The Value of the â Buccal Pad of Fatâ in the Reconstruction of Oral Defects Following Removal of Intraoral Tumours - A Clinical Assessment

Abstract:

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Abstract
The buccal pad of fat (BPF) is an important structure found in the orofacial region of humans. It is larger in infants and gradually becomes smaller in adults. We present twenty seven (27) cases with an average age of 60 years, with a variety of pathological lesions in which we have used the BPF to reconstruct the defects following resection of tumours. Twenty (74%) patients were diagnosed with Squamous Cell Carcinma. The commonest surgical sites were the soft palate and maxilla (46%). A clinical analysis of the value of BPF in reconstruction was made by using assessment criteria, mouth opening, cosmesis, fistula formation, approved by the ethical committee of the Hospital. Our findings show that the BPF is an excellent pedicled graft for the reconstruction of defects up to 10x5.5x1.1 cm in size. The donor site had no morbidity in terms of fuctions including, mouth opening (normal), masticatory movement, deglution, motor / sensory loss and patients were unaffected cosmetically (no temporal hollwing). There was no abnormal finding e.g. fistula, Freyâ s syndrome, speech and movement of the soft palate was unaffected. Salivary function was not affected (parotid duct). Speech outcomes were normal. We used a pre-surgery constructed blow â down soft or a preformed acrylic plate to support the fat pad in 13 (50%) patients, secured with mini screws. The use of a splint to support and protect the flap allowed early feeding.

Introduction
The buccal pad of fat (BPF) is an important structure found in the orofacial region of humans. The buccal pad of fat (BPF) was first mentioned by Heister in 1732 and then better described by Bichat in 1802. It is larger in infants (suction) and gradually becomes smaller in adults. Its function is one of helping the masticatory muscles in their gliding action, a facial filler and in distribution of masticatory / biting forces. It was described as a definite anatomical entity. Its loss due to fat atrophy (anorexia) did not impede mouth opening. In 1977, Egyedi was the first to report the use of the BPF in reconstruction of oroantral and oronasal communications.[1] He recommended that the BPF be covered with a skin graft but later Tideman et al in 1986 showed there was no need to cover it with skin graft if used in the oral cavity.[2] Neder in 1983 reported the use of the BFP (or BPF) as a free graft for intra oral defects.[3] Rapidis et al in 2000 and Hao in 2000used pedicled buccal fat pad flaps for reconstruction of medium sized post-surgical oral defects. Most of these were following excision of malignant lesions.[4,5]

Most studies were concerned about the size of the defect, mouth opening and scarring with each study aiming to cover larger defects. Histological examination of the Buccal Pad of Fat used in reconstruction shows that it takes 4-6weeks for its surface to heal completely.[2] Slowly and gradually the fat cells decreases in number. Evidence of stratified squamous epithelium with parakeratosis was found near to the margin of the mucosa. After 4-6weeks the BPF was completely replaced by epithelial mucosalisation and fibrous tissues. The anatomy of buccal fat pad (Fig. 1) is complex and has been described in anatomical papers.[6,7] It is covered by a thin capsule and consists of a main fatty body and four fat extensions: buccal, pterygoid, superficial temporal and deep temporal. The parotid duct and buccal, zygomatic branches of the facial nerve (V) cross the lateral surface of fat pad. The weight of the buccal fat pad is 9.3 g. It has a rich blood supply from branches of deep temporal, maxillary and facial arteries. The buccal fat pad is thought to aid in contouring of the face, masticatory function especially in infants for suckling and in adults enhances the inter-muscular gliding movements allowing opening and closing of the jaw to progress smoothly. It was because of this that concern was initially raised about mouth opening.

Methods
Once the tumour was removed, the margins of each defect was assessed, undermined to allow some primary closure to decrease the original defect size (Fig 2). A 2cm. incision is made in the buccal vestibule near to second maxillary molar and the buccal fat pad exposed. Blunt dissection was performed gently but firmly through the buccinators muscle, which allowed the soft buccal fat pad to herniate through it (Fig. 3). The Buccal Pad of Fat was then gently grasped, mobilised, brought and spread over the defect to cover it completely with out traumatizing it. It initially looked frail and this can be disconcerting for the inexperienced. It was sutured to the margins of the surgical defect with resorbale 3/0 vicryl sutures (Fig. 3). The buccal fat pad was supported / covered with an acrylic / polyvinyl plate in 50% of cases (Fig. 4). This enabled the patient to post-operatively drink fluids, eat a soft diet and keep it clean in an undisturbed condition. The plate was secured with titanium screws and removed after one week to see the status of healing. It was then used for eating and it was fully removed after 2-3 weeks. The other patients (50%) were fed through either a NG tube passed through opposite nostril or a Percutaneous Endoscopic Gastrostomy (PEG) tube.

