Oral Oncology 46 (2010) 71–76

Contents lists available at ScienceDirect

Oral Oncology

journal homepage: www.elsevier.com/locate/oraloncology

Review

Contemporary reconstruction of the mandible

Mathew Bak, Adam S. Jacobson *, Daniel Buchbinder, Mark L. Urken

Department of Otolaryngology-Head and Neck Surgery, Beth Israel Medical Center, Albert Einstein College of Medicine, New York, NY, USA

ARTICLE INFO

Article history:
Received 5 August 2009
Received in revised form 14 November 2009
Accepted 16 November 2009
Available online 29 December 2009

Keywords:
Mandible reconstruction
Fibular free flap
Iliac crest free flap
Scapular free flap
Microvascular surgery
Oral cancer

SUMMARY

Reconstruction of the mandible has evolved significantly over the last 40 years. Early attempts were often disfiguring and wrought with complications but with the introduction of free tissue transfer of well vascularized bone in the 1970's there was a significant improvement in outcomes. In recent years the harvest, inset, and microvascular anatomosis have been refined to the point that success rates are reported as high as 99% throughout the literature. Focus has now shifted to optimizing functional and aesthetic outcomes after mandible reconstruction. This paper will be a review defect classification, goals of reconstruction, the various donor sites, dental rehabilitation, new advances, and persistent problems.

Reconstruction of segmental mandibular defects after ablative surgery is best accomplished using free tissue transfer to restore mandibular continuity and function. Reestablishing occlusion and optimizing tongue mobility are important to post-operative oral function. Persistent problems in oro-mandibular reconstruction relate to the effects of radiation treatment on the native tissue and include xerostomia, dysgeusia, osteoradionecrosis and trismus. These problems continue to plague the oral cancer patient despite the significant advances that allow a far more complete functional restoration than could be accomplished a mere two decades ago.

© 2009 Elsevier Ltd. All rights reserved.

Introduction

Defects of the mandible following ablative surgery can be both disfiguring and disabling. Currently there are several well established reconstructive options for restoring mandibular continuity and oro-mandibular function. The challenge of the reconstruction is selecting and optimizing these techniques to produce the best functional and aesthetic result that is individualized for the patient.

Historically, mandibular reconstruction has been a technical challenge for reconstructive surgeons. Early attempts at using non-vascularized, autogenous bone grafts and external and internal (i.e. plates) immobilization devices were compromised by salivary contamination and adjuvant radiation, leading to infection and graft resorption.[1–3] Pedicled osteomyocutaneous flaps were first reported in the early 1970's. A number of flaps were utilized, including the pectoralis major with rib, sternocleidomastoid with clavicle and trapezius with scapula.[3–5] These techniques led to improved outcomes by bringing vascularized bone to restore the mandibular arch. Despite this advance, reconstructive success was still limited due to the inadequate vascularity of the bone and the lack of maneuverability of the soft tissue relative to the bone.

The advent of microvascular surgery in the 1980's revolutionized oro-mandibular reconstruction.[6–9] In two separate reports Taylor, as well as Sanders and Mayou described the deep circumflex iliac artery and vein (DCIA/V) as a reliable and easily utilizable vascular pedicle to transfer iliac bone and the overlying skin as a free tissue transfer.[6,7] In 1986, Swartz et al. introduced the scapular osteocutaneous free flap (SOFF) for use in head and neck reconstruction.[8] In 1989, Hidalgo became the first to report the transfer of fibular bone to reconstruct a segmental defect of the mandible.[9] Microvascular surgery has afforded the ability to transfer a substantial amount of bone and soft tissue with its own vascular supply to the head and neck, which has permitted successful reconstructive efforts, even in the face of contaminated wounds and previously irradiated recipient sites.[10] Today, osteocutaneous free tissue transfer with titanium plate fixation is the gold standard for mandibular reconstruction. Since its advent, microvascular transfer has been refined, leading to a high rate of reproducibility and success rates approaching 100%.[11,12] These advances have dramatically changed the approach to, and expectations of, patients afflicted with both benign and malignant neoplasms affecting the mandible as well as the palatomaxillary complex. The ability to reliably reconstruct segmental mandibular defects has led to a change in the surgical algorithm when the mandible is involved by the disease process. In addition, dental implants can restore functional mastication, which impacts greatly on patient acceptance of such devastating surgery.

* Corresponding author. Address: 10 Union Square East, Suite 5B, New York, New York 10003, USA. Tel.: +1 212 844 8775; fax: +1 212 844 6975.
E-mail address: ajacobson@chpnet.org (A.S. Jacobson).

1368-8375/$ - see front matter © 2009 Elsevier Ltd. All rights reserved.
doi:10.1016/j.oraloncology.2009.11.006

Classification of oro-mandibular defects

The TNM classification of oral cancer is based on the size and the extent of bone and soft tissue involvement. While this system provides a means for stratification, communication and prognostication regarding the oncologic outcomes of oral cancers, it does not provide a useful method for describing the reconstructive needs of an oral defect created in the treatment of both benign and malignant conditions. It is because of this, that our group introduced a classification system for oro-mandibular defects based on the anatomical subsites of the mandible as well as associated soft tissue defects. The shift to the use of an independent reconstructive classification system from the accepted oncologic system is based on the concept that segmental bone losses at different subsites impact oral function differently.[13,14] Anterior segmental defects that result in the well known "Andy Gump Deformity", challenges the patient's ability to maintain oral intake and can also lead to airway obstruction necessitating a permanent tracheostomy. Lateral defects in a dentate mandible and segmental defects in an edentulous mandible may be tolerated better. However, loss of mandibular continuity has obvious effects on the mechanics of mastication, regardless of the location of the defect or status of the patient's dentition. The overlying soft tissue structures lose support and contract, tethering the lip and tongue leading to oral incompetence, dysarthria, and a disturbance in the oral phase of swallowing; functional problems that are exacerbated by post-operative radiation therapy. In addition, the disturbance in facial appearance can have a significant impact on the patient's feeling of self confidence and their desire to return to their pre-disease employment and social interactions.

