Long Term Follow-up of Vascularized Dermal Fat Transfer

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Backgrounds: Fibrous dysplasia is an uncommon, benign disorder characterized by a tumor-like proliferation of fibro-osseous tissue. It can present as an autosomal dominant disorder affecting the mandible and maxilla bones in children in their teenage years. The patient manifests with unilateral firm swelling of cheek. It can be managed by excision and resulting contour defect that can be managed by reconstructing using vascularized dermal fat. Resorption is the main problem due to an insufficient blood supply, and vascularized dermal fat have been described to minimize this problem.
Patients and Methods: In this study we report the results after insertion of vascularized dermal fat into zygomatic-maxilla region. The method consists of implantation of vascularized dermis with attached subcutaneous fat from the antero-lateral thigh (ALT) into the right zygomatic-maxilla region, anastomosing the vascular with temporal superficial vessel. During a one-year follow up, the patient showed good results. Graft atrophy was observed. Despite the more extensive surgery and some minor complications the safety of this method with good functional and cosmetic results makes vascularized dermal fat an excellent alternative to reconstruct facial contour defect.
Results: Compared with free-fat grafts, resorption rates for vascularized adipose tissue transfers are very low. Satisfactory cosmetic results were also achieved.
Summary: The advantages of this method is the minimized resorption and an excellent functional and cosmetic result. Therefor, we imply that vascularized dermal fat is an excellent method to reconstruct facial contour defect.
Keywords: *Vascularized dermal fat, Fibrous dysplasia*
Latar Belakang: Fibrous displasia adalah kelainan yang jinak dan jarang ditemukan, ditandai dengan proliferasi yang berlebihan dari jaringan fibro-osseus. Kelainan ini bersifat autosom dominan dan melibatkan maksila atau mandibula, biasanya terjadi saat usia remaja. Gambaran klinisnya adalah pembengkakan yang padat pada daerah pipi. Tatalaksana berupa eksisi yang meninggalkan defek luas yang dapat diatasi dengan menggunakan dermal fat. Masalah utama yang dihadapi dengan teknik ini adalah resorpsi karena vaskularisasi yang inadekuat. Vascularized dermal fat diharapkan mampu mengatasi masalah ini.
Pasien dan Metode: Studi ini melaporkan sebuah kasus vascularized dermal fat untuk defek pada regio zigomatiko-maksila. Metode ini mencakup implantasi dari dermis yang dengan vaskularisasinya beserta lemak subkutan dari paha antero-lateral ke regio zigomatiko-maksila. Dilakukan anastomosis dengan vasa temporalis superfisialis. Evaluasi 1 bulan pascaoperasi menunjukkan hasil yang memuaskan. Terdapat sebagian atrofi dari graft. Metode ini merupakan alternatif yang sangat baik untuk rekonstruksi kontur wajah.
Hasil: Dibandingkan dengan free-fat graft, tingkat resorpsi sangat rendah. Hasil yang didapat memuaskan secara kosmetik.
Ringkasan: Keuntungan dari penggunaan metode ini adalah tingkat penyusutan yang rendah serta hasil yang baik secara fungsional dan estetik pada evaluasi.
Kata Kunci: *Vascularized dermal fat, Fibrous dysplasia*

Fibrous dysplasia is the most common osseous craniofacial tumor encountered by plastic surgeons, an uncommon, non-neoplastic, benign bone disease first described by von Recklinghausen in 1891. The pathogenesis of fibrous dysplasia involves abnormal activity of the bone-forming mesenchyme with an arrest of bone maturation in the woven bone stage, forming irregularly shaped trabecula. Mutations of signaling

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protein and increased interleukin-6 levels have been implicated in the process. The condition is usually progressive until age 30, and reports of progression well into adulthood are not uncommon. The most often affected bones in the cranium are the frontal and sphenoid bone, and in the face, the maxilla.[1]

Surgical treatment of fibrous dysplasia consists of either conservative shaving/ contouring or radical excision with immediate reconstruction. Surgical treatment of fibrous dysplasia consists of either conservative shaving/contouring or radical excision with immediate reconstruction. Free-fat grafts and vascularized dermal fat flap has been an option for fill the facial contour defect of Fibrous Dysplasia.

