



Research Article

Submissive Osteoarthrectomy in Temporomandibular Joint Ankylosis- Subharti Experience

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Abstract:

Objective: The purpose of this study is to assess the effectiveness of submissive osteoarthrectomy in temporomandibular ankylosis patients.

Patients and method: A total 15 patients (20 joints) were operated under general anaesthesia and in these 15 patients 5 were male and 10 were female. Out of these 15 patients 10 were suffering from unilateral TMJ ankylosis and 5 were with bilateral TMJ ankylosis. The age of the patients was ranged from 10-19 years with mean of 12.53 years. After exposure ankylotic mass a gap of 6mm was created to achieve the satisfactory mouth opening followed by interposing the temporalis myofacial flap and pedicled buccal fat pad between the cut ends of the bone.

Result: All the patients were followed post-surgery for a minimum duration of 24 months. The mean post-operative mouth opening of the patients was 32.45 mm after 2 years with significant improvement in contralateral excursive and protrusive movements. In this case series no significant sign of heterotrophic calcification or reankylosis was noted and anatomical shape of the condyle was also achieved in all cases.

Conclusion: Submissive osteoarthrectomy is a modification in surgical technique for the release of temporomandibular joint ankylosis has considerable results in terms of functional and esthetic outcome.

Keywords: TMJ ankylosis; Preoperative orthopantomogram; maximum inter incisal opening

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Introduction

Ankylosis of the temporomandibular joint (TMJ) is an intra-capsular union of the disc-condyle complex to the temporal articular surface that restricts mandibular movements, including the fibrous adhesions or bony fusion between condyle, disc, glenoid fossa, and eminence[1]. Ankylosis of the TMJ has various causes that include trauma (usually the most common) 13-100%, local or systemic infection 10-49%, or systemic disease 10%[2]. It is a challenging problem, and often starts during the active growth stage of early childhood[3-7]. A variety of the techniques for the treatment of the ankylosis have been described, however no single method has uniformly produced successful results[7-17]. Many of the experienced authors proposed that even after aggressive osteoarthrectomy recurrence rate are unacceptably high accompanied by shortening of the ramus, hampered growth of mandible, contralateral open bite, deviation on opening, no support for the rotating mandible and need to reconstruct the created gap[18-23]. In view of above mentioned problem few authors recommended interpositional arthroplasty with minimal osteoarthrectomy (over 6 mm) considering that disc or soft tissue barrier has potential role in preventing TMJ ankylosis rather than creating a large gap[24-26]. The most popular protocol for the treatment of pediatric TMJ ankylosis was first described by Kaban *et al.* in 1990 and was later modified in 2009. This prospective study highlights that Kaban's protocol may required modification as submissive osteoarthrectomy in place of wide aggressive resection in the management of pediatric TMJ ankylosis.

Patients and methods

A prospective study was conducted on 15 patients with restricted mouth opening as a result of temporomandibular joint ankylosis who visited to the Out Patient Department of Oral & Maxillofacial Surgery, Subharti Dental College, Swami Vivekanand Subharti University between the period from February 2009 to March 2011. Demographic data including the age, gender, profession and home address were recorded. All 15 patients were operated under general anaesthesia and in these 15 patients 5 were male and 10 were female. Out of these 15 patients 10 were diagnosed as unilateral TMJ ankylosis and 5 were with bilateral TMJ ankylosis. The age of the patients ranged from 10-19 years with mean of 12.53 years. A detailed history of mode of onset and duration were recorded. All patients had routine haematological examination. All the patients had been explained regarding the purpose of study and written consent had been taken. This trial was approved by the ethical committee of the university. Preoperative maximum interincisal opening (MIO) and contralateral excursive movements were recorded (Fig 1a, 2a). All patients had preoperative orthopantomogram (OPG) (Fig 1b, 2b) computed tomography (CT) scan and underwent submissive osteoarthrectomy (6-7mm) followed by interposing pedicled buccal fat pad or temporalis myofascial flap between the cut ends of the bone. Mandibular mobilization was started 72hr postoperatively. Patients were discharged on 7th day postoperatively. Functional assessment of TMJ was done using MIO and contralateral excursive & excursive movements at regular intervals.

