

Kummoona Platysma Muscle Flap for Reconstruction of the Atrophied Masseter Muscle, New Technique

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Hemifacial microsomia or first arch dysplasia syndrome is a genetic disease showing unilateral disfigurement of the face, the child born with this phenomenon, it is very upsetting disease to the family when their child borne with these deformities of the face.

The aetiology is due to early occlusion of embryony stapedia artery of the first arch and might be the cause is a thrombus. These deformities featured as three varieties milled, moderate or severe types.

Flap is a mass of tissue contain or composed of skin, sub-cutaneous tissue and muscle and they are two types, Axial pattern flap with good arterial and venous blood supply or Random flap based on capillaries blood supply and they are either local flaps of donor tissue obtained from area surrounding the defect and to be an ideal solution or the use of regional flap like Kummoona lateral cervical flap or distant flap or tube pedicle flap also it is not necessary the flap contain all content of flap like skin, subcutaneous and muscle but Axial pattern flap of transposed type like our flap Kummoona Platysma flap which consist only from muscle and advocated for reconstruction of the atrophied or underdeveloped masseter muscle in Hemifacial microsomia or First Arch dysplasia syndrome in children [5,6].

The milled form of First arch showing underdeveloped mandible with absence or deformed condyle with underdeveloped masseter muscle some time, the chin slightly twisted to the affected side, the moderate types of this disease or deformity showing microsomia and slight cleft of the angle of mouth and slight deformity of the ear or presence of tags of cartilage in front of the ear these may be remnant of Michele's cartilage with absence of the temporomandibular joint (TMJ) and missing of upper part of the ramus.

The severe form of this deformity characterised by cleft of the angle of the mouth, absence of the ear or missing the helix and perihelia, missing glenoid fossa, missing condyle and TMJ also zygomatic root of temporal bone is missing and the mandible showing severe twist to the affected side with under develop midface.

The managements of these cases requiring great knowledge and skill, experience and required series of operations for correction of these deformities.

Reconstruction of First Arch Syndrome usually done by stages started by reconstruction of the zygomatic root of temporal bone by bone graft from iliac crest and glenoid fossa by cartilage graft from other normal ear, followed by reconstruction of the angle of the mouth (Commissure Plasty) and removal of tags and remnant cartilage of Michele's and reconstruction of atrophied masseter muscle by Kummoona platysma muscle flap, the aim of this reconstruction was for making a good bed for bone graft with good muscle covering and enough blood supply to the graft.

The author advocated his technique for reconstruction of the masseter muscle and after few months the condyle and TMJ should be reconstructed by Kummoona Chondro-Osseous graft.

Kummoona Chondro-Osseous graft designed for reconstruction of the temporomandibular joint (TMJ) [1-4] and for restoration of growth in the condyle and midface. The graft harvested from iliac crest at age 5 - 7 years where the cartilage is active for growth. The growth of iliac crest cartilage is based on columnar type cells for the height while when the graft transferred to the TMJ, the function of these cells changed from weight bearing function to masticatory type of function.

Dissection of the flap started from the transverse supra clavicular incision by making two parallel vertical incisions in platysma muscle and the dissection carried out in platysma muscle only, and carried upward beneath the skin till submandibular incision, keeping the muscle flap attached superiorly to maintain blood supply of the flap before insertion of the flap through submandibular incision for building masseter muscle, the flap should be carefully dissected because it's thin muscle (Figure 1).

Histological examination of the graft was showed 4 zones, the first layer was thick articular layer of dense fibrocartilage due to demand of masticatory process of Rabbit food, the second layer showed several zones of active layers of round cells of mesenchymal stem cells which represent the proliferative layer, the third layer showed series of hypertrophic chondrocyte passed through series of changes, the third layer function is to represent the differentiation of mesenchymal stem cells to chondrocyte and osteoblast and the fourth layer showed an osteoid bone and bony trabecula with bone marrow spaces in between [1,2,4].

Anatomy

Platysma muscle is one of expression muscles of the face, originate from the inferior border of the skin and subcutaneous tissue of lower part of the facial muscles and inserted in the fascia covering superior parts of pectoralis major muscle and deltoid muscle in the upper arm. Its action is to express sadness and fright by pulling the angle of the mouth downward, because the posterior upper muscle fibres communicate with muscle fibres of the lower lip and angle of the mouth. The blood supply of the muscle mainly from sub-mental branch of facial artery and nerve supply from cervical branch of facial nerve and venous drainage to internal jugular vein.

Masseter muscle is a powerful muscle of mastication, it's one of 4 muscles, they are temporalis, masseter, medial pterygoid and lateral pterygoid.

This platysma flap with a fan shape, it is local transposition flap, axial pattern designed by the author for reconstruction of the atrophied and underdeveloped masseter muscle in cases of hemifacial microsomia or first arch dysplasia syndrome to improve the bulk and good investing cover to Chondro-Osseous graft that designed for reconstruction of the TMJ and upper part of ascending ramus of the mandible and for aesthetic and functional demand of mastication of the masseter muscle and to correct facial deformity.

