

CASE REPORT

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Use of autologous-fat graft in postenucleation-socket syndrome

ABSTRACT

Objective

To describe the use of autologous-fat grafting in postenucleation-socket syndrome.

Methods

This is a case report.

Results

There was marked improvement in the gross appearance of the treated orbit of the patient. There was relief in enophthalmos and superior-sulcus deformity. Bilateral orbital symmetry was achieved. Postoperatively, only minimal bruising and swelling both in the orbit and source site were observed, which resolved in 4 weeks.

Conclusion

The use of autologous-fat graft is a novel but highly effective technique and a good alternative in treating patients with postenucleation-socket syndrome.

Keywords: *Autologous-fat transplantation, Autologous-fat graft, Microfat injection, Microfat graft, Postenucleation-socket syndrome*

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THE USE of adipose tissue in plastic and reconstructive surgery is not new, having been first reported at the end of the 19th century. Its evolution has been reported in 3 eras, the first in 1889 to 1977 when it was called "open surgery." During this period, graft fat fabric was harvested using surgical excision. In ophthalmology, Laubier used a graft fat fabric for the correction of orbital-volume loss after exenteration. Unfortunately, there was no record of graft survival. In the second era called unrefined surgery, which encompassed 1977 to 1994, Illouz developed liposuction by cannulation. Fat graft was harvested by aspiration through liposuction. The adipocytes were then transplanted to recipient sites. The grafts remained intact with a reasonable rate of survival. In the third era, "nontraumatic refined surgery," which began in 1994 and continues to the present, Sydney Coleman introduced the lipostructure technique. Its basic principle was the atraumatic manipulation of graft fat fabric through modified liposuction. This technique was the basis of autologous-fat graft.

This paper describes a patient with postenucleation-socket syndrome who underwent autologous-fat graft of the affected orbital socket.

CASE REPORT

A 36-year-old male consulted at the Oculoplastic and Reconstructive Lacrimal and Orbital Clinic of the Department of Ophthalmology and Visual Sciences at the Sentro Oftalmologico Jose Rizal, University of the Philippines–Philippine General Hospital for sunken left-eye socket. He was allegedly hit with a broken bottle on the left eye 3 years prior to consultation. He was diagnosed to have globe rupture with tripod, medial-wall, and orbital-wall fractures at a hospital in Korea. Initially, primary closure with lateral canthotomy was done. One year postoperatively, he noted phthisis with frequent pain. He then underwent evisceration with scleral wrapped orbital implant.

Gross examination revealed superior sulcus deformity, sunken socket, ptosis with adequate fornices on the left orbit. Cranial computed tomography (CT) showed enophthalmos, intact scleral wrapped orbital implant, medial-wall fracture, zygomatic-bone fracture, and orbital-floor fracture on the left. He was assessed to have anophthalmos on the left, s/p evisceration with scleral-wrapped orbital implant for ruptured globe; neglected tripod fracture left, medial-wall fracture left; and orbital-floor fracture left. He subsequently underwent autologous-fat graft on the left orbit with intumescent liposuction at the periumbilical area.

Informed consent was obtained after the procedure and risks including hemorrhage, fat embolism, graft resorption and rejection were explained to the patient. Under general

anesthesia, a 3-mm incision was made at the periumbilical area. Tumefactive local anesthetic (1 liter Lactated Ringers solution, 15 cc of 2% lidocaine, and 5 mL of epinephrine) was infiltrated in the area (source site). The amount of tumefactive local anesthesia infiltrated was computed at 1:3 ratio: for every 1 mL of aspirated fat, 3 mL of tumefactive local anesthesia was infiltrated. Fat was harvested through multilayered "feathered" passes using a 2 mL cannula with a gentle negative pressure from a liposuction machine not exceeding -1 atm pressure, attached to a Toomey syringe. Harvested fat was transferred to 10 mL syringes and allowed to stand for 30 minutes. This separated the mixture into 2 layers: a more dense serosanguinous local-anesthetic mixture and a less dense fat layer. The serosanguinous-local anesthetic mixture was allowed to drain under gravity. The fat layer was injected into the preseptal, postseptal, and retrobulbar planes using gauge 18-19 needles. Multiple layered, "feathered," passes were made in the aforementioned planes. Caution was taken not to penetrate the orbital walls and to avoid nonfatty orbital soft tissues and sites of major vessels. The passes were repeated until the desired correction of enophthalmos and bilateral orbital symmetry were achieved. The puncture wounds were allowed to heal by secondary intent. At the end of the procedure, gentle pressure dressing was applied for 48 hours. Postoperative follow-up was done weekly for 2 weeks, monthly for the next 4 months, and every 6 months thereafter. Photography and gross examination were done.

RESULTS

A total of 26 mL of fat was injected into the patient's left orbit. Postoperatively, there was note of minimal pain on the left periorbital area. Photograph taken one week postoperation showed moderate swelling and hematoma in the left periorbital area, and the periumbilical area (Figures 1 and 2). Orbital symmetry was achieved. Residual hematoma and swelling of the periorbital area and complete resolution of the periumbilical area were seen (Figure 3) 2 weeks postoperatively. Complete resolution of the hematoma on the periorbital area with conformer fitted snugly into the orbital socket (Figure 4) was achieved at 1 month postoperatively.

There was no hemorrhage or clinically evident embolism. The injection site did not show any contour irregularity and the injected fat appeared to blend well into the recipient area. There was also no significant source-site morbidity. The minimal swelling and hematoma in the periorbital and periumbilical areas resolved spontaneously in 2 to 4 weeks.