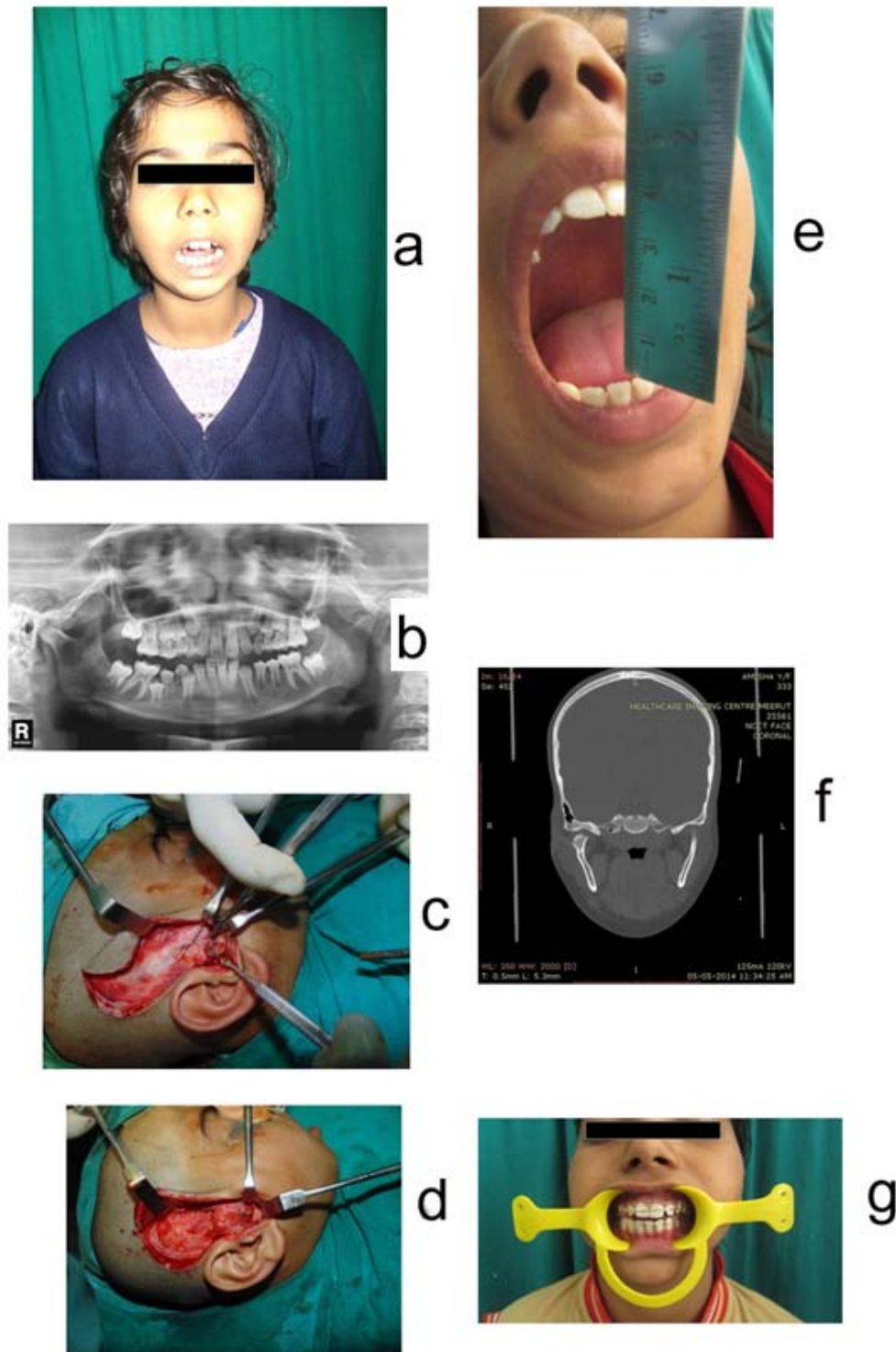


Figure 1 (a) Preoperative mouth opening; (b) Preoperative orthopantomogram; (c) Exposure of ankylotic mass; (d) Temporalis myofascial flap interposition; (e) Postoperative mouth opening; (f) 20 months postop coronal cut CT ; (g) Postoperative photograph showing twin block appliance in place.

