disadvantage. Contrary to the pediatric population, in which the fat graft undergoes augmentation amid the adjacent orbital tissue thereby covering up for the missing orbital volume after an enucleation procedure; adults face an erratic resorption of the fat graft.[15]

In the present study, 69% of the patients experienced a good cosmetic outcome at the conclusion of the initial week, which continued to improve by the end of one month (75.2%) and became very good by the end of three months (78.2%). A retrospective study by Nentwich found an 83% patient satisfaction rate after primary dermis fat graft placement.[16] Another study by Guberina observed no variation in the graft volume even after five years among 81% of the cases after implanting autogenous dermis fat graft in an ophthalmic sockets whereas 19% experienced graft resorption to a varying level and concluded that dermis fat graft is a favorable preference for the substitution of synthetic allograft following primary enucleation, extruded or migrated implants as well as a valuable in enophthalmic and contracted orbital sockets. [17] Satyanarayana harvested dermis graft from the peri umbilical region and the substitution of the orbital volume after the surgical procedure was assessed via Luedde's exophthalmometer. Orbital volume was found to be good in 93.3% of the patients and suture abscess was noted in 6.7% patients. [18] This study harvested dermis fat graft from the gluteal region in all the eighty-five patients and post enucleation orbital volume substitution by dermis fat graft was measured with the help of Hertel's exophthalmometer instead of Luedde's exophthalmometer. Karatas *et al* carried out a study among individuals undergoing primary and secondary dermis fat graft transplant harvested from the gluteal area and found that those who underwent secondary dermis fat graft transplant ended up with a multitude of complications such as hindrance in graft epithelialization, drooping of the lid, laxity of the inferior lid, formation of adhesions in the inferior fornice, infectivity, narrowing of the orbital socket and fat atrophy. It was concluded that dermis fat graft transplant had a considerable better outcome after primary implantation.[19] Baum studied the reliability of autogenous dermis fat graft for the restoration of anophthalmic socket and found that 91.7% had an aesthetically steady long-term result with low occurrence of complications and reasonable functionality for both primary and secondary transplantation.[20] Lu presented a case report on exposure of orbital implants being a frequent complication and suggested that the easily obtainable dermis fat grafts are a favorable choice since they provoke a minimal immunological response.[21] Similarly, a review was carried out which evaluated the lasting outcomes of several diverse kinds of synthetic orbital implants along with the outcomes of dermis fat graft for restoring implant exposure. The review found that in the long run, exposure of synthetic porous orbital implants was common due to inappropriate pegging and dermis fat graft implantation was a valuable restorative procedure for large areas of implant exposure.[22] Compared to the aforementioned studies, all of the patients in this study underwent primary dermis fat graft transplantation and post operative orbital volume replacement was measured via Hertel's exophthalmometer. The complication rate was minimal and aesthetic outcome was very good with autogenous primary dermis fat graft transplantation at the end of the follow up period which was in accordance with the studies done previously. Autogenous dermis fat grafts represent a safer substitute to synthetic alloplastic orbital implants. Graft loss along with other grave complications was infrequently observed. Owing to its safety profile together with admirable practical and aesthetic outcomes, autogenous dermis fat grafts are suggested for primary dermis graft transplantation.

CONCLUSION

Autogenous primary dermis fat graft implantation, regardless of being a fairly extensive surgical procedure, is safe with minimal complications in addition to outstanding post operative purposeful and cosmetic outcomes in anophthalmic sockets necessitating orbital volume substitution.

Ethical approval: Ethical review committee at LRBT Tertiary Teaching Eye hospital approved this study.

Conflict of interest: Authors declare no conflict of interest.

Financial disclosure: None

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Submitted: July 31, 2021	*Revised: September 1, 2021*	*Accepted: October 31, 202*

Address for Correspondence:

Zeeshan Kamil, LRBT Teaching Tertiary Eye Hospital, Karachi Pakistan
Cell: +92 334 3038028
Email: dr.zeeshankamil@yahoo.com