

INTERPOSITIONAL ARTHROPLASTY FOR TRUE ANKYLOSIS OF THE TEMPOROMANDIBULAR JOINT — A REPORT OF TWO CASES

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SYNOPSIS

The etiology, pathogenesis and management for true ankylosis of the temporomandibular joint were outlined. Two cases of recurrent true ankylosis of the temporomandibular joint were presented. The rationale of treatment were discussed.

INTRODUCTION

Non movement of the mandible may be due to pathology of the temporomandibular joint itself or otherwise. When non-movement of the mandible occurs as a result of obliteration of the joint space it is known as true intracapsular ankylosis of the temporomandibular joint. When non-movement of the mandible occurs as a result of pathology in the joint but outside the joint capsule eg. periarticular fibrosis, it is known as extra-articular ankylosis of the temporomandibular joint. When non-movement of the mandible occurs as a result of pathology unassociated with the joint itself it is known as false or pseudoankylosis of the temporomandibular joint eg. depressed fractured zygomatic arch, enlarged coronoids or muscle fibrosis.

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Before the antibiotic era, the commonest cause of intracapsular ankylosis of the temporomandibular joint was infection. With the discovery of antibiotics, the most common etiology is trauma. With better understanding of the pathology of ankylosis of the temporomandibular joint and more efficient management of the traumatised joint, the incidence of ankylosis of the temporomandibular joint has decreased. However, this trend is not yet seen in Malaysia. In a review of 185 intra articular ankylosis cases Topazian (1) found that infection was involved in 48.7%, trauma in 29.2%, "congenital factors" in 2.6% and unknown causes in 19.5%. In a series of 20 cases of ankylosis, El-Mofty (2) found that 16 cases resulted from trauma and 4 cases due to infection. In an analysis of 60 cases, Kummoona (3) found that 42 cases were due to trauma and only 11 cases were caused by infection.

Many temporomandibular joints were traumatised, yet only a small proportion became ankylosed. Kazanjian (4) suggested that ankylosis of the temporomandibular joint in children is due to the lateral pterygoid muscle becoming attached to the tip of the glenoid fossa following condylar fractures and this muscle then ossified. According to Shafer et al (5), the meniscus undergoes progressive destruction with flattening of the glenoid fossa and the head of the condyle thickens leading to narrowing of the joint spaces and ultimately its obliteration. According to Rowe (6), ankylosis occurs in children due to the impact on the chin being transferred through a relatively thick condylar neck to a relatively thin cortical bone of the condyle. This force disrupts the subarticular layer which was found by Blackwood (7) to exhibit an interconnecting plexus of blood vessels many of which penetrate the bone and extend into the capsule. This haematoma contains highly osteogenic cells and in due course becomes organised into a fibroosseous and ultimately osseous mass. According to Laskin (8) two

important factors that predispose a traumatised temporomandibular joint to ankylose are 1) the dislocation or tearing of the meniscus, 2) the child assumes a posture of non-movement of the joint to avoid pain.

Sicher (9) has reported that growth at the condylar cartilage is an important factor in determining the length of the mandible, the height of the ramus and the expansion of the intermaxillary space. Now, it is widely accepted that the condylar growth centre is not a primary growth centre of the mandible. Durkin et al (10) showed that the cartilage in the condyle, unlike those in the long bones, are not arranged. After examining costochondral transplants to replace surgically excised condyles in the Macaca Irus Monkey, Poswillo (11) was of the opinion that the irregularly distributed cartilage cells allowed a multi-directional growth to take place. In this way the condyle functioned as a site for secondary adaptive remodelling responses to changes of the enveloping soft tissue. According to Macleanan (12), mandibular growth is affected minimally if ankylosis occurs after 5 years of age.

CASE 1

An eight year old Chinese girl was referred to me from the Department of Orthopaedic for management of post surgical correction of the left ankylosed joint in 1980. (Fig.-1)

The child had a history of sustaining a fall at 4 years of age followed by inability to open her mouth widely. She was seen in the Orthopaedic Department, University of Malaya, and jaw exercises were instituted. This did not prevent the gradual development of ankylosis of the left temporomandibular joint. The ankylosed joint was released surgically when she was 8 years old. She was able to open about 20 mm immediately post operatively.



Fig. 1 — Case 1 — Pre-operative photograph showing the mouth opening of 5 mm only.

