

BICORONAL FLAP AND INTERPOSITIONAL ARTHROPLASTY IN ANKYLOSIS OF TEMPOROMANDIBULAR JOINT

G Dhaif, BDS, FFDRCSI* # F Brady, FRCSI, FDSRCS, FFDRCSI**

Objective: Study the efficacy of bicoronal flap as an approach to temporomandibular joint (TMJ) and temporalis fascia flap as an interpositional arthroplasty in cases of TMJ ankylosis.

Design: Ten consecutive patients with 16 ankylosed temporomandibular joints were studied. Their ages ranged from 9 to 35 years. Preoperative mouth opening ranged from 0 to 10 mm. Bicoronal flap was used to approach the joint and temporalis fascia flap was used as an interpositional arthroplasty.

Results: Trauma was the most common cause of the ankylosis of TMJ (70 %) followed by infection (30 %). The postoperative mouth opening ranged from 30-45 mm with a mean follow-up period of 20.4 months. There was no morbidity associated with the flap.

Conclusion: Bicoronal flap is highly recommended for the exposure of TMJ and temporalis fascia interpositional arthroplasty offers great advantages in cases of TMJ ankylosis. Bahrain Med Bull 1996;18(2):

Ankylosis of the temporomandibular joint (TMJ) is usually a sequel of trauma or infection to the Joint¹. Historically, the surgical treatment is primarily directed towards the creation of pseudoarthrosis by means of a gap arthroplasty, an interpositional arthroplasty or reconstruction of the joint². The residual deformity is corrected later in life by virtue of mandibular and maxillary surgery, although simultaneous correction has been reported³. There are different approaches to expose the TMJ including preauricular incision⁵, preauricular incision with temporal extension⁶ and bicoronal flap⁷.

* Registrar

** Consultant
Maxillofacial Unit
St James's Hospital
James's Street
Dublin 8, Ireland

Currently working in the Department of Oral and Maxillofacial Surgery, Salmaniya Medical Centre, State of Bahrain.

In this paper we review the cases of TMJ ankylosis operated at the National Maxillofacial Unit, Dublin, Ireland and using bicoronal flap as an approach to the TMJ and temporalis fascia as an interpositional arthroplasty.

METHODS

Ten patients underwent release of 16 ankylosed temporomandibular joints, six (60 %) required bilateral release and four (40 %) were unilateral. Preoperative assessment included review at the joint orthognathic clinic, physical examination to determine the cause of ankylosis, measurement of maximal interincisal opening, radiographic analysis including Panorex and CT scanning to clarify the status of the mandible and the TMJ (Fig 1). At the time of intervention, their ages ranged from 9 to 35 years. The preoperative mouth opening ranged from 0 to 10 mm.

The study also included two patients who had previously been treated for ankylosis with costochondral graft reconstruction. In these cases the joint was exposed through preauricular incision.

All patients had simultaneous coronoidectomy performed. Surgery was performed under general anaesthesia with endotracheal intubation using fiberoptic techniques and two required tracheostomy under local anaesthesia because it was not possible to intubate them. The joint was exposed through bicoronal flap with preauricular extension. Patients were kept in the intensive care unit for an overnight observation before being transferred to the ward on the following day. Jaw-opening exercises were started 24 hours postoperatively.

RESULTS

Trauma was the most common cause of ankylosis (70 %) followed by infection (30 %). The bicoronal flap was used to expose the TMJ in all the patients and temporalis fascia flap was utilized as an interpositional arthroplasty. Postoperatively, there was no morbidity associated with the flap including facial nerve weakness, sensory nerve loss, and hematoma formation or wound breakdown. Postoperative mouth opening ranged from 30-45 mm (Figures 2,3 and 4). Mouth opening which ranged between 10 to 20 mm was considered satisfactory, 20 to 30 mm as good and < 30 mm as excellent. The follow-up was between 3 to 36 months. It was obvious from the results that the postoperative mouth opening of the patients presented at this paper is excellent. The results of our follow-up examinations are summarized in Table 1.

Table 1
Clinical data of 10 patients with TMJ ankylosis

Patient	Sex	Ankylosis	Cause	Age	Pre-op mouth opening mm	Post-op mouth opening mm	Follow- up months
1	M	Bilateral	Infection	16	5	35	36
2	F	Bilateral	Infection	15	10	40	24
3	M	Unilateral	Infection	10	7	30	22
4	F	Unilateral	Trauma	10	8	34	26
5	M	Bilateral	Trauma	13	5	30	21
6	M	Bilateral	Trauma	35	0	45	22
7	F	Bilateral	Trauma	9	10	32	20
8	M	Bilateral	Trauma	12	7	31	18
9	M	Unilateral	Trauma	15	5	30	12
10	M	Unilateral	Trauma	13	9	28	3

DISCUSSION

The most common causes of TMJ ankylosis are trauma^{3,8}, infection^{1,5,10} and rarely following arthritis³. Congenital ankylosis is probably due to neonatal infection or birth trauma⁵. Topazian found that infection is the most common cause of ankylosis accounted for 43 % while trauma accounts for 38.6 %². Rowe support the view that trauma followed by infection are the principal causes of ankylosis in children¹.

The most common problems associated with the release of ankylosis are re-ankylosis of the joint which is often linked to the lack of patient's compliance. The development of an open bite and postural deviation of the mandible. The utilization of temporalis fascia flap, pedicle inferiorly, as an interpositional arthroplasty (Fig 4) offer the advantage of being immediately adjacent to the surgical site causing less morbidity⁴.

There are several approaches to expose the TMJ including preauricular incision⁵, preauricular incision with temporal extension as described by Al-Khayat and Bramley⁶ and bicoronal flap⁷. The bicoronal flap provides an excellent and wide surgical access to the TMJ¹¹. In patients who have had previous exploration of the joint, scarring, fibrosis and loss of landmarks make conventional approaches difficult and increase the risk of damage to the zygomatic and temporal branches of the facial nerve. With bicoronal flap, there is an access to carry out simultaneous procedures such as coronoidectomy or temporalis fascia and muscle flaps. There is usually no need for accessory incisions e.g. submandibular or intraoral incision. The complications reported in the literature following bicoronal flap were not encountered in this study⁶. The risk of damage to the zygomatic and temporal branches of facial nerve is minimised with precise knowledge of the surgical anatomy of the region⁶. The zygomatic and temporal branches of the facial nerve lie on the temporal fascia and should be reflected anteriorly prior to entering into the joint space. Postoperative trismus associated with the bicoronal flap is avoided by emphasizing immediate postoperative jaw-exercises. Hematoma and infection have also been reported, but with meticulous surgical technique, antibiotics and suction drainage, these complications are usually minimized. Increased blood loss has never been encountered in this study due to the application of Raney's clips and the use of diathermy⁵. We noted that temporalis muscle was atrophied and hence temporalis fascia was mainly used as an interpositional flap.

There are many autogenous interpositional substances such as pedicled temporalis or masseter muscle^{2,8}, temporalis fascial³, fascia lata⁹, full thickness skin¹⁰, homologous and bovine cartilage¹², autogenous costochondral grafts^{13,14}, and prefabricated joint prosthesis¹⁵. Full-thickness skin autotransplantation to gap arthroplasty was followed by low incidence of reankylosis¹⁰. However, few partial recurrences of ankylosis had been encountered probably due to inadequate coverage of the mandibular stump by the skin, or immediate postoperative mandibular movements. Interposