

# TMJ Ankylosis: A Reveiw

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## Abstract

Temporomandibular joint (TMJ) ankylosis is a pathologic condition where the mandiblar fusion takes place to the fossa by bony or fibrous tissues. It interferes with normal day to day activities such as mastication, speech, oral hygiene, etc. Trauma to the chin is the most common factor of TMJ ankylosis followed by infections. This article highlights the eitiology, clinical features, various classifications radiographic features, histopathological features and surgical management of TMJ ankylosis.

**Keywords:** *TMJ Ankylosis, Unilateral Ankylosis, Bilateral Ankylosis, Gap Arthroplasty, Condylectomy, Interpositional Arthroplasty.*

## Introduction

TMJ ankylosis is defined as the merging between the condyle of mandible, fossa, maxilla, zygoma, or bottom of the skull. The fusion may be fibrous or bony. It occurs due to several factors such as trauma(13-100%) most common factor, local or systemic infections (10-49%), or systemic diseases (100%) such as rheumatoid arthritis, ankylosing spondylitis, otitis media, mastoiditis, osteomyelitis of mandible, Reiter's syndrome, hemarthrosis and psoriasis. Trauma to the chin is the most important factor causing TMJ ankylosis. Other etiological factors include secondary rheumatoid arthritis or it may be congenital. It can also occur due to TMJ surgery.<sup>1</sup>

In TMJ ankylosis the chin has deviated towards the affected side resulting in deformity of the face. It leads to various difficulties such as abnormal facial growth, problems in chewing, swallowing, digestion, speech, appearance, and lack of good oral hygiene with

multiple dental caries and impacted teeth. Physical and psychological disability may occur due to compromised airway as a result of disturbed facial and mandibular growth. It affects all age groups but more common in children below 10 years of age. It equally affects males as well as females. It is usually seen in the Asian subcontinent.<sup>2</sup>

**Kazanjian (1938)** classified TMJ ankylosis is of two types: True (intraarticular)- The spinous surfaces of the TMJ are fused. The fusion may be either by bone or fibrous tissues. False (extracurricular)-It takes place outside the joint due to some pathologic condition that results in very less mandibular movements.

**Sawhney (1986)** graded TMJ ankylosis into four types: Type 1: flattening or condylar deformity with little joint space as seen on radiograph. There are extensive fusions of fibrotic tissues around the joint. Type 2: bony fusion of outer edges of articular surfaces with no fusion in deeper areas of the joint, Type 3: a bony bridge is seen between the ramus of the mandible and the zygomatic arch, Type 4: the whole of the joint is replaced by a bony mass.

**Topazian (1966)** classified TMJ ankylosis as: Stage 1: Bony ankylosis extending to the condylar process, Stage 2: Here the bony ankylosis has reached the sigmoid notch, Stage 3: Bony ankylosis has extended to the coronoid process. Generally, the classification of TMJ

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ankylosis can be done by the area involved (internal or external), variety of tissue involved (fibrotic or bony), facial symmetry (unilateral or bilateral), and extent of ankylosis (partial or total).<sup>3</sup>

**Unilateral TMJ Ankylosis:** In unilateral ankylosis due to facial asymmetry chin is deviated towards the affected side. Here the mouth opening is very less. Asymmetry of the face is seen along with fullness in the affected side and relative flattening of the unaffected side of the face.

**Bilateral TMJ Ankylosis:** In bilateral TMJ ankylosis both sides of the face are affected. Here bird face appearance (micrognathia) is seen. There is no gliding movement neither protrusive nor lateral movement. The presence of a scar on the chin is seen (mostly due to trauma). Class 2 malocclusion occurs along with protrusive incisors and anterior open bite. In a long term case there may be atrophy or fibrosis of muscle. In a congenital bilateral ankylosis there is the difficulty of introducing the nipples into the mouth of newly born infants.<sup>4</sup>

**Radiographic Features:** In radiographs TMJ ankylosis is detected by various findings such as reduced height of mandibular ramus, joint space is either partially or completely obliterated with sclerotic bone, condyle may be replaced by shapeless bony mass, a prominent antegonial notch is seen in the affected side of the mandible. There is elongation of the coronoid process of the mandible. Sometimes a transverse or oblique dark line is seen crossing the mass of dense bone showing fibrous.