DISCUSSION

Surgical anophthalmos may give rise to a variety of complications including wound dehiscence, postoperative

infection, implant migration or extrusion, and most noteworthy, postenucleation-socket syndrome. This is characterized by a lax socket, enophthalmos, superior-sulcus deformity, socket contraction, lower-lid ectropion, and anophthalmic socket. Oculoplastic and orbital surgeries have a wide variety of approaches to address postenucleation-socket syndrome. Tissue augmentation is achieved with grafts such as fat, cartilage, bone or porous

polyethylene. The most novel of these methods is the use of autologous-fat transplant.

Grafted fat exhibits many of the qualities of an ideal filler. It is autologous and completely biocompatible, available in sufficient quantities in most patients, naturally integrated into host tissues, no possibility of rejection and most importantly provides minimal source-site morbidity. The liposuction technique, as used in autologous-fat



Figure 1. Postenucleation-socket syndrome preoperatively (A) and 1 week postoperatively (B).



Figure 2. The periumbilical area 1 week postoperatively.

transplantation, is done in 3 steps—harvesting, refinement, and transfer and placement. In harvesting, the source site is chosen based on accessibility and sufficiency of available fat. Among these are the abdominal, gluteal, and thigh areas. Only a 3-mm incision is made at the source site, making the procedure minimally invasive. Refinement of fat can be achieved ideally through centrifugation at 3,000 rpm for 3 minutes.¹ This will allow good separation of the serosanguinous fluid from the fatty tissues. Decanting is then done by allowing the

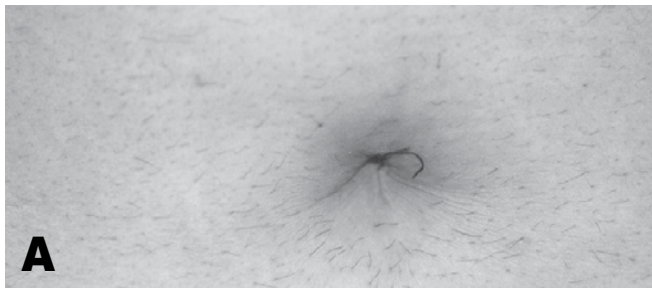


Figure 3. The periumbilical (A) and periorbital (B) areas 2 weeks postoperatively.

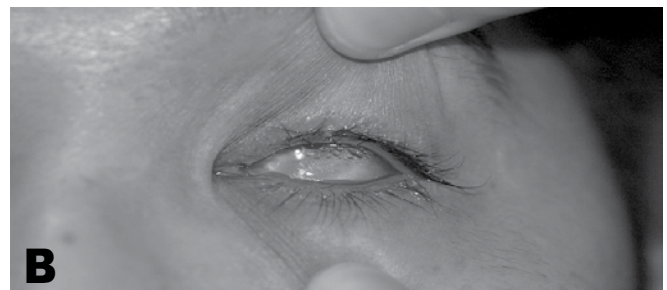


Figure 4. The periorbital area (A) 1 month postoperatively with well-fitted conformer (B).

serosanguinous fluid to drain by gravity, leaving the purified fatty tissues intact and ready for injection. With no available centrifuge in our setting, we refined the solution by letting it stand in several 10-ml syringes for 30 minutes, allowing the more dense serosanguinous fluid to separate by gravity and settle at the lowermost area of the syringe. The serosanguinous fluid was then allowed to drain by gravity.

The purified fat was injected into the periorbital area by multilayered “feathered” technique. This allows deposited fatty tissue parcels to fall into the natural tissue planes, and the host tissue collapses around them. This method attempts to separate the parcels of injected fat from one another. Therefore, the grafted fat is not in contact with other grafted fat; instead, it will be in contact with the receiving tissue. This larger area of contact between the host tissue and its capillaries and the newly grafted tissue promotes better respiration and greater nutrition. It stabilizes the grafted fat to prevent migration and integrates the fat so that it feels like generalized fullness rather than a discrete collection of fatty tissues. This is the key principle to a successful fat graft.¹ A case series of 3 patients done by Coleman in 2006 showed that the volume of grafted fat stabilized in 3 to 4 months with a slight decrease in volume up to 1 year postoperatively and eventual deterioration only after 8 to 12 years. The survival rate of grafted fat was more than 90%.¹

Some of the reported complications of the procedure were significant swelling, bruising, lumps, and fat atrophy.¹ Care must be given to avoid highly vascular areas of the orbit to prevent fat injection into the blood vessels. This is done to avoid fat embolism. A retrospective study of 12 patients done by Hardy and colleagues in 2007 showed no occurrence of fat embolism in any of the 12 patients

who underwent autologous-fat graft using the technique described by Coleman, the same technique employed in this study. They also noted that no significant morbidity occurred, only minor swelling and bruising in the source and injection sites.²

Pre- and postoperative photographs are important in evaluating the gross changes following the procedure, as well as fat-graft survival and atrophy. Both the studies of Hardy and Hunter in 2007 employed pre- and postoperative photos to evaluate the cosmetic results of the procedure among their participants.

In conclusion, autologous-fat graft is a promising, effective, and safe procedure in the management of patients with postenucleation-socket syndrome. However, it is still relatively new in the field of ophthalmology. Though several international studies have been conducted, more studies with larger sample sizes and longer follow-up periods are needed. In the Philippines, the use of autologous-fat graft is still in its early stage. The experience of Filipino ophthalmologists is still limited. It is, therefore, recommended that the procedure be employed more extensively and studies be conducted. This will enable us to explore the other possible applications of this procedure on different kinds of orbital conditions. This will also help us be aware of the possible complications it may bring, as well as realize the measures we must employ to further improve its effectiveness and safety.

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