DERMIS FAT GRAFT IN OCULOPLASTIC SURGERY

Submitted for Partial Fulfillment of Master Degree in Ophthalmology

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2013

Acknowledgement

It has been a great honor to work under the supervision of Prof. Dr. SHERIF ELWAN, MD Professor of Ophthalmology Faculty of Medicine, Ain Shams University, I am greatly indebted to him for suggesting, planning the subject and supervising the whole work. I will never forget his unlimited help, continuous support, kind encouragement and wise guidance. To him, words of praise are not sufficient and I am really greatly indebted to him.

I also would like to express my special thanks and gratitude to Asst. Prof. Dr. HISHAM KHAIRY ABDEL DAYEM Assistant Professor of Ophthalmology Faculty of Medicine, Ain Shams University, for his patience, meticulous supervision and unlimited willingness for guiding.

Lastly, I wish to extend my sincere thanks to all my family especially to my dad, my mum, my brother, my daughter and colleagues who have continued to support me spiritually and provide valuable advice to help guide me to the correct path throughout this project.

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SUMMARY

Dermis-fat grafts showed to be an effective method of correcting orbital volume deficit, maintaining satisfactory prosthetic motility and preventing the development of conjunctival deficiency, due to its high degree of safety concurrent with excellent functional and cosmetic results. The dermis-fat transplant is particularly advantageous for young patients. Also in cases of complicated orbits and contracted sockets the method of dermis-fat transplantation often represents the only promising option.

The autogeneous dermis fat grafts can be useful in managing extrusions in previously eviscerated sockets and is a promising implant for the pediatric anophthalmic socket.

Dermis fat is a novel posterior lamellar spacer graft and offers numerous advantages over conventional lower eyelid spacer grafts for repair of lower eyelid malposition.

Factors that affect fat survival appear to be: the size of the fat graft, the trauma associated with the fat harvest, the vascularity of the donor site, inflammation following transplantation and lipolysis of the fat cells.

Summary

It was found that inserting a free dermofat graft onto a pre-existing alloplastic orbital implant carries a considerably high risk of transplant failure. So, situations in which a dermis fat transplant would appear advantageous for the restoration of a difficult socket with an alloplastic orbital implant already in place, this should be removed and replaced by a dermofat graft. If necessary, for greater volume, an alloplastic implant can later be inserted behind the DFG.

Insertion of the graft into the socket should be handled carefully. It should not be squeezed into the space, and any undue pressure should be avoided; otherwise the risk of graft atrophy is enhanced.

Dissection to expose Extraocular Muscles should be avoided in secondary implantation, it is advantageous to treat the socket as atraumatically as possible.

Unnecessary manipulation enhances the risk of bleeding and late fat atrophy. However, it is important to anchor the sutures in the best possible position, which means deep enough in the socket in the region where the rectus muscles are suspected.

Advantageous is the fact that typical complications of all alloplastic implants, like migration and extrusion, can be avoided. Heterologous materials like donor sclera are unnecessary and the functional and cosmetic results are very good.

Disadvantages are the need for a donor site with inevitable scar formation and possible secondary pathology, as well as a longer rehabilitative period postoperatively.

DERMIS FAT GRAFT IN OCULOPLASTIC SURGERY

Dermis Fat Graft:

A dermis fat implant (dermofat graft, DFG) is an autologous transplant consisting of de-epithelialized epidermis with its adjacent subcutaneous fat tissue. It can be used as an alternative orbital implant to alloplastic implants. Currently, it is the only autologous transplant used for this purpose in ophthalmic plastic and reconstructive surgery.[1]

Fat is better to use as it is an easily obtainable, nonimmunogenic, autograft which is in plentiful supply [2], suitable to be considered in the replacement of aesthetic defects secondary to subcutaneous tissue loss.[3]

The Prime Use of Dermis Fat Graft:

The idea of using free fat transplants in surgery goes back to the end of the 19th century.[4, 5] At the beginning of the 20th century, free fat grafting for the maintenance of the acquired anophthalmic socket was introduced. Barraquer, from Mexico, first described autologous fat transplantation as an implant following evisceration[6], before it was used following enucleation.[7-9] Free fat was inserted into the extraocular muscle cone and covered with conjunctiva. Later the rectus muscles were sutured across the transplanted tissue.[7,9] Significant postoperative atrophy, however, made this technique unacceptable.[10]

According to Neubauer[11], the first dermis fat transplant including fat in conjunction with de-epithelialized skin, was introduced by Loewe[12] and was extensively utilized by Lexer.[13] In Europe, free dermofat grafting was widely used in the first decades of the 20th century.[14-20] Following the development of modern

alloplastic Orbital implants during and after the Second World War, dermofat grafting fell into oblivion.

