Dermofat grafts to the extraconal orbital space

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Abstract

Dermofat grafts were placed in the upper or lower lid sulci in 35 subjects, aged from 11 to 59 years, to improve the cosmesis of volume deficient sockets or prevent tissue adhesion. Volume enhancement and cosmetic improvement were achieved in 31 patients, in whom useful vision was present in 13/22 after previous trauma, in 4/4 with facial clefting, and in 3/3 with orbital or facial fat atrophy. Grafts were used successfully in nine patients to prevent scar formation after division of adhesions between the eyelids or levator muscle and the orbital margins. A reduction of the bulk of upper-lid grafts was required in three cases; histopathology of the excised fat showed relatively minor degrees of inflammation, atrophy, and fibrosis.

Since the introduction of dermofat grafting¹ the most common ophthalmic use has been the augmentation of soft tissues in volume deficient sockets after enucleation; such grafts are placed within the residual tissues of the intraconal space.²⁻⁸ Unlike non-autogenous materials used for volume augmentation dermofat grafts (being autogenous) have negligible risk of rejection, although there is some tendency for lipolysis and resorption of adipose tissue in the early post-operative period.

Free dermofat may be grafted into the extraconal spaces,^{4,8-11} where the dermis is apposed to the periosteum of the orbital rim or to other suitably vascularised structures; in this situation the grafts can provide both volume augmentation and a valuable barrier to the formation of scar tissue.

The results of dermofat grafting to the extraconal orbital space in 35 patients are reviewed in this paper.

Patients and methods

Patients having extraconal dermofat grafting between 1980 and 1991 were identified from the surgical records at Moorfields Eye Hospital.

All surgery was performed under general anaesthesia. The dermofat graft was taken from the buttock, at a point half-way between the ischial tuberosity and ipsilateral greater trochanter, using well-established techniques.¹² Parenteral antibiotics were given at the time of harvesting the tissue.

EXTRACONAL DERMOFAT GRAFTS FOR VOLUME DEFICIENT SOCKETS

For volume deficient sockets with deep upper-lid sulci the orbital rim was approached through a skin crease incision at a level determined pre-

operatively. The orbital septum was divided and the fat along the anterior part of the orbital roof displaced inferiorly. The dermal surface of the dermofat graft was attached to the periosteum of the orbital roof using 6/0 polyglycolate sutures, with care being taken to avoid damage to the supraorbital neurovascular bundle and the trochlea. The skin crease was reformed by sutures attached to the anterior part of levator muscle or aponeurosis.

A subciliary blepharoplasty approach was used for dermofat grafting to the interior orbital rim. The rim was approached in a similar fashion to the upper lid and the graft secured to the anterior periosteum of the orbital floor.

EXTRACONAL DERMOFAT GRAFTS FOR PREVENTION OF TISSUE ADHERENCE

Areas of adhesion between lid tissues and orbital rim were approached as in the volume deficient sockets. Tissue adhesions were separated with respect for natural tissue planes, and any necessary repair of tissues (such as levator muscle) performed. The dermofat graft was then sutured to the periosteum overlying the site of tissue adherence and the superficial layers closed.

In some cases other measures, such as medial canthoplasty or lateral tarsorrhaphy, were used

Table 1 Extraconal dermofat grafts in 35 patients

Reason for dermofat grafting	Status of the eye	Initial ocular/orbital pathology
26 cases for cosmetic improvement	Sighted* eyes (13)	9 post-traumatic 1 post-operative 1 hemifacial atrophy 1 blepharochalasis 1 maxillary dysplasia
	Blind eyes (2) or enucleated (1)	8 post-traumatic 5 tumours
4 cases for tissue separation	Sighted* eyes (4)	1 post-traumatic 3 facial clefts
5 cases for tissue separation and cosmetic improvement	Sighted* eyes (3) Blind eyes (1) or enucleated (1)	3 post-traumatic 1 post-traumatic 1 post-irradiation

* 'Sighted' denotes an acuity of finger-counting or better.

Table 2 Ocular characteristics for patients undergoing dermofat grafting to the extraconal orbital space

Ocular characteristics	Mean value	Number of cases
Depth of upper lid sulcus (graded 0-3)		
preoperative	2.4	29
postoperative	0.7	29
Depth of lower lid sulcus (graded 0-3)		
preoperative	1.1	10
postoperative	0.3	10
Degree of enophthalmos (graded 0-3)		
preoperative	1.3	35
postoperative	1.3	35
Palpebral aperture (affected side; mm)		
preoperative	8.9 (9.0)*	34 (33)*
postoperative	7.8	30
Levator function (affected side; mm)		
preoperative	9.0 (14.4)*	31 (31)*
postoperative	8.2	29

* Values for the unaffected (healthy) side, where appropriate.

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to help eyelid closure and the eyelid was placed on traction if needed.

Ocular characteristics were graded from the case notes and, where possible, from clinical photographs. Subjective measures were arbitrarily graded as '0', '1' (mild), '2' (moderate), or '3' (marked) and other measurements, such as palpebral aperture or levator function, were assessed using standard methods.

Results

Thirty five patients (15 male, 20 female), aged from 11 to 59 years, underwent extraconal

dermofat grafting to the right, left, or both sockets (20, 13, and two cases, respectively); grafts were placed in the upper eyelid (29 cases) or lower eyelid sulcus (10 cases). Follow-up intervals were from 4 months to 7 years (median 1 year).