Design of the flap

The flap was designed by making a submandibular incision about 5 cm and another one down in the supraclavicular area parallel to above incision.

Dissection of the flap started from supraclavicular incision a transverse cut done in platysma muscle only sub cutaneous by two parallel vertical incisions directed and muscle and the dissection of carried in platysma muscle and continued upward beneath the skin till the submandibular incision and kept the muscle flap attach in the submandibular area for blood supply, flap dissected carefully because it is a thin muscle (Figure 1).

Through submandibular incision we expose the superior and the dorsum surface of masseter muscle, platysma turned up, inserted and fixed to the outer surface of masseter muscle. Both Supraclavicular and Submandibular incisions were closed in layers.

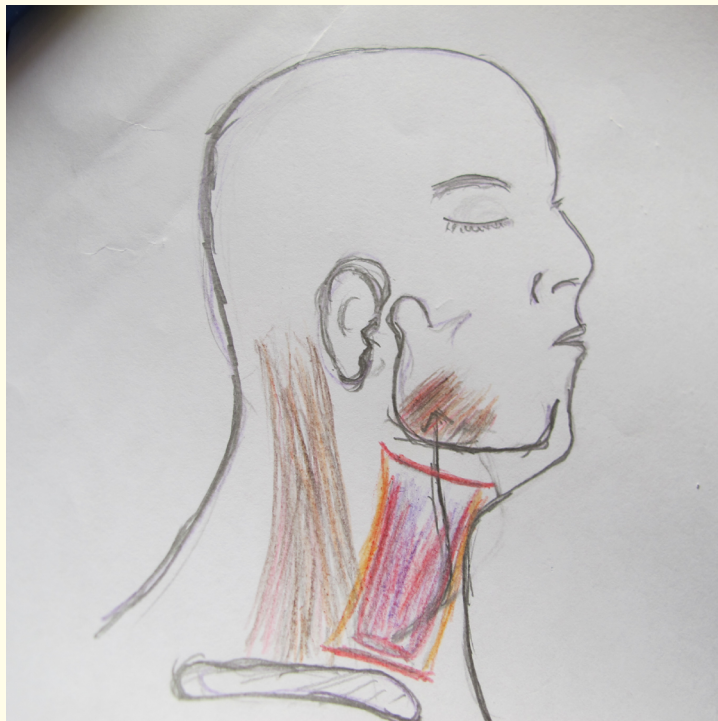


Figure 1: Illustration showing design and technique of platysma muscle dissection and transfer to build masseter muscle in First Arch dysplasia Syndrome.



Figure 2A: A six months child borne with hemifacial microsomia, photograph showing distraction device fixed on the ramus of the mandible, the technique was unsuccessful procedure.

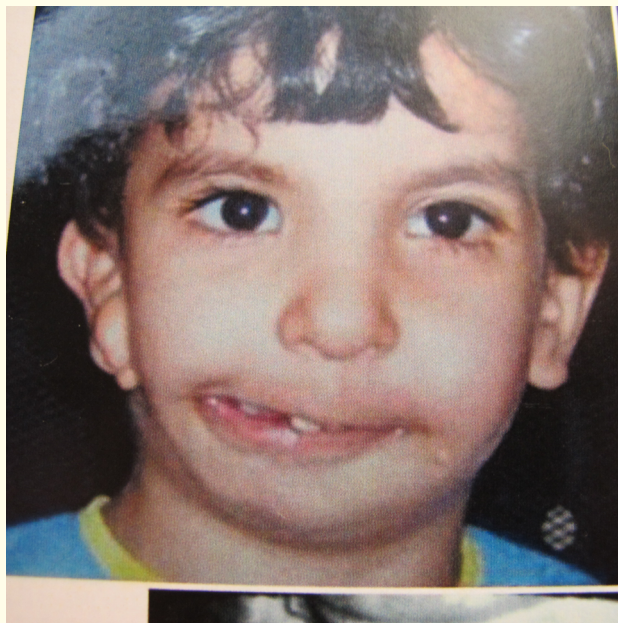


Figure 2B: The same child at age of 4 years showing cleft in the angle of the mouth, Microsomia.

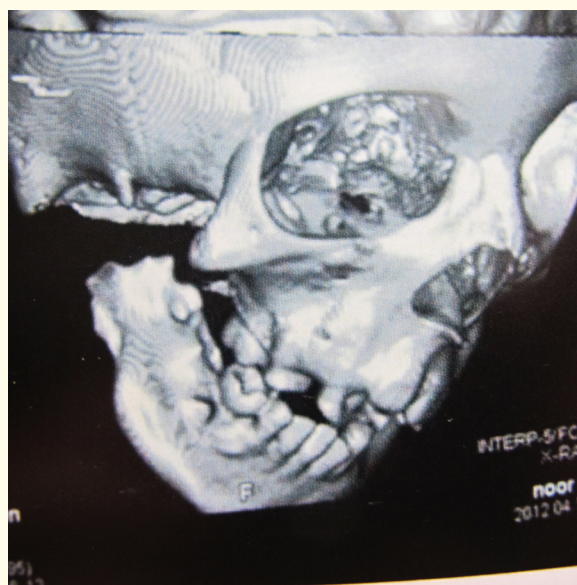


Figure 2C: CT Scan of the same girl showing missing ascending ramus and zygomatic arch and TMJ.