Goals of reconstruction

The goals of mandibular reconstruction are to reestablish the form of the lower third of the face and to restore the patient's ability to eat in public, be intelligible to both trained and untrained listeners, and to maintain an unencumbered airway that allows the freedom to perform all activities. Rarely are defects from head and neck malignancies limited to mandibular bone, so the soft tissues involved need to be considered in order to optimize oro-mandibular function. The greater the loss of tongue volume, the greater the negative impact on the patient's prognosis for recovery of oral function. Thus, the approach to the reconstruction should start by addressing the impact of the surgery on the patient's tongue. In most cases, optimizing tongue bulk and mobility is more critical to the post-operative functional recovery than management of the bony defect. Loss of mucosa from the floor of mouth is critical in the assessment of whether to restore this component of the defect with non-native tissue. Preventing the tongue from becoming tethered to the neomandible is vital to preservation of mobility. Restoring tongue bulk and preserving mobility allow for palatoglossal contact which is critical for improving articulation during speech and bolus manipulation during deglutition. Oral reconstruction must also address lower lip function by attempting to achieve oral competence while preserving the expressive motion of the lips that is so important to normal facial movement.

With respect to the segmental defect in the mandible, the surgeon should assess the patient's dentition and occlusion. Restoring mandibular continuity while maintaining proper occlussal relationships and providing a structure for dental implantation permits the neomandible to produce and withstand the masticatory forces necessary for complete oral function. At the same time, this reestablishes lower facial contour and with dental rehabilitation, a normal oral function.

Reconstructive options using free tissue transfer

There are three main donor sites for vascularized bone used in mandibular reconstruction: fibula, iliac and scapula. While there is a substantial experience in the use of the radial osteocutaneous flap, it is our opinion that it does not provide a sufficient amount of bone stock, and therefore plays very little role in our current approach to oro-mandibular reconstruction.[15]

The fibular osteocutaneous free flap (FOFF) is the workhorse donor site for mandibular reconstruction[11] (Fig. 1). Multiple studies demonstrate a greater than 95% flap survival rate with skin paddle viability in over 90% of cases.[16–19] It has become the first option in most centers performing mandibular reconstruction and the only donor site that permits reconstruction of total mandibular defects. The bone is readily osteotomized to contour the neomandible and it provides sufficient bone stock for dental implantation. A limitation of the FOFF is the amount of soft tissue that can be transferred for large compound oro-mandibular defects. Fibular bone also does not recreate the alveolar height of the native dentate mandible, which can influence lower lip position at rest and make dental rehabilitation more difficult, especially if the remaining mandible is dentate. Common donor site morbidities include poor appearance of the skin graft placed over the lateral calf as well as weakness of extension and flexion of the great toe.[16,19,20] More serious complications are related to blood flow to the distal lower extremity after harvest of the peroneal artery. We recommend a pre-operative evaluation with Magnetic Resonance Angiography (MRA) or an ultrasound duplex study in all patients to rule out peripheral vascular disease and congenital vascular anomalies that would make composite flap transfer hazardous.

The scapular osteocutaneous free flap (SOFF) is the most versatile composite flap used for mandibular reconstruction allowing for replacement of bone and restoring large soft tissue defects. The lateral border of the scapula can be harvested in conjunction with a horizontally oriented scapular or vertically oriented parascapular fasciocutaneous flap. The thoracodorsal artery can be included for transfer of the latissimus dorsi muscle with an overlying skin paddle. The angular branch of the thoracodorsal artery supplies the tip of the scapula allowing for separate orientation relative to the bone segment of the more cephalad portion of the scapula supplied by the circumflex scapular artery.[21]

Several series have demonstrated favorable flap survival rates (89–96%) with limited donor site morbidity.[22–24] Although the range of flap survival would suggest a lower level of reliability, these are series that span a much longer period of time and therefore do not reflect the advances in microvascular surgery of the past decade. Our own experience with this donor site over the past 10 years, has been as favorable as that of fibular flap transfers. The variety of different flaps that can be harvested based on the subscapular system, as well as the ability to separate and rotate the different tissue components independent of one another, make this system favorable for large and complex oro-mandibular defects.[24] This flap can be especially useful in the setting of salvage surgery after chemoradiation failure by including the latissimus dorsi muscle for coverage of vital vascular structures in the neck. The SOFF is also preferred by the authors for the geriatric patient undergoing a composite resection. The scapular donor site allows for early ambulation and does not further complicate lower extremity venous stasis, or arterial insufficiency, which are common co-morbidities in this patient population (Fig. 2).

Disadvantages of the SOFF include decreased range of motion of the shoulder especially with performing tasks above the head. The intra-operative positioning required for harvesting the flap also makes it difficult for a two-team approach. The amount of bone that can be harvested is limited, especially in women of slighter

Download English Version:

https://daneshyari.com/en/article/3165232

Download Persian Version:

https://daneshyari.com/article/3165232

Daneshyari.com