

## The Role of Mesenchymal Stem cells in Kummoona Chondro-Osseous Graft for Reconstruction of the Temporomandibular Joint

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### Editorial

The temporo-mandibular joint (TMJ) reconstruction was a great challenge to all Craniomaxillofacial surgeons for the last 6 decades. The biological Reconstruction of the TMJ diseases in cases such as damaged TMJ in ankylosed joint or missing or under developed one in cases of First Arch dysplasia syndrome due to early occlusion of stapedia artery the main nutrient vessel to First and Second branchial arches of the embryonic development.

Ankylosis of the TMJ is a serious crippling disease with stiff joint effect children due to traumatic injuries to the TMJ in road traffic accident or fall from height with intracapsular fracture of the condyle, miss treatment lead to ankylosis. The child complain from inability to open or close the mouth with difficulty in chewing food, swallowing or speech. the consequences of this disease are damage to the growth centre in the condyle and effect on growth of the mandible and midface.

The growth disturbance in the lower jaw and midface showing deformity of the mandible with twisted jaw to effected side and anti-gonial notch (Concavity in the lower border of the body of the mandible),

with short height of the ramus and midface. The midface showed underdeveloped in the affected side with underdeveloped floor of the mouth, the tongue is large and in retro pharyngeal position further to that hyperplasia of epiglottis and deformity of laryngo-pharyngeal inlet. patient may suffer from respiratory apnoea during sleep.

The mechanism of ankylosis due to the severity of the impact of injuries to the chin of the mandible, the impact transmitted through the long axis of ascending ramus to the TMJ causing intracapsular comminute fracture of the spongy highly vascular condyle with fragmentation of intra articular disc and damages to cartilaginous part of the TMJ, with hemarthrosis lead to haematoma and organised fibrosis end with fused of the fragmented condyle with the glenoid fossa and adhesion of the capsule and elongation and hyperplasia of the coronoid process.

The success of surgical managements of ankylosed TMJ in children required excision of the ankylosed joint with resection of hyperplastic coronoid through our technique for access to the joint by pre-auricular flap with extension to the temporal region as? Question mark of full thickness fascio-cutaneous flap and dissection started from temporal region down to the capsule, L shape incision in the capsule should be done for exposing the callus of ankylosed joint, re attachment of muscle of mastication should be done before reconstruction of the TMJ by Kummoona Chondro-Osseous graft of 4-5cm length biocritical harvested from iliac crest with cartilaginous cap of 1cm. These operations should be done at age of 5-6 years.

In First dysplasia syndrome with three clinical varieties as mild, moderate and severe types, it is manifested with under develop or missing part of the ear with soft tissue tags in the preauricular region and Macrosomia or cleft in the angle, the TMJ either deformed or missing, the glenoid fossa is shallow and short ramus with deviation of the mandible to the effected side. Reconstruction started at early stage of life during 6-8 years of age by excision of remnant tags in preauricular region with reconstruction of the cleft of the angle by commissure -plasty as first stage, followed after six months by reconstruction of atrophied masseter muscle by Kummoona Platysma muscle flap as second stage, the third stage was to reconstruct of shallow glenoid fossa by cartilage graft from opposite normal ear, the fourth stage is by reconstruction of the TMJ by Kummoona Chondro-Osseous graft for restoring growth, remodelling and repair. The last stage is to reconstruct the ear.

There are two biological techniques for substitution of the damaged TMJ:

1-Costo-Chondral Graft

2- Kummoona Chondro-Osseous graft

The Cost-Chondral graft was well studied by many scientists like Sir Harold Gillies, John Kennett and the late great British Maxillofacial Surgeons the Late Professor David Poswillo 1974, he tested this graft experimentally on Maccaca Iris monkeys, the result of his research was very optimistic and very popular type of reconstruction for the last 5 decades it was a revolutionary technique for reconstruction of the TMJ for restoration of growth of the condyle. The objection about the costa-chondral graft was the attachment of the cartilaginous part is very fragile with the rib, easily dislodged with long intermaxillary fixation (IMF) for six weeks, the child after that cannot be able to open his mouth due to spasms of

muscles of mastication, further cases reported with hyperplastic un controlled growth of the graft. KUMMOONA Chonro-Ossous graft 1986 published as first primary report, this graft proved to be more widely acceptable graft and widely used for reconstruction of the TMJ, because the cartilage cap is firmly attached to osseous element of the graft, the graft firmly fixed to ascending ramus and the patient advised to chew after few days.

This graft contain mesenchymal stem cells in the second granular cells layers of the graft, the graft has the potential to grow and to restore function and normal height of the face and it has the ability to grow, repair and remodelling of the TMJ.

We proved these features of the graft by experimental studies on Rabbits. Experimental research was carried out by us for demonstration the condyle as growth center. The histological examination of the graft showed 4 zones, in the first layer was a dense layer of thick fibrocartilage due to demands of hard masticatory process of hard food of the Rabbit, the second layers showed several zones of active round cells of mesenchymal stems cells which represent the proliferative layer and the third layer showed series of hypertrophic chondrocyte passed through series of changes with osteoid tissue, the third layer represent the differentiations of mesenchymal stem cells to chondrocyte and osteoblast, these changes represent the growth potential of the graft. The fourth layer was showing an osteoid tissue and bony trabeculae and bone marrow spaces in between. By this research we proved the viability of our Chonro-Ossous graft and the most popular technique for reconstruction of the TMJ.