**Radiographic investigations** of TMJ ankylosis includes lateral oblique view, O.P.G view, cephalometric radiograph, submentovertex view, posteroanterior view, CT Scan.<sup>5</sup>

**Histopathological Features:** In Type 1 ankylosis irregular fibrous tissue is filled in the joint space. On both sides the cartilage cell layer is thickened and the mid of the joint space is loaded with non-uniformly distributed fibrous tissues. In Type 2 ankylosis the joint space is mostly filled with fibrous tissues and some cartilaginous tissues. In Type 3 ankylosis, joint space is principally packed with the cartilage resembling like hyaline cartilage. Here the chondrocytes were seen enlarged, calcified and expanded towards the bony cavities and joint space showing the bone was active. In Type 4 the joint space disappears, so it is not considered

in the histological examination.<sup>6</sup>

**Management of TMJ Ankylosis:** TMJ ankylosis can be treated both surgically and non-surgically. Non-surgical treatment includes physiotherapy- it includes continuous passive movements, use of tongue blades, etc. Orthodontic treatment includes use of functional appliances.

**Surgical management of TMJ ankylosis:** Surgical management aims to create a gap between the fragments adequately, to make the joint mobile for improvement of patient's oral health, speech, chewing, etc. It aims to preserve the vertical height of mandibular ramus. It decreases the recurrence rate and preserves normal facial growth pattern. Various complications may occur during surgical treatment such as haemorrhage due to injury to the superior temporal vessels, facial artery, etc. Injury to the external acoustic meatus, auriculotemporal nerve, malar and temporal branch of facial nerve and teeth. Infections and open bite may also occur. Various procedures for surgical treatment of TMJ ankylosis includes condylectomy, gap arthroplasty, interpositional arthroplasty, extraction of the specific dentition.<sup>7</sup>

**Condylectomy:** It is usually done in fibrotic ankylosis. In this procedure first preauricular incision should be given then a cut is given at the mandibular condyle neck. The top portion of the condyle should be detached from the upper attachment thoroughly. Then suturing should be done in layers. Most common defect of this process is diversion towards the ankylosed side. Anterior open bite may also occur.

**Gap arthroplasty:** Gap arthroplasty is mostly done in case of bony ankylosis. Here gap is created between the glenoid fossa and ramus of the mandible by removing the bony wedges. Gap helps in mandibular movements. The gap should be at least 1 cm in order to avoid re-ankylosis.

**Interpositional arthroplasty:** Interpositional arthroplasty is modified form of gap arthroplasty. Here the gap is filled with certain materials to prevent recurrence of ankylosis. In this procedure gap is created as in gap arthroplasty but here materials are inserted in the gap between the two surfaces in order to maintain adequate vertical height of mandibular ramus and to prevent recurrence of ankylosis. Materials used in interpositional arthroplasty may be autogenous, heterogeneous or alloplastic. Autogenous materials such as temporalis muscles, temporal fascia, fascia

lata, cartilaginous grafts such as (CCGs, metatarsal, sternoclavicular graft, auricular graft), dermis of skin, etc are used. Heterogeneous materials such as chromatised submucosa of pig's bladder, lyophilized bovine cartilage are used. Alloplastic materials includes metallic and non-metallic materials. Metallic includes tantalium sheets, stainless steel, titanium, gold, etc. Non-metallic includes silastic, teflon, acrylic, nylon, ceramic, etc.<sup>8</sup>

Another treatment for management of TMJ ankylosis include **Kaban's protocol (1990)** It includes seven steps: Aggressive resection, ipsilateral coronoidectomy, contralateral intraoral coronoidectomy, creating lining of joint, mandibular ramus is again reconstructed with the costochondral graft, rigid fixation, early mobilization and aggressive physiotherapy.

**Kaban's protocol new (2009)** includes the following steps:

**Excision of the ankylosed mass:** A preauricular incision is given to approach the TMJ along with a hemicoronal incision in order to unveil the temporal fascia and muscle, zygoma, ankylosed part and the sigmoid notch. A horizontal incision is given to the periosteum above the arch and then it is then repeated over the fibrous or bony part and is then continued to the visible portion of ramus of the mandible which is not affected. Then invasive excision of fibrotic or bony part is done. If any TMJ defect is detected then segregation of ramus of mandible from base of the skull is done by extension of major osteotomy into the joint. If ulnar notch is identified then minor osteotomy is done by posterior extension 1.5 to 2 cm below the ankylosed mass margin. Then a bur is used for reshaping the base of the skull into a glenoid cavity.