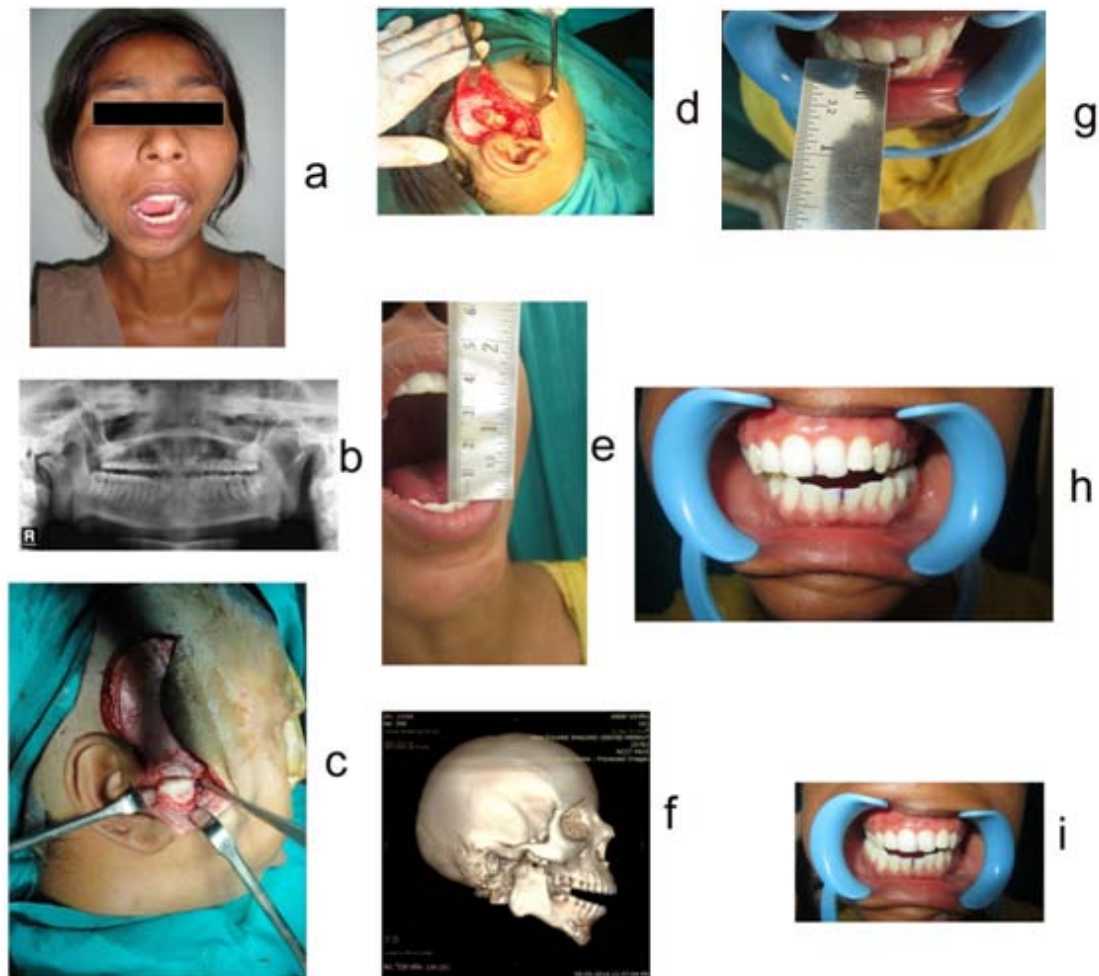


Figure 2 (a) Preoperative mouth opening; (b) Preoperative orthopantomogram; (c) gap osteotomy of 6-7 mm; (d) Temporalis myofascial flap interposition; (e) Postoperative mouth opening; (f) 24 months postop 3D-CT showing remodelled condyle; (g) Postoperative photograph showing protrusive movements; (h) Postoperative photograph showing left excursive movements; (i) Postoperative photograph showing right excursive movements.

Technique

The joint was exposed through an extended preauricular approach (with Al-Kayat Bramley modification) (Fig1c). After exposure ankylotic mass was executed using a combination of surgical burs, chisel and mallet to create a gap of 6mm with special consideration on the medial aspect to ensure total resection(Fig 2c). Glenoid fossa was reshaped with acrylic trimming bur, bone file followed by plenty of irrigation with normal saline to ensure the complete removal of bony pieces from the joint area. MIO was assessed intraoperatively. If MIO was inadequate (less than 35mm), ipsilateral and contralateral coronoidectomy were performed. The buccal fat pad (BFP) was approached through the same preauricular incision as used for TMJ exposure, interposed between the cut ends of the bone surface and pedicled BFP sutured to the root of the zygomatic arch with a previously drilled hole and

medial soft tissue. A temporalis fascia and muscular pedicle flap was dissected with wide base keeping in mind the anteroposterior width of cut end of the bony surface and rotated below the zygomatic arch to fill the gap created after arthroplasty and sutured on the medial side of the soft tissue in few cases where the volume of the fat was not adequate(Fig 1d, 2d).Soft tissue closure was done in layers. Pressure dressing was applied with dynaplast reinforced with mastoid dressing over it.

Results

All 15 patients (20 joints) were treated with a minimum gap of 6-7mm vertically with interpositional arthroplasty. Unilateral coronoidotomy was done for 9 patients and bilateral coronoidotomy for 6. Preoperative mouth opening (maximum interincisal opening) ranged from 0- 14 mm with an average of 4.9 mm. The mean post-operative mouth opening of the patients was 32.45 mm after 2 years(table 1). The resultant contralateral excursive and protrusive movements improved from nil to noteworthy values.Follow-up duration was between 24-36 months (mean 28.93 months). The patients were kept on regular follow-up to assess the mouth opening and range of mandibular movements(Fig 1e, 2e, 1g, 2g, 2h, 2i).Minimum followed after one year postoperatively the patients were investigated with CT scan to rule out any heterotrophic calcification and early sign of reankylosis(Fig 1f, 2f). In this case series no significant sign of heterotrophic calcification or reankylosis was noted and anatomical shape of the condyle was also achieved to some extent in all cases. Centric and advancement genioplasty was performed for the correction of facial asymmetry in 4 of our young adult patients and remaining were in the growing stage, so advised for myofunctional therapy(Fig 1g).