When she was seen again at 11 years of age in 1983, she was only able to open her jaws 5 mm. On examination, patient was well expect for limited mandibular opening. There was a surgical scar in the left pre-auricular region, and a 20 mm traumatic scar in her chin.

Intra-orally the teeth present were $\frac{765421|12C4567}{764321|1234567}$ and in good condition. Radiographic examination revealed bony ankylosis of the left temporomandibular joint. (Fig. 2)

Patient was admitted to hospital on 17/3/83.

General medical findings of her cranial nerves, cardiovascular system, respiratory system, gastrointestinal tract and limbs were normal.

removed and wired to the root of the zygoma. A redovac drain was inserted and the wound closed in layers.

Postoperative course

Patient was well except for a large haematoma that formed after the redovac drain was removed after 48 hours. The haematoma cleared spontaneously without aspiration. Some weakness was noted in the temporal branches of the facial nerve. However there was complete recovery on the 3rd month post-operatively. Exercises using finger pressure were instituted on the 2nd post-operative week. She was able to open her mouth 30 mm 30 months post-operatively. (Fig. 3)

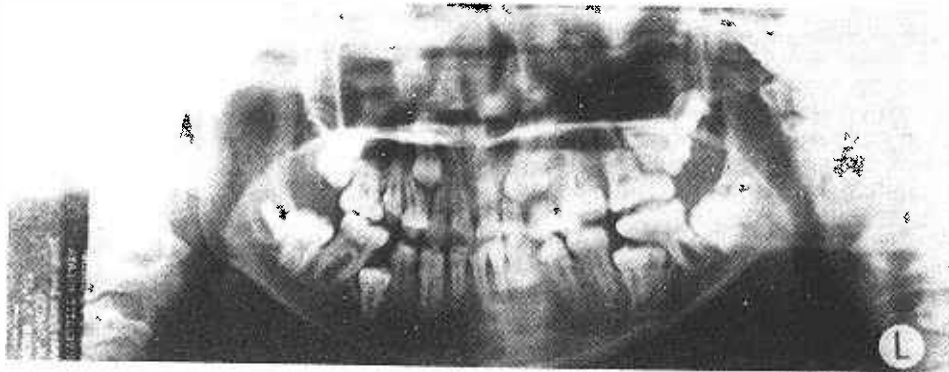


Fig. 2 — Case 1 — Pre-operative orthopantomogram showing ankylosis of left temporomandibular joint.

Preoperative Preparation

Two units blood were ordered.
 The left temporal region was shaved.
 Antibiotic cover was instituted on the day of operation — 1/V. Ampicillin 250 mg qid x 1 day
 Per rectal Metronidazole tablet 500 mg bd x 3 days followed by Oral Ampicillin 250 mg qid x 2 wk.
 Oral Metronidazole 200 mg tds x 11 days.

Surgical Procedure

General anesthesia was achieved by "blind" endotracheal intubation.

The Al Khayat-Bramely (13) type preauricular incision was used to gain access to the ankylosed left temporomandibular joint and the left coronoid. The ankylosed joint was adequately exposed. The mandible was separated from the base of the skull with a fine osteotome. The bony fusion was found to have extended about 20 mm medially. A gap of 5 mm was created. The cut surface of the mandible was reshaped with a bur till it had a smooth curved surface. There was only minimal opening of the jaw even though the mandible was freed. On sectioning the ipsilateral coronoid through the same incision the jaw could be opened wider. When the contra-lateral coronoid was sectioned via the intraoral approach an opening that was sufficiently wide was achieved.

A 0.08 inch thick silastic was contoured to fit into the articulating fossa from which the bony union was



Fig. 3 — Case 1 — 30 months post-operative photograph showing mouth opening of 30 mm.

CASE 2

An 18 year old Chinese girl came to the department on the 12.4.1983 with a request for treatment to enable her to open her mouth.

The patient reported that 1 month after a fall when she was 6 years old, her jaw gradually became fixed. A surgical procedure was done on the left temporomandibular joint when she was 13 years old. Subsequently she was able to open her mouth. 1 month after her operation, the jaw gradually became tight again.

Apart from her jaw problem, she was also attending the heart clinic in the General Hospital in KL for a congenital heart condition. Follow ups disclosed that she had dextrocardia, patent ductus arteriosus and pulmonary hypertension.

Examination revealed that her mouth opening was limited to only 5 mm interincisally (Fig. 4). Her occlu-

sion was quite satisfactory and there was only minimal facial asymmetry. There was a 20 mm scar in her chin and a 30 mm curved scar in the left preauricular region.