PATIENTS AND METHODS

A 26 year old woman presented with right hemifacial swelling since 16 years ago. Biopsy taken in 2007 with histopathological examination result was fibrous dysplasia. This patient have taken the multi-stage reconstruction; right maxillo-mandibulectomy continued with implant. This patient then admitted to Cipto Mangunkusumo Hospital with defect of right zygomatic maxilla region.

Operative intervention was performed to fill the facial contour defect, using vascularized perforator-based anterolateral thigh (ALT) dermal fat flap into the right zygomatic-maxilla region by anastomosing femoral descendent lateral circumflex artery and vein with superficial temporal artery and committantes vein (Figure 1). The results of this procedure are minimal pain or paresthesia, acceptable scar cosmesis, good contour and rapid mobilization. Satisfactory cosmetic results were achieved. This patient then followed up for functional and aesthetic result until one year.

RESULT

The observation of this patient at one month and one year after surgery revealed equal shape and contour of the right site facial area. We assumed that the volume of the dermal fat flap doesn't underwent resorption.

DISCUSSION

The most common osseous craniofacial tumor encountered by plastic surgeons is fibrous dysplasia; an uncommon, non-neoplastic, benign bone disease first described by von Recklinghausen in 1891. The pathogenesis of fibrous dysplasia involves abnormal activity of the bone-forming mesenchyme with an arrest of bone maturation in the woven bone stage, forming irregularly shaped trabecula.[1]

Surgical treatment of fibrous dysplasia consists of either conservative shaving/ contouring or radical excision with immediate reconstruction. The choice of surgical option depends on several factors: site of involvement,

Table 1. Classification of craniofacial skeleton and recommended treatment.

Zone	Region	Recommended Treatment
Zone 1	Frontal, Orbital, Nasal, Ethmoid, Zygoma, Upper Maxilla	Surgical treatment for epiphora, Extraocular motility distrubance, Proptosis
Zone 2	Parietal part of the Occipital, Temporal, Lateral Cranial Base	Surgical treatment largely instituted for cosmetic reasons
Zone 3	Central cranial base petrous, Pterygoid, Sphenoid	Surgery avoided until appearance of symptoms
Zone 4	Maxillary alveolar bone, Mandible	Teeth-bearing bones, Conservative treatment

Figure 1. Above Left: Design Incision on the right zygomatico maxilla region, **Above Middle:** Elevation of vascularized dermal fat from anterolateral thigh (ALT), **Above Right:** Flap of the right zygomatico-maxilla region for dermal fat insertion, **Below Left:** Vascularized dermal fat into the right zygomatic-maxilla region, anastomosing femoral descendent lateral circumflex artery and vein with superficial temporal artery and committantes vein, **Below Right:** Evaluation of vascular flow using Doppler one week post operative.

Figure 2. Left: Post-op defect of polyostotic fibrous dysplasia. **Middle and Right:** Shown stable volume from one month to one year post operative.

rate of growth, aesthetic disturbance, functional disruption, patient preference, general health of the patient, surgeon's experience.[2]

In the surgical management of craniofacial fibrous dysplasia, the craniofacial skeleton has been classified into 4 major zones. Zone 1 includes the fronto-orbital, zygomatic and upper maxillary regions; zone 2 represents the hair-bearing cranium; zone 3 is the central cranial base; and zone 4 includes the teeth-bearing regions of the maxillary alveolus and mandible. For lesions in zone 1, total excision of the dysplastic bone is recommended. For lesions in zones 2, 3 and 4, conservative excision or shaving has been proposed.[2, 3] Reconstruction after excision is important in the management of craniofacial fibrous dysplasia. This is particularly true in cases of zone 1 involvement (Table 1).[2]

