

# EVOLUTION OF SECONDARY RECONSTRUCTION IN MAXILLOFACIAL REGION-A REVIEW

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*RUNNING TITLE – Evolution of secondary reconstruction*

## **1. INTRODUCTION-**

**We restore, repair and make whole those parts of the face which nature has given but which the fortune has taken away, not so much that they delight the eye but that they may buoy up the spirit and help the mind of the afflicted( GASPARE TAGLIACOZZI-1546-99)**

**The twilight of the 20<sup>th</sup> century was a time of many advances in the management of head and neck cancer but perhaps none have been so, dramatic as those found in the reconstruction of defects of the maxillofacial region.**

**Keywords: xenograft, reconstruction, vascularized, osteotomy.**

## **2. Discussion-**

Clark et al<sup>(1)</sup> said preconditions for vascular in growth are secure immobilization of the grafted tissue and an intimate contact between the nonvascularized grafts recipient bed, because proliferation of capillaries can cover only distance of 0.4mm per day. The specific tissue components and architecture determine the suitability of a potential graft for nonvascularized transfer.

Axhausen.W<sup>(3,4)</sup> found the physiology of the PBCM graft was explained by the theory of osteogenesis which states that surviving translated cells proliferate and form new random osteoid, which is dependent on the spatial orientation of the grafted tissue. Thus, the eventual quantity of bone is determined in phase I. This process takes place during the first 4 post-transplantation weeks. The second phase of osteogenesis results from induction of the host bone, a process partially mediated by bone morphogenic proteins. Phase II of osteogenesis results in resorption and remodeling of the random osteoid into mature osteons with organized structures. The quality of bone is thus determined in phase II.

Burnwell et al<sup>(3)</sup> in the journal of bone and joint surgery says that “Despite of the drawbacks, allograft bone offers a useful adjunct to the range of bone graft materials. Bone can be minced and mixed with autogenous grafts in spinal fusions or hip prosthesis operations”

Heiple et al<sup>(5,6)</sup> said “xenografts elicits an acute antigenic response with a high failure rate. Partial deproteination and defatting have been demonstrated to decrease the antigenic response (Kiel bone) but at the cost of the osteoinductive capacity.”

Robin and Pollet recommended surgical dissection for nasal deviation at the level of each dihedral angle, the release of the mucosa is affected on both faces and carried along the length of the nasal crest this submucosal dissection commences on the lateral aspect of the septum and passes upwards and outwards to the lateral wall being reflected over the region of dihedral angle between the medial and the lateral parts.

Lendrodt J<sup>(6)</sup> said “the major problem of any flap used for the augmentation of soft tissue contour and volume in the head and neck region, however in the long term maintenance of the grafted tissue volume after transfer to the recipient area. Non vascularized transfer of the fat tissue has been subject to resorption of up to more than 50% of the grafted volume in the long term because of necrosis and subsequent replacement by connective tissue.”

Conley J<sup>(8)</sup> started the use of another muscle flap to carry a bone graft which included the sternocleidomastoid muscle. He used the medial fragment of the clavicle. Many surgeons reported on modifications of this technique. The feasibility of the sternocleidomastoid muscle flap depended largely on the way the neck dissection was carried out, i.e. with or without inclusion of the muscle. There are some obvious drawbacks associated with the above mentioned methods. The grafted bone, particularly rib, is too thin and thus not suitable for an implant-supported prosthesis. The sternocleidomastoid muscle is not always available or not sufficiently vascularized to be used as a pedicle. The aesthetic results of these techniques were no always acceptable when compared with currently used free flaps. The introduction of microvascular free flaps has largely replaced the techniques described.

Burchardt et al<sup>(10)</sup> in the journal of bone and joint surgeon says that “compact bone is probably never fully replaced or invaded by the graft site tissue; the outcome is therefore inferior integration and infections. It also has the tendency to resorb, making it an unreliable material.”

Ariyan et al said according to the volume of the deficit to be filled, suitable flaps for these locations are the deltopectoral flap, a pectoralis major island flap, or a pedicle transfer of the latissimus dorsi.