Radiographic examination included a panoramic view of the jaws, transpharyngeal view of the left temporomandibular joint, temporomandibular joint views of both joints and left temporomandibular joint tomography. The radiographs disclosed a "mushroom" shaped mass obliterating the normal joint spaces (Fig. 5). The shape of the left glenoid fossa could be made out. The left coronoid process seemed larger than the one on the contralateral side.

A diagnosis of recurrent ankylosis of the left temporomandibular joint was made.

The patient was admitted to hospital on 20.11. 1983. A medical opinion was sought regarding her heart condition. She was found to be fit to undergo the opera-

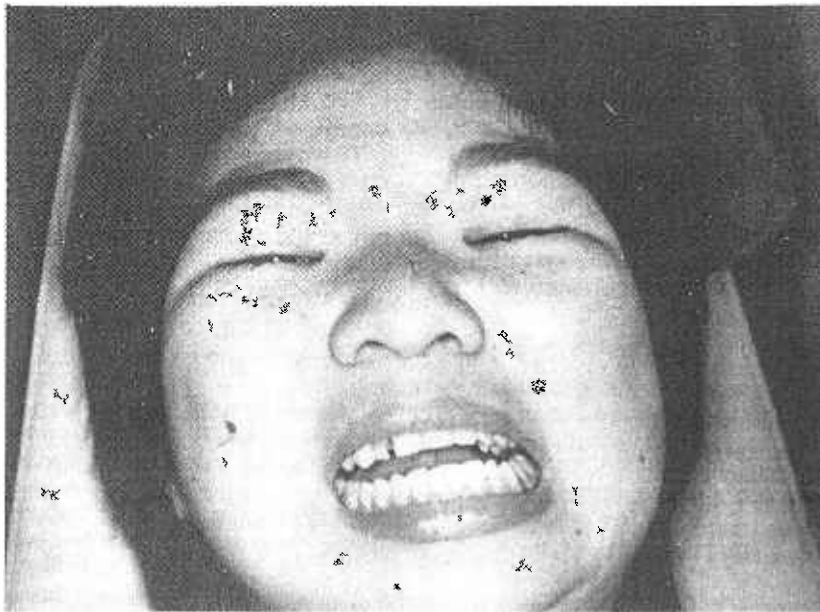


Fig. 4 — Case 2 — Pre-operative photograph showing mouth opening of 5 mm only.

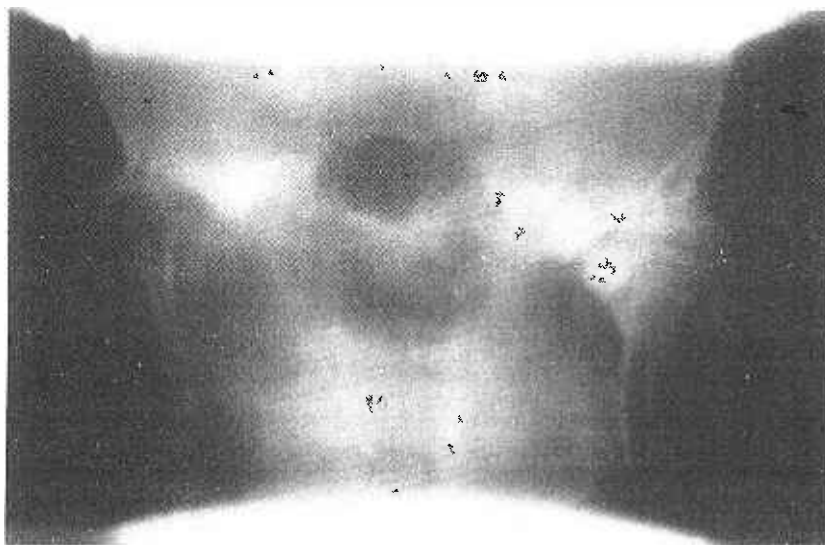


Fig. 5 — Case 2 — A tomogram showing mushroom shaped bony ankylosed left temporomandibular joint.

tion if precautions were taken to prevent hypoxia and bacteraemia. Apart from her condition of dextrocardia, patent ductus arteriosus and pulmonary hypertension her other physical examination and laboratory tests were within normal limits. Antibiotic cover consisting of I/V Metronidazole 500 mg tds and cefoperazone 750 mg tds was instituted 1 hour before the operation and continued for 3 days; followed by Metronidazole suppositories 1 gm bd and Ceporex 500 mg gid orally for 4 more days.