**Ipsilateral coronoidectomy (contralateral if necessary):** At first a pit is made below the coronoid process and then a wire is placed for the pull. From the depth of the ulnar notch the osteotomy extends to the intersection of the parallel and perpendicular portion of ramus of the mandible. After completion of the osteotomy the coronoid is placed on the traction with the wire. The whole of the coronoid is removed by cutting the left over temporalis muscle and tendons. If the coronoid tip removal is inadequate, reformation of coronoid occurs and it attaches to the temporalis tendon.

**Glenoid fossa lining:** During resection of the ankylosed mass if an unaffected part is detected then it should be separated, and replaced on the top of the new

glenoid cavity. In some instances the temporomandibular joint is lined with temporalis muscle and temporal fascia flap based inferiorly which is turned and placed into the joint. The flap is inferiorly supported over the deep temporal artery. In order to construct a barrier the deep temporalis fascia and the superficial muscle layer are shifted in order to aid in normal functioning of the ramus which has been constructed or condylar part and to support the blood supply of the flap. Then suturing of the flap done on the front and back side of the soft tissue with 4-0 monocryl suture.<sup>9</sup>

**Reconstruction of mandibular ramus and condyle unit:** An infra-mammary incision is given to obtain a CCG for the construction of the condylar unit. The cartilage then contoured to have rounded edges. Thickness of the cartilage should be 1 to 2 mm. Trimming and contouring of the rib is done to obtain a good bony interface. Submandibular incision is given. Then the graft with cartilaginous articulating surface is placed against the temporalis flap. This is secured with 2.0 mm titanium bone. Then suturing is done in layers. Reshaping of remaining part of the mandible done in order to obtain a disc shaped tip. Corticotomy is performed, leaving sufficient bone to act as transportation medium. After securing decompression device corticotomy done and movement of the segment is checked by starting off the half buried single directional decompression device. After around 4 days of the treatment active distraction starts at the rate of 1 mm and rhythm of 2 to 4 activations daily. The distraction is ended after the contact of transport disc with the base of the skull. As a result pressure will not be created. Benefits of this are physiotherapy can be started after the surgery on that day donor site and morbidity are not required.<sup>10</sup>

**Early mobilization and aggressive physiotherapy:** It includes sidewise movement of the mandible in repeated manner and pulling the digits in front of the mirror. The exercises should be repeated 3 to 4 times per day for 3 to 5 minutes. After completion of 6 weeks of surgery solid food items can be given and the 'Thera-Bite Rehabilitation System' should be done 4 to 5 times per day for 3 to 5 minutes. The physiotherapy procedures also involve heat treatment, rubbing and kneading and mastication. If the sufferer is unable to achieve the maximal interincisal opening during the surgical treatment or else if there is no signs for improvement of the maximal interincisal opening after 6 to 8 weeks then stretching of the mandible should be done under general anaesthesia. Utilizing the Thera Bite system 4

to 5 times daily, chewing of gums and manual finger stretching exercises should be done and patients should follow this routine regularly for 1 year.

**Recurrence of TMJ Ankylosis After Surgical Treatment:** TMJ ankylosis may reoccur after surgical treatment due to following reasons such as lack of sufficient gap between the fragments, if costochondral graft is fractured, if the surface of glenoid fossa is not covered properly, if postoperative physiotherapy is not done adequately and if there is increased osteogenic potential and periosteal osteogenic power which is more common in children.

3 most important factors to prevent re-ankylosis includes adequate gap should be maintained between the fragments of width (1.5 to 2 cm), interpositional barrier should be carefully placed and stabilized that should completely cover the surfaces of the sectioned bone. Adequate jaw exercises should be done regularly for a long term. Amongst the three factors most important one is the use of exercise regularly.<sup>8-10</sup>

### Conclusion

From the above discussion it is clear that TMJ ankylosis mainly occurs due to trauma and certain infections and usually takes place in children of younger age. Most of the time due to lack of understanding of clinical features and radiographic features of TMJ ankylosis by the dental surgeon may lead to poor diagnosis of TMJ ankylosis. Patients usually faces difficulty in mastication, speech, facial growth pattern, etc. Patients suffering from this have limited mouth opening. Psychological disorders may also occur. Thus it causes functional as well as aesthetic problems. When it occurs in early age it interferes with the development of mandible. But can be treated by both surgical and non-surgical treatment. In surgical management the recurrence rate is very high if not operated carefully. It can be managed by proper exercise of the jaw regularly for several years. Thus if proper diagnosis and proper surgical treatment is done on time with sufficient exercises then good results can be obtained.

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