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THE MANAGEMENT OF TMJ ANKYLOSIS A COMPLETE REVIEW.

Dental Science

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ABSTRACT

Temporomandibular joint (TMJ) ankylosis is one of the most serious disabling condition; Impairment of speech, difficulty in mastication, poor oral hygiene; rampant caries, disturbances of facial and mandibular growth and acute compromise of the airway invariably result in physical and psychological disability This paper describes the management protocol of TMJ ankylosis and its review. The major objectives of surgical treatment in patients with temporomandibular joint ankylosis include the meticulous and radical removal of the ankylotic bone and reconstruction and restoration of the physiologic functions of the jaws. Kaban's operative protocol for unilateral and bilateral TMJ ankylosis entailed resection of ankylotic mass, ipsilateral and/or contralateral coronoidectomy, interpositional tissue transfer to the TMJ with temporalis myofascial flap, and early mobilization and aggressive physiotherapy. Common complications that encounter includes deviation of the mandible to the effected side , telescoping of the mandible following gap arthroplasty leading to occlusal discrepancies & anterior openbite, temporary facial nerve weakness. Deviation of the mandible & occlusal disturbances can be treated by early placement of arch bars & mouth opening exercises. Improvement can be noticed in 3 to 4 months. The post-operative physiotherapy plays an extremely important role in preventing re-ankylosis & maintaining adequate mouth opening. A careful surgical technique and subsequent meticulous long-term physiotherapy are both essential to achieve a satisfactory result.

KEYWORDS

TMJ ankylosis; gap arthroplasty; interpositional arthroplasty active physiotherapy.

Introduction:

Ankylosis of the temporomandibular joint (TMJ) involves fusion of the mandibular condyle to the base of the skull. When it occurs in a child, it can have devastating effects on the future growth and development of the jaws and teeth. Trauma or as a result of local and systemic infections are the leading causes of ankylosis[1,2,3,4]. Restoration of normal function and jaw mobility in patients with TMJ ankylosis is difficult. Various techniques have been defined for its treatment[6,2,8,10,12,13,15,16,17,18,3,20] . In addition, failures and variable results following the different methods employed have been reported[2,6]. The most frequently encountered complication in the post-operative period is restriction in jaw mobility and recurrence of ankylosis[2].

Pathogenesis of intra articular ankylosis (true) is a chronic progressive destruction of the joint which consists of deterioration of meniscus, flattening of mandibular fossa, increased thickness of condyle resulting in obliteration of capsular spaces, and either ossification or calcification of attached fibrous tissue, rendering the mandible not merely contiguous but also cotinuous with the base of skull. Occasionally hyperostoses involves not only the condyle and skull but extends also to the coronoid process, ramus and zygomatic arch. In the extra articular (false) type of ankylosis, the joint becomes splinted by scar tissue, which forms secondary to. Massive tissue injury in the region.

Pathogenesis:

Trauma:

In 1928, Beavis in an interesting discussion, reported that 75% of his cases were the results of trauma to chin. In a report of 23 cases of ankylosis from the Mayo clinic, Henderum & New attributed four to trauma. In a number of more recent studies, trauma was reported as the underlying cause of limited jaw opening in 3%, 18%, 38% & 64% of cases respectively. Variation in between these studies in part depends on whether both intra & extra articular causes of ankylosis are considered. Henderson & New considered both intra articular & extra articular & combination (articular & extraarticular) causes of ankylosis.

Infection:

Infection is the second most frequent cause of true ankylosis. Before the use of antibiotics, the incidence of ankylosis resulting from infection exceeded that caused by trauma. Pathologic changes are same as those following traumatic destruction, although periarticular adhesions and capsular thickening are great.

Inflammation of joint due to direct extension:

Includes otitis media, mastoiditis, osteomyelitis of temporal bone or condyle and soft tissue abscesses.

Primary inflammation of joint:

Includes rheumatoid arthritis, infective arthritis, ankylosing spondylitis (Marie Strumpeil disease), gonococcal arthritis, tuberculous arthritis and osteoarthritis.

Evaluation to be carried out with history, physical, and radiological examinations. Panoramic radiographs and computed tomography (CT) were used for confirmation of the diagnosis and for outlining the osseous mass. Also specifically recorded for documentation were age, gender, aetiology of ankylosis, existing facial asymmetry, maximal pre and post-operative mouth opening and complications encountered.

The Kaban's surgical protocol to be followed for TMJ ankylosis was as : 1) Adequate exposure 2) Adequate removal of the ankylotic mass (15mm), 3) Ipsilateral coronoidectomy in all cases, 4) Contralateral coronoidectomy when inter incisal opening on the table is less than 30 mm, 5) Rotation of temporal muscle flap in case of Bilateral & Recurrent cases, 6) Active physiotherapy within 72 hrs of post-operative, continue for next 3-4 weeks vigorously and 7) follow up religiously next 06 months.