Operative Procedure

An elective tracheostomy was carried out under local anaesthesia and the patient was anaesthetized through the tracheostomy.

The Al Khayat-Bramely type preauricular incision was used to gain access to the ankylosed left temporomandibular joint and the left coronoid. A large mass of bone seen in the radiographs was confirmed. A distinct groove indicating the shape of the glenoid fossa was also seen. The bone uniting the mandible to the base of the skull was meticulously chiselled away at this groove level. The bony union was found to have extended about 20 mm medially from the surface. There was only an indication of slight movement of the mandible even though the ankylosed temporomandibular joint was freed. The obstruction to opening was now localised to the rigidly fixed left coronoid process to the medial surface of the anterior part of the zygomatic arch. This coronoid was sectioned with a

drill. When it was found that the cut coronoid was stuck onto the zygomatic arch a wide gap between it and the mandible proper was created. The mandible could be opened about 20 mm at this stage. After the contralateral coronoid was sectioned via the intraoral approach, the mandible could be opened 50 mm.

Bone from the cut stump of the posterior end of the ramus was removed as much as possible to reduce its surface area and then reshaped to simulate a condylar surface.

A 0.08 inch thick silastic was contoured to fit into the articulating fossa from which the bony union was removed. This interpositional material extended over the cut surface of the coronoid tip and was wired to the root of the zygoma. A redivac drain was inserted and the wound closed in layers.

Posoperative course

Patient was well except for a few episodes of vomiting which were not controlled by antiemetics. This response was due to irritations from the tracheostomy tube. The tube was removed after 24 hours. The redivac drain was removed on the 2nd post operative day. Healing was uneventful.

The patient was encouraged to open her jaw daily herself. Active jaw exercises were instituted 2 weeks after the operation (Fig. 6). She was able to open 40 mm at the end of 22 months (Fig. 7). No facial paralysis was noted.

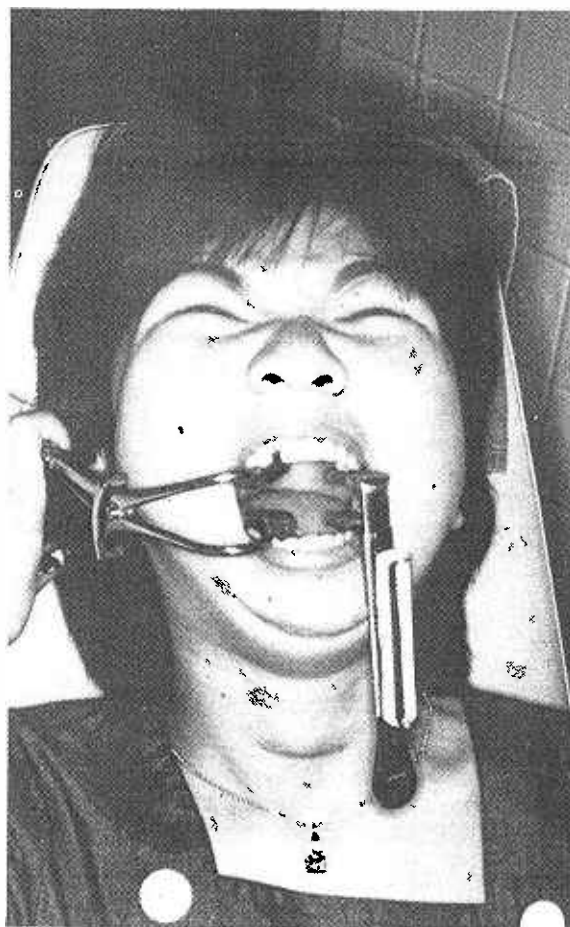


Fig. 6 — Case 2 — Photograph showing appliances utilized as exercisers.