It was not until 1978 that dermis fat implants were resurrected by Smith and Petrelli[21] and further propagated by Smith et al. in 1982.[22] Smith originally used the dermis fat implant as a secondary orbital implant, but then began using it more and more as a primary orbital implant.[23,24] This short excursion into medical history demonstrates that dermofat grafting is by no means a recent development, but, rather, has been used quite successfully for more than 100 years.

Donor Site of Dermis Fat Graft:

The gluteal region is advantageous as the preferred donor site, because the dermis is stronger and the subcutaneous fatty tissue is, according to Guberina[25], more robust than in other regions. Underwear usually hides the scar. Alternatively, tissue can be harvested from the periumbilical area.[26]

Autologous tissue consisting of de-epithelialized skin with its adjacent subcutaneous fat is used as a primary or secondary orbital implant. The graft is usually taken from the gluteal region and transplanted into the socket with the external dermis facing outward. The extraocular rectus muscles or adequate orbital soft tissues are sutured to the margin of the dermis. The conjunctiva of the recipient is fixed onto the surface of the dermis, leaving part of it bare for spontaneous reepithelialization (Figure1).

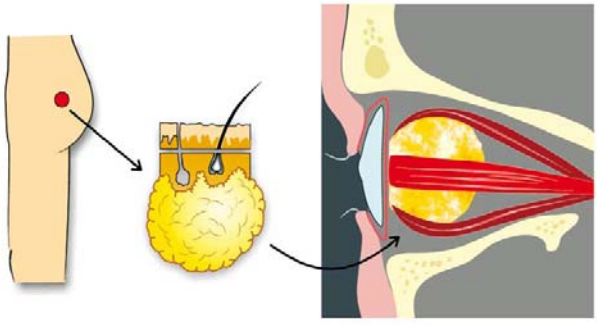

Figure 1. Principle of dermis fat transplant (schematic). De-epithelialized skin with adjacent subcutaneous fatty tissue is transplanted from the gluteal region into the socket.[27]

Size of the Dermofat Graft:

The correct and adequate size of the dermis fat transplant do depend on the implantation site.

However, there are certain rules that should be kept in mind. Published reports showed variations. They range from "as much fat as possible"[28], to a "surface of 15×18 mm and a depth from 30 to 40 mm" [1], to a "spherical implant of 35 mm diameter"[29] or "25×25 mm and an adequate depth".[30,25] A depth of 10 mm for the fatty part of the graft was shown to be insufficient.[31]

In Munich, they have been using circular grafts measuring 25 mm in diameter and about the same in depth. This was a suitable size for any primary procedure involving removal of an average eyeball. However, this has to be modified depending on the size of the orbital implantation site. In secondary procedures, the graft often needs to be smaller, and in congenital anophthalmos our smallest implant measured only 12 mm in diameter. Again, it is essential, not to push the graft into the socket with force.

Shape of the Dermofat Graft:

The discoid shape is a stable form with a low risk of central ulcerations. Alternatively, narrower transplants shaped like a banana have been described.[32] Their donor site is easier to close, however, since they have to be sutured in order to get a discoid shape, they are much more at risk of developing central breakdown and ulcerations.

Uses of Dermis Fat Graft:

Successful uses in the eyelid and orbit include augmentation of the anophthalmic sockets[33], correction of the lower eyelid depression in iatrogenic (postblepharoplasty) and congenital cases[34], elimination of lower eyelid pretarsal skin laxity and filling of superior sulcus defects in the upper eyelid.[35]

Indications and choice of patients for DFG orbital implant:

DFG is indicated for the following states:

1) Enucleation orbital implant whether primary or secondry.[36, 29]

2) Management of congenital anophthalmia and childhood enucleations.[37]

3) Evisceration orbital implants.[38]

4) Reconstruction of contracted sockets.[39]

5) Use of dermis fat graft in upper lid.

(1.1) DFG as a primary enucleation orbital implant:

DFG enucleation implant in adults:

A great attention should be paid to the state of vascularity of the recipient bed, as it is a major determintial factor of survival of the graft: a dermis–fat graft takes well in primary implantation at the time of enucleation. The chances of graft survival are at their maximum when the state of the recipient bed is healthy. The advantage of primary implantation is preservation of a normal socket anatomy, which facilitates preparation of the recipient bed.

Easy identification of recti muscles, which are affixed to the graft, plays an important role in its vascularization and viability. The conjunctival lining of the socket with its deep fornices is retained. Dermis fat graft is permenant; it does not extrude or migrate. The larger volume replacement with dermis fat graft rather than with a synthetic ball permits the wearing of a thinner and lighter prosthesis. With less weight bearing, the tonus of the lower lid is better preserved.[39]