Discussion

A variety of techniques for the treatment of ankylosis have been described including gap arthroplasty, interpositional arthroplasty, and excision of the ankylotic mass within the TMJ.Ankylotic mass can be accessed by various surgical techniques which can be broadly classified in to preauricular and postauricular approaches[27]. In accordance to the “osteocyte jumping potential concept”, many of the eminent authors have recommended that a gap of 15-20mm should be left between the recontoured fossa and mandible to prevent reankylosis after gap arthroplasty[28, 29]. In contrast to this statement, Salins PC and Koe *et al.* proposed that radical removal of the bone leaves opposing surface of healing bone that are likely to be bridged by the fibrotic tissue and that prevent unimpeded mandibular movement[19] while osteotomizing the ankylotic mass instead of excising or relieving reduce the size of clot formation, its organisation, subsequent ossification and hence prevent reankylosis[20].There are various reasons why ankylosis recurs after release surgery but those most commonly implicated include failure to create a soft tissue barrier, lack of aggressive physiotherapy, and poor compliance by the patients. Kaban *et al.* [30] postulated that recurrent ankylosis is primarily caused by inadequate excision of the ankylotic mass.In normal conditions the meniscus acts as a soft tissue barrier to prevent fusion of the condyle with glenoid fossa but in children ankylosis still may happen even after a mild degree of injury, without any damage to the miniscus. But sole aggressive gap athroplasty with no interpositional graft might leave a dead space and allow a hematoma to organise, and together with opposing bony surfaces would lead to scarring and repeated adhesion or ankylosis. Considering the various disadvantages of aggressive osteoarthrectomy, submissive osteoarthrectomy/ minimal gap

arthroplasty appears to overcome the most of the problems and advantages seen were minimal ramus shortening which prevent telescoping of the mandible, ipsilateral deviation, maintains occlusion, avoid lateral pterygoid myotomy which generate lateral and protrusive movements, eliminate requirement of IMF after condylar reconstruction, early physiotherapy and cost effective since no secondary surgical site is needed for condylar reconstruction thus preventing associated morbidity at that site. Author assume that this technique prevented damage or involvement of lateral pterygoid muscle which led to postoperative early improvement of contralateral excursive and protrusive movements, which in turn resulted in early range of mandibular movements and masticatory efficacy. In growing patients it is presumed that growth is less hampered as lateral pterygoid myotomy produces opposite effect on proliferative activity i.e. decreased mitotic activity at the condylar cartilage and hence affect the overall lengthening of lower jaw[31]. In all our cases, therefore, a vertical gap of 6-7mm was created uniformly with emphasis on complete lateral to medial removal of ankylotic mass to permit adequate mobilisation. The adequate mobilisation in our institutional experience, has been defined as the extent of downward mobilisation of mandible, so much so that tongue protrude out of oral cavity, like hot potato sign which resembles in presentation to famous Indian deity “KAALI MATA” as KAALI MATA SIGN. Author has noticed that this technique is more beneficial and successful in in Topazian type I and type II type of ankylosis where ankylotic mass is confined to glenoid fossa or partially extended in to sigmoid notch. Our experience, though not on a large case series, indicates that among the various surgical options available for treating temporomandibular joint ankylosis, use of interpositional arthroplasty with temporalis fascia and/or muscle, buccal fat pad, transport distraction osteogenesis provides the most satisfactory results for all age groups[32]. Simple gap arthroplasty appears to be of limited value in temporomandibular joint ankylosis surgery, particularly due to the high risk of recurrence and masticatory inadequacy[33]. Silastic sheet interposition and endoprosthesis implantation are the alloplastic materials for interposition following osteotomy having their own advantages and disadvantages[34]. Costochondral graft is satisfactory in the young age group (< 12 years) as it provides a growth centre for condylar growth[25]; however two surgical sites are required which may be a source of parental refusal for operation.

Conclusion

There are various treatment modalities available for TMJ ankylosis but an efficient technique can be judged by evaluating both the functional and cosmetic outcomes. Although it require a long term study to comment on growth with minimal gap arthroplasty but the effect of jaw protruder muscle activity and its resultant growth cannot be overlooked. If any modification in the surgical technique has some considerable results, it is worth to consider using that technique.

Ethical Committee Approval Number

SDC/MISC/2009/228

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