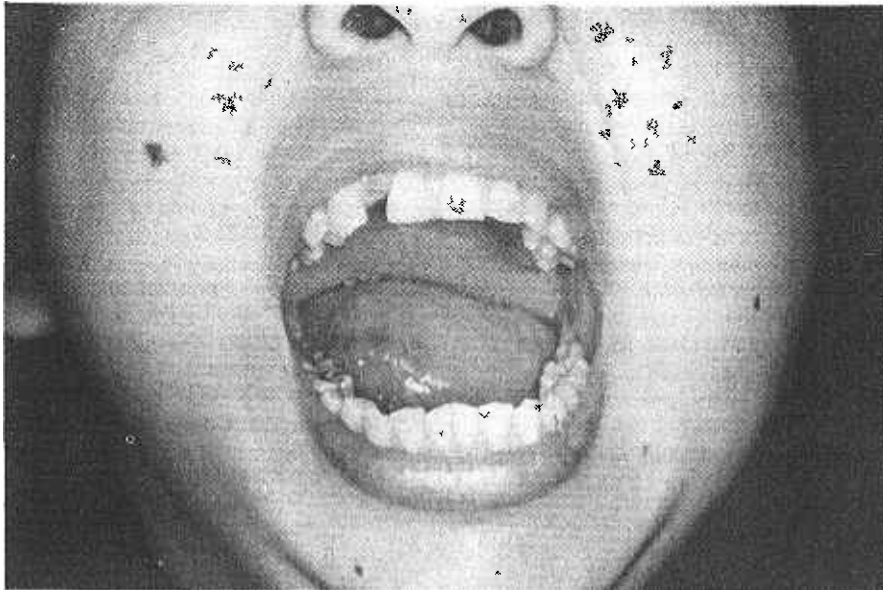


Fig. 7 — Case 2 — 22 months post-operative photograph showing mouth opening of 40 mm.

DISCUSSION

Surgical intervention to free an ankylosed temporomandibular joint has a notorious tendency to recur. Various procedures have been advocated to overcome this complication. The method used in this case to free the temporomandibular joint was designed by Stratigos (14) in 1971. It has the advantage of fixing the silastic sheet to the non-mobile part of the joint thus minimising the possibility of its dislodgement and extrusion. In a series of 185 cases, Topazian (15) found that no recurrence occurred when an interpositional arthroplasty was performed.

The plane of separation of the ankylosed joint was made at the original surface of the articulating fossa of the temporal bone to ensure that an enormous gap was not created as in gap arthroplasty. A gap was created sufficient only for the 0.08 inch silastic to be inserted. This altered the vertical dimension which was already reduced minimally. At operation it was found that the articulating surface of the glenoid fossa was rather flat and the cut end of the mandible translated on initial opening of the jaw and later rotated over its posterior border on further opening. Thus a well shaped curved posterior surface of the cut bone would facilitate smooth movement of the jaw on opening.

When the fusion is too extensive, Rowe (6) cautioned against sectioning the ankylosed joint at this level because of the danger of entering the medial cranial fossa inadvertently. However, if extreme care and correct techniques were employed during separation of the fused joint, this hazard could be avoided. Bearing in mind the proximity of the internal maxillary artery at the posterior side of the upper part of the ankylosed joint and the great vessels medially, it is prudent to operate in a clear field only.

Limitation of mandibular movements due to a relatively large coronoid have been reported. In case 2 the coronoid was preventing movement of the mandible even though all the tissues uniting the ankylosed joint were removed. On sectioning the coronoid, the mandible could be opened 2 cm. Ideally, the coronoid should have been removed completely. At operation, it

was found to be technically quite difficult to remove the coronoid completely as it was firmly stuck onto the zygomatic arch. According to Topazian (15), the outcome of the operation would not be compromised if a wide gap was created between the fixed part of the coronoid and the mandible proper and the silastic sheet extended over the cut tip of the coronoid instead. Since the jaw could be opened only 20 mm the contralateral coronoid was sectioned too to eliminate any fibrous adhesions of the temporalis. The jaw could be opened 50 mm when this procedure was completed.

The patients were seen daily for a period of 2 hours over a period of 2 months so that jaw exercises were instituted meticulously as it has been emphasized in all papers that post-operative exercise is imperative for this type of surgery.

Unless a controlled clinical trial has been done and proved otherwise, jaw exercise post operatively is mandatory to redevelop normal muscle function and to stretch any maturing fibrous tissues.

Precautions were taken to prevent infection. The silastic sheet used was sterilised in an autoclave and antibiotic cover was instituted for 2 weeks. If infection supervened the silastic sheet might have to be removed, fibrosis might occur and recurrence of ankylosis might set in.

The above procedure seems good for cases where there is minimal alteration in mandibular growth. Case 1 exhibited a greater degree of facial asymmetry 2½ years post operatively compared to Case 2 two years post operatively. The patients were able to execute a bit of lateral movements and protrusive movements. In patients with grossly defective vertical ramus as a consequence of early ankylosis of the temporomandibular joint, the use of costochondral graft as an interposition medium followed by secondary osteotomies have shown good results.

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