Kruger and Krumholz reported on 62 patients who underwent a secondary bone grafting procedure using rigid fixation. One of these grafts were completely lost and one partially lost, but in 15% of cases pseudo arthrosis was present.

Simpson AH et al<sup>(2)</sup> the intrinsic vascular system of the periosteum itself is divided in to three sets of vessels encompassing a circular system in which the vessel encircle the bone; a longitudinal system, in which vessel run parallel to the long axis of the bone; and a set of short vessel, which have no predominant direction of flow. The vessels communicate with the cortical capillary anastomoses, which run in the bone cortex between the intramedullary circulations and the periosteal vessels.

Schmelzeisen et al<sup>(3,2)</sup> says “facial reanimation after long standing paralysis of facial nerve has made a great progress with the transfer of neurovascular segments of the gracilis muscle or the pectoralis minor. These grafts have been used to restore movement of the oral commissure and the cheek with good success. The restoration of the periorbital muscle functions and orbicularis oculi function also have been achieved to some extent by the free or pedicle transfer of muscle tissue.”

Hidlgo DA et al<sup>(7)</sup> said the fibula mandibular reconstruction is different in height and appearance in comparison to native mandible in some cases the literature that describes success with the flap for this purpose. His extensive experience dispute those who downplay the use of this flap. The flap height and shape of the flap resembles closely the structure of an atropic edentulous mandible. Throughout the world, the fibula flap has become the most common means of primary mandibular reconstruction. The distance of the donor site from the head and neck field is an advantage because it allows for simultaneous surgery. Likewise, the lack of significant morbidity of the flap harvest with proper attention to detail is also a significant advantage of the flap.

Brown MR et al<sup>(5)</sup> the author believes that the bone stock is insufficient for use in mandibular reconstruction because it doesn't support endosseous dental implant rehabilitation. Dental rehabilitation should be a primary goal of all mandibular reconstructions. Quality of life studies demonstrate that for patients, the most important aspects that affect their quality of life are eating normally and speaking clearly. Without the dental rehabilitation, the achievements of these goals would be possible; the free radial forearm osteocutaneous flap remains a rarely used flap in the surgical armamentarium.

Dimitroulis G<sup>(6)</sup> said there are several types of these reconstruction plates on the market, but the overriding principle is to have one single plate of sufficient thickness and width to hold the fragments in place. This implies plates approximately 3mm thick and 5mm wide. A special feature of the modern times is the locking screw. This is supposed to minimize compression between the plate and the underlying bone, thereby optimizing the vascularity surrounding the graft.

Wodajo FM et al<sup>(8)</sup> said an endoprosthesis is a metallic device that replaces diseased bone in the long bones and is fixed internally with bone cement within the medullary space of the remaining health bone. There is no need for screw fixation. The variable length of the bone gap can be

bridged by using the modules that allows for accurate 3-D reconstructions. The modules are connected by a locking system.

Martola M et al<sup>(9)</sup> found that when part of the ascending ramus is involved in the resection, a plate should be applied that has a contour more or less follow this anatomic structure. In general, plates need to be adapted to the underlying bone of the stumps, which is done using special bending forceps. This causes weak spots in the plate, which are prone to fracture when the plate is loaded. This was also demonstrated in the animal study using sheep.

Sacco AG et al<sup>10</sup> said for mandibular reconstruction, a technique known as transport disc distraction osteogenesis (TDDO) is used. A segment of bone is cut adjacent to the defect and moved gradually across the defect by a mechanical device. New bone fills in between the two bone segments. The piece of bone being moved or transported is referred to as the transport disc.

### **3. CONCLUSION-**

Secondary reconstruction of the maxillofacial region can be one of the most complex procedures and to restore it functionally and esthetically is the work of a best maxillofacial surgeon. The main purpose of the secondary reconstruction is to restore the form and function. Virtual surgical planning plays a major role nowadays in the secondary reconstruction. Preoperative evaluation plays a major role in determining the outcomes of the patient postoperatively.

**ETHICAL CLEARANCE** – Not required since it is a review article

**SOURCE OF FUNDING** – nil

**CONFLICT OF INTEREST** – nil

### **4. REFERENCE-**

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