Figure 1: Clinical diagram highlighting the anatomy (consent obtained)

Results
There were 27 patients, with an average age of 60 years (oldest 78 and youngest 17). Age did not seem to affect the size of the fat pad. Seven (25%)were male and twenty(75%) were female. Twelve patients (44%) came from the Dublin area and the rest (56%) were from other parts of Ireland. Twenty patients (74%) were diagnosed with Squamous Cell Carcinma

(Fig. 2). One (1) patient had a significant carcinoma in situ developed in â Lichen planusâ . There were 6 patients (22%), who were diagnosed with other pathological anomalies, ameloblastoma, polymorphic low-grade adenocarcinoma, juvenile ossifying fibroma, pleomorphic adenoma, malignant melanoma and a case of leukoplakia with changes of carcinoma in situ, dysplasia and discoid lupus erythematosis affecting the left buccal mucosa.

Figure 2: Cancer (SCC) excision margin marked pre-operatively

Figure 3: BPF secured with vicryl rapide

The surgical sites (43) in the 27 patients were the soft palate (23%), the maxilla (23%), the buccal mucosa / cheek (16%), the retromolar area (14%), the bony alveolus (12%), the tongue (9%) and the floor of mouth (2%). Most of the lesions were on the left side so the left BPF was used in eighteen (67%) patients and right side BPF was used only in nine patients (33%). Six patients (22%) had larger defects requiring an additional form of reconstruction i.e. tongue was used in five and the pectoralis major muscle was used in one case where multiple structures had to be sacrificed. Two (7%) patients, who had extensive surgery e.g. neck dissection with or with out mandibulectomy, required a tracheostomy

In our patients the average surgical defects was 4.4 x3.1 x1.7 cm. (range 1.3x4.3x0.6---10x5.5x1.2 cm.). The success rate was high. There was no total or partial loss of the buccal fat pad. There were very few side-effects, except for an initial decreased mouth opening, in common with almost all oral cancer resections. We used a pre-surgery constructed blow â down soft or a preformed acrylic plate to support the fat pad in nearly 50% (13) of patients secured with mini screws. Patients with a blow down splint / acrylic splint (50%) were fed orally. Fourteen patients (50%) had no splint (2 were fed orally, 8 through a NG tube and 4 by PEG tube feeding. One patient with a very large defect (soft plate, uvula, alveolus, and retromolar area) had not surprisingly problems with eating, drinking and clinical mucosal scaring.

Figure 4: Surgical site covered with blow down/ acrylic plate.

Most patients had no complaints whatsoever and were very happy with the reconstruction, especially as it avoided major reconstructive surgery. Mouth opening was in the normal range. There was no temporal hollowing. There was no motor or sensory loss at the donor sites. There was no abnormal finding e.g. fistula, Freyâ s syndrome, speech and movement of the soft palate was unaffected. Salivary function was not affected (parotid duct). Speech, taste and swallowing were normal. No patients complained of a discharge or a bad taste in their mouth. The cosmetic outcome was excellent.

Discussion

Egyedi was the first to report the successful use of the â buccal fat padâ as a pedicle graft. He covered it with a split thickness skin graft. In all our cases we did not use any skin graft to cover the BPF. We used a pre-surgery constructed blow â down soft or a preformed acrylic plate. Nearly 50% (13) patients got a blow down or and acrylic splint secured with mini screws. The thermoplastic silicone (4mm) blow down / acrylic splint was used to protect delicate flap during initial phase of healing, keep it clean from food debris, maintain sulcus depth, and enable almost immediate oral feeding. Our patients started on liquidised and then semisolid food as soon as the speech and language

therapist deemed swallowing satisfactory. Egydei has used the BPF for defects of less than 4cm.[1] Later Tiedeman used it for the defects 5x3cm.[2] Fujimura used it for the defect sized 6x 5x 3cm.8In our patients the average surgical defects was 4.4x3.1x1.7 cm (range 1.3x4.3x0.6---10x5.5x1.2 cm.). There was no partial or total loss of the buccal fat pad. They were all successful.

The buccal pad of fat as ilustrated by Marttin-Granizo et all in 1997and Ahmad et al in 2010, is a very useful and successful reconstructive pedicled flap and should be considered to reconstruct defects in the mouth (up to 10 cm) after removal of oral and maxillofacial tumours.[9,10] Although it has a potential disadvantages of restricted mouth opening due to scaring and retraction, this was not a finding in our patient group at 6 â 12 months after surgery. We believe the high success rate is because of its good blood supply, atraumatic surgery and the use of, where possible, a blow-down / acrylic palate, to protect the delicate fat pad graft during the initial phase of healing. The flap has a low morbidity is well accepted by the patient and can be used with association of other grafts. There is no loss of sensory or motor control in the donor site. The Buccal Pad of Fat does not interfere with intra- oral prosthesis (dentures), does not affect speech or deglution. Patients did very well with few side effects. The Buccal Pad of Fat is a well recognised technique but has not been used widely since the development of microvascular tissue transfer. We found it a very useful reconstruction method in covering the small to medium size defects (10cm.) in oncological /non-oncological procedures in the oral cavity with a high success rate and very few complications.

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