Figure 2D: *TSix year female old, photograph showing normal face after series of operations for correction of the First Arch Syndrome.*



Figure 3A: *Six year old girl with flat right side of the face as milled form of Hemifacial Microsomia.*

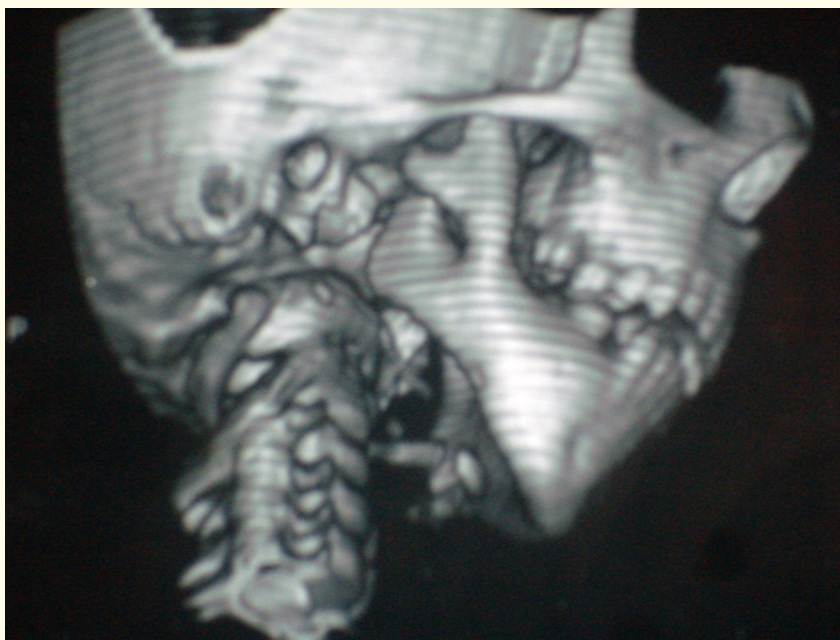


Figure 3B: CT Scan showing deformities or rudimentary type of the condyle and duplication of the coronoid process simulating two condyles.



Figure 3C: Two incisions one above in sub-mandibular region and the other parallel one down in the supra clavicular area for transfer of platysma muscle, dissection started in the supraclavicular are by making transverse incision in the platysma with two parallel incisions in the muscle sub cutaneously dissected up to submandibular incision for exposing the masseter muscle and build it by platysma muscle to make it bulky to cover and accommodate the Chondro-Osseous Graft.



Figure 3D: After one year post-operative photograph after series of operations for restoring normal face.



Figure 4A: Four year old boy with moderate type of First dysplasia syndrome showing clefting of the angle of the mouth and tags in the front ear and deformity of lower jaw with Microsomia.

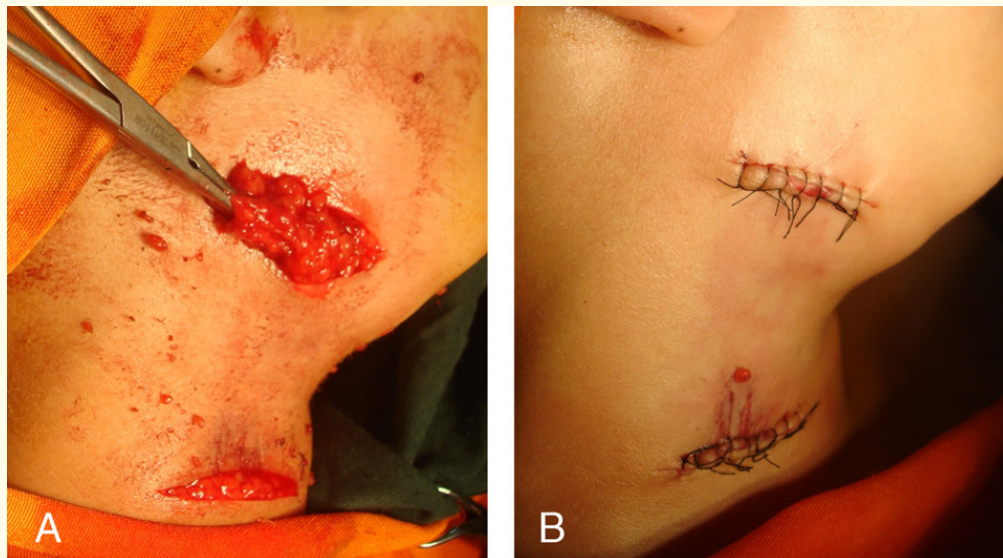


Figure 4B: Photograph showing technique of platysma muscle transfer for building masseter muscle.



Figure 4C: One year post-operative photo after series of operations for restoring normal face.

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