Operative Technique

The temporomandibular joint can be approached through ALKAYAT & BRAMLEY[21] incision extended 3 cm into the temporal region for exposure of the temporalis fascia. Then lift the temporalis fascia from the infratemporal fossa anteriorly at the pericranial level, while the zygomatic root was uncovered. An avascular tissue plane along the cartilaginous meatus will be established using surgical scissors. The ankylosed TMJ is then palpable and an incision made directly onto the bone, exposes the ankylosed TMJ. Excision of the fibrous tissue and ankylotic bony mass carried out using drill and saw. Special attention to be directed to the medial aspect of the joint to ensure total resection, bone resection to be done in increments. Following excision of the ankylotic mass and coronoidectomy, the inter-incisal opening to be

measured. If the inter-incisal opening is less than 35mm, a contralateral coronoidectomy to be performed via an intraoral approach. After optimal inter-incisal opening (defined as 35 to 50mm with enough translation to produce normal translation of the contralateral condyle in unilateral cases) to be achieved, the joint will be reconstructed. The TMJ is then lined with a finger-shaped temporalis muscle fascia flap rotated over the arch into the joint as described by Pogrel and Kaban[22]. The temporalis flap pedicled inferiorly on the deep temporal artery. A minimum of 4mm is necessary to support function of the condyle and maintain vascularity. The flap is to be sutured medially, anteriorly and posteriorly with 4-O vicryl. A drain should be placed, the incisions closed, and a pressure dressing to be applied.

Results :

Pre-operative evaluation

On statistical analysis there were males more affected than females. The mean age at the time of treatment includes 25.5years (range 6 to 54). There were 04 patients with facial asymmetry. Mean pre-operative Minimal Incisive 0pening(MIO) will be 16.5±9.06mm (range 02 to 20mm). Lateral excursions would be severely limited or absent in all affected joints. No protrusive movements will be elicited except in patients with fibrous ankylosis. Patients with unilateral ankylosis, deviates mandible to the affected side on opening.

Intra-operative findings

The mean pre-operative MIO under general anesthesia would be 16.5±9.06mm (range 02 to 20). Gap Arthroplasty to be done with unilateral ankylosis and interpositional arthroplasty with temporalis myofascial flap to be done in patients with bilateral ankylosis. An average of 45mm of mouth opening to be achieved in all the cases.

Post-operative followup

Aggressive physiotherapy should start immediately on first post-operative day. Patients should start on with jaw-opening exercises consisting of active hinge opening with heister's jaw opener, lateral excursions , and manual finger stretching in front of a mirror. During the next 3 to 4 weeks, the diet was advanced to a solid consistency. The physiotherapy program includes heat, massage, gum chewing, manual stretching exercises for 4 to 5 times daily for 20minutes. Patients should be followed on a monthly basis for at least 1 year. The mouth opening will increase progressively and will be optimal at the end of the first month. Aggressive physiotherapy found to be the main factor in preventing the reankylosis in all our cases whether they are gap arthroplasty or interpositional.

Some patients will develop anterior openbite on the very first post-operative day due to telescoping of the mandible, inspite of the temporal myofascial flap interposition. Some patients may develop contralateral open bite and deviation of the mandible to the effected side. These patients should received arch bar application in both the jaws and given guided elastics to bring the mandible back in to occlusion. The elastics were then removed whenever the physiotherapy was required, rest of the time they were maintained by the elastics. The guiding elastics should be maintained for a minimum period of 3 months and helps achieving perfect occlusion following this therapy. Some patients might develop facial nerve weakness. Development of this weakness follows a particular pattern. It might be normal on the first day and the weakness progressively increases to maximum by the 7th post-operative day and recoveres from the facial nerve weakness in 3 months to one year period.

Discussion:

Restoration of normal motion and function in patients with TMJ ankylosis has been a difficult goal to achieve. Pathological conditions concerning the TMJ are similar to those in other joints of the body. They result in damage to the articular surface and facial asymmetry in children and young adolescents[9,14,24,25]. Ankylosis developing in childhood or the early stages of development is a joint disorder which results in major facial deformity, and is most commonly due to trauma[1,2,3]. In our series Trauma has been the aetiology in all 22 patients. The three principal surgical methods include the simple gap arthroplasty, interpositional arthroplasty and total joint replacement with a prosthesis[16,20,23].

The simple gap arthroplasty aims to reduce the rate of recurrent ankylosis by increasing the distance between the cut surfaces of the ascending ramus and the cranial base. If the gap is too small, recurrence is more likely. If the gap is large, there is loss of ramus height and no support for the rotating mandible, with a tendency to contralateral open bite and deviation on opening. Even after wide gap arthroplasties, the recurrence rates are unacceptably high[5].