Sulcus dermofat grafts were performed in 22 sockets after previous trauma; enucleation has been performed in six cases and 13/16 remaining had sighted eyes (Table 1). After prior ocular surgery or tumour six patients had grafts solely for volume augmentation (five enucleated) whereas one enucleated socket was grafted also to prevent tissue adhesions (Table 1). Three

Fig 1A

Fig 2A

Fig 1B

Fig 2B

Figure 1 A deficiency of soft tissue volume is present in the right orbit after blowout fracture; although the upper lid sulcus is very deep, the vision, ocular movements, and eyelid movements are all normal (A, B).

Figure 2 The same patient as Figure 1, 3 months after dermofat grafting to the upper eyelid sulcus; eyes (A) open, (B) closed.

Fig 3A

Fig 4A

Fig 3B

Fig 4B

Figure 3 Patient with bilateral lower lid retraction (A), lagophthalmos (B) and secondary corneal exposure; there is adherence of malar scars to the maxillae, which were advanced during surgery for Apert's syndrome.

Figure 4 Same patient as Figure 3, 6 months after freeing of tissue adhesions and dermofat grafting on the inferior orbital rims; the grafts reduce adherence of scar tissues and improve the malar profile. Eyes (A) open, (B) closed.

Figure 5 Specimen of dermofat removed 1 year after grafting into the upper lid sulcus. There is no significant inflammation or fibrosis and the histological structure of the fat is well maintained.

patients had severe orbital fat atrophy (one blepharochalasis syndrome, one hemifacial atrophy, and one maxillary hypoplasia) and were grafted for volume deficient sockets, whereas three other patients with facial clefts had grafts to prevent tissue adherence between the eyelids and orbital margins; all six of these patients had sighted eyes. Dermofat grafting was combined with other procedures to the upper eyelid in eight patients – namely, levator muscle resection (six cases), recession of the upper-lid retractors (one case), and entropion repair (one case).

There were no intraoperative complications even in cases where the orbital roof had been damaged at initial injury. As a result of surgery, however, two patients developed a transient supraorbital neuropraxia. Lipolysis occurred in many grafts and a minimal discharge of liquefied fat from the skin incision was quite common. One patient developed a staphylococcal abscess at 2 months after surgery, which resolved with drainage and systemic antibiotics; there was however, marked reabsorption of fat from the graft and subsequent adhesion between the eyelid and the orbital margin.

Despite reabsorption of fat there was good augmentation of tissue volume and reformation of the upper-lid skin crease with all grafts (Table 2; Figs 1 and 2). Similarly where the graft was used as a 'spacer' there was a satisfactory prevention of tissue adhesion which improved eyelid movements (Figs 3 and 4); in the overall group of 35 patients, however, there was a tendency to a slight reduction of palpebral aperture (due to gravitational ptosis) but almost no change in the elevator function (Table 2).

Five patients had anterior approach ptosis surgery as a secondary procedure (three planned before dermofat grafting). The bulk of the graft was too great in four patients and three had a secondary debulking (one with ptosis correction, one with skin crease reformation).

Discussion

Free dermofat grafts into the extraconal space are useful for augmenting the tissues within volume deficient sockets. The grafts, placed in the upper and/or lower sulci, are particularly useful where volume has already been augmented

by intraconal⁸ and orbital floor implants,^{8,13} or where there is a sighted eye and orbital floor implantation would carry a significant risk of optic nerve damage.

Volume enhancement was the prime indication for dermofat grafting in 26/35 patients in this series, of whom one half had usefully sighted eyes (Table 1; Figs 1 and 2); enhancement of socket volume had been performed where possible by intraconal and orbital floor implantation. There were five patients in whom volume enhancement was a secondary gain after the prime necessity for a 'spacer' to prevent tissue adhesions; three of these five patients had sighted eyes (Table 1; Figs 3 and 4). The aim in all patients was to slightly overcorrect volume deficiency, to allow for postoperative fat reabsorption, and loss of tissue volume was not a significant problem (Figs 2 and 4). All 31 patients had a satisfactory reduction in the depth of the eyelid sulci, although the grafts remained too bulky in four patients and were surgically reduced in three cases.

The anterior approach to grafting the upper lid allows both reformation of the skin crease and also surgery to correct ptosis or upper-lid entropion. A postoperative ptosis is common after upper-lid grafting but typically improves as reabsorption of the fat and tissue oedema occurs; secondary ptosis surgery was needed in 5/31 patients and had been expected in three of these five cases.

Mobile tissues, such as the eyelids or levator muscle, may become adherent to the fixed orbital margins after trauma; after surgical separation a re-adherence of these tissues is almost inevitable unless the two surfaces are kept apart by the use of a 'spacer' – such as dermofat or silicone sheet. A dermofat graft is less liable to extrusion or infection than non-autogenous materials, the risk of infection being particularly great in post-traumatic cases where sinus fractures are fairly common. Unlike silicone sheet, which tends to be prominent when placed near the orbital margin, dermofat grafts have a smoother contour when straddling the orbital rim – a position often required for 'spacer' grafts (Fig 4).

The primary indication for dermofat grafting in nine patients was to provide a 'spacer' and in eight of these the scars were either post-traumatic or postoperative (Fig 3). Eye closure was improved in all cases and the position and movements of the upper (six cases) or lower (three cases) eyelids were better. In some of this group the visual acuity improved after surgery as the preoperative exposure keratopathy resolved.

With the exception of one patient, in whom the graft became infected, the degree of postoperative fat reabsorption was not sufficient to impair the surgical results. Where the dermofat graft required debulking it is of particular interest that the excised tissue from two cases showed only minimal inflammatory cell infiltrates or fibrosis and that the cellular architecture for the adipose tissue was very well maintained (Fig 5); this finding of almost normal fat architecture is similar to that in another report.¹⁴

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