Among autologous options, the dermal fat has remained a well-established tool for the correction of contour defects in reconstructive surgery for more than 70 years.[4] Dermal fat have been used successfully for reconstruction of facial contour defects for almost a century, but they have failed to gain widespread clinical acceptance. This lack of popularity persist despite numerous advantages of free dermal fat over available alloplastic implant materials. Two misconceptions may explain the reluctance to use free dermal fat for reconstruction of facial contour defects. The first misconception is the unsupported notion that free dermal fat put the patient at high risk for epithelial cyst formation secondary to retained epithelial elements. It may have originated from experiments in which buried whole skin frequently led to epithelial cyst formation. The second misconception is the fear of complete free dermal fat resorption, which may have been perpetuated by the comparatively poor performance of free fat grafts, the use of excessively large free dermal fat, and the failure of most free dermal fat studies to provide long term follow-up.

The observation by Starks showed that free dermal fat greater than 1.0-cm thickness result in excessive absorption. Grafts greater than 1 to 1.5 cm in thickness appear to exceed the limits of re-vascularization derived from contact of the grafted dermis with the subdermal plexus of the overlying recipient skin flap.[5]

Owing to the inevitable volume loss of implanted free dermal fat, many authors have recommended initial overcorrection to compensate for anticipated graft shrinkage. While the exact overcorrection is seldom quantitated, published estimates range from 10% to 40%. In the patient without complications, free dermal fat resorb predictably by 25% to 30% when the subdermal fat is limited to thicknesses of 1.5 cm or less.[5]

Resorption is the main problem due to an insufficient blood supply, and vascularized dermal fat have been described to minimize this problem. In this patient, we used vascularized dermal fat from antero-lateral thigh (ALT) into zygomatic-maxilla region, anastomosing femoral descendent lateral circumflex artery and vein with superficial temporal artery and committantes vein.

The anterolateral thigh flap is an extremely versatile extremity flap since its moderately thick skin and large potential muscle bulk can be independently tailored to provide ideal tissue matches for this heterogeneous group of defects.[7] It is a septocutaneous artery flap based on the septocutaneous or muscle perforators of the lateral circumflex femoral system. This flap is a suitable donor region, but it is still little used in maxillofacial surgery. Recent studies have demonstrated the advantages of the anterolateral thigh flap to be the following: 1) elevation is easy because there are several perforators deriving from the descending branch of the lateral circumflex femoral system, 2) the diameter of vascular pedicle is approximately 2 mm, 3) the flap is potentially sensate because the lateral femoral cutaneous nerve can be used, 4) the skin territory of the anterolateral thigh flap is very long and wide (about 25 cm long and 18 cm wide), 5) the donor is far from the head and neck regions, and 6) the donor site is hidden and therefore more acceptable to the patient. The disadvantages of this flap are: 1) The anatomy of the pedicle vessels is irregular, 2) the flap has hair follicles in male patients, and 3) a large

flap will result in a significant donor scar owing to skin grafts.[8]

The anterolateral thigh flap seems to be suitable for the coverage of defects that require a thin and relatively large mobile flap, especially for defects in the head and neck regions. Indications for this flap are application in the management of deep, extensive facial skin defects, such as those of the buccal mucosa and skin. Shibahara et al. conclude that the anterolateral thigh flap is suitable material for the reconstruction of extensive defects of the head and neck.[8]

SUMMARY

Vascularized dermal fat in this patient provides a lasting, reliable, and effective source of autogenous implant material for repair of facial contour defects.

In this patient, improvement of cosmetic results were achieved. Advantages of the method are no shrinkage and stable. During a 1-year follow up, by comparing between the one-month post operative result and one-year post operative result, the appearance and contour after surgery were satisfied. Therefore, we imply that vascularized dermal fat is an option method to reconstruct facial contour defect.

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