Interpositional arthroplasty is widely accepted as the primary surgical treatment for TMJ ankylosis. The interpositional material may be alloplastic and autogenous. Alloplastic like silicon, titanium, proplast, ticonium, stainless steel, acrylic, vitallium and Medpor have been used[17,20]. But there remain problems of possible fragmentation with foreign body reaction, instability, infection and extrusion. Autogenous like temporalis muscle and fascia, costochondral grafts, auricular cartilage, dermis and dermis fat have all been used. Credit for originating the interpositional arthroplasty is given to Eschmarc who in the second half of the 19th century reported the technique of suturing together the muscle components of the pterygomasseteric sling, thus separating the osteotomized parts of the ascending ramus of the mandible. In more recent times, the temporalis muscle/fascia flap has gained popularity as an interpositional material because it is close at hand, has a local blood supply and is relatively simple. This separates the cut bony surfaces but there may be scarring of the muscle, limiting mouth opening unless an ipsilateral coronoidectomy is performed [11,12,19,22]. The tissue may be too soft to resist the compression of the ramus. No perfect interpostional material exists at present. All have some drawbacks. Muscle flaps tend to contract and become fibrous; fascia is lacking in substance; cartilage may undergo calcification; alloplastic components may fragment and the debris may result in foreign body reactions.

Regardless of the technique, a post-operative maximal opening greater than 35mm is rarely achieved. In most studies[9,24], patients were divided into post-operative Mouth Incisal 0pening of 10 to 20mm, 20 to 30mm, or greater than 30mm. In these series, the percentage of patients with post-operative maximal opening greater than 30mm ranged from 10% to 81%, and the incidence of recurrent ankylosis from 0% to 100%. Kaban[2,7] recommended aggressive resection and physiotherapy, early mobilization, ipsilateral coronoidectomy and, if necessary, coronoidectomy of the opposite side. The application of temporal fascia or cartilage to the arthroplasty zone and reconstruction of the ramus using a costochondral graft are among the other methods that these authors recommended. Many researchers have also stressed the importance of early mobilization and aggressive physiotherapy for successful treatment[1,2,12]. According to Schobel et al[8] there is no standard concept for treatment, but general agreement that patient cooperation and postoperative physiotherapy are important.

In our present study the most significant aetiological factor is trauma. Trauma has been found to be the main cause in all 22 cases. Also improper initial management at the time of primary trauma, poor socio-economic conditions might have contributed to the ankylosis of TMJ.

We have chosen two surgical procedures for the release of ankylosis, namely Gap arthroplasty and interpositional arthroplasty. Our main procedure is gap arthroplasty by creating 10-15mm of gap mainly to increase the distance between the surfaces to prevent any reankylosis. The interposition by the temporalis myofacial flap was done only with intension of compensating the loss of ramus height, hence we preferred this in bilateral ankylosis patients. But the tissue is so soft to resist upward and backward movement of the ramus and patients developed anterior openbite post-operatively. We found the interpositional arthroplasty with Temporalis Myofascial flap did not give any additional advantage.

The most important and significant finding in our study is the importance of early and aggressive physiotherapy. We started this from the very first post-operative day. It consisted of active mouth opening exercises with Heister's jaw opener, stretching with fingers, by wooden sticks, moist heat application etc. The same was continued for a period of six months and followed upto 3 years. Hence with the findings & experience gained by the study we can confidently say early and active physiotherapy following TMJ ankylosis surgery will prevent post-operative adhesions and reankylosis.

Another interesting finding we encountered is the effect of

contralateral coronoidectomy. Patient who had undergone contralateral coronoidectomy had relatively effortless post-operative mouth opening. Hence we are of the opinion it is better to do bilateral coronoidectomy in all cases whether unilateral or bilateral whether or not their mouth opening on operating table is 30mm or above.

Most challenging complications we encountered post-operatively was anterior openbite due to the telescoping of the mandible because of the powerful pterygomassetric muscle group. They developed on the very first post- operative day itself. This challenge was successfully faced by immediate placement of arch bars and guiding the teeth into occlusion by application of guided elastics. The elastics were replaced after physiotherapy to guide the teeth back into occlusion. This regime was continued for about six months. At the end of six months all patients had good occlusion and this complication was effectively managed.

Facial nerve weakness was observed in eight of our patients. The weakness had a particular pattern. They were all right on the first post-operative day but slowly started developing weakness from 2nd post-operative day which reached maximum by 7th day. All these patients were simply observed. They were prescribed eye drops/ ointment and placement of medicated tape over upper eyelid while sleeping. All of them gradually recovered completely over a period of 3 months to 1 year. Which emphasize that it occurs mainly because of neuropraxia due to stretching of the flap.

Conclusion:

In our study trauma found to be the main cause of TMJ ankylosis. Gap arthroplasty & interpositional arthroplasty with Temporalis Muscle/ Fascia flap, both techniques offered successive results. Bilateral coronoidectomy cases did very well post-operatively; long term physiotherapy played an extremely important role in preventing post-operative adhesion and reankylosis. A careful surgical technique and subsequent meticulous long term physiotherapy are both essential to achieve a satisfactory result. Early recognition of associated complications and their management is important to prevent residual deformity & facial asymmetry.

Conflict of interest :

There is no conflict of interest between the authors and the production of this article. No sponsorship or financial gain was obtained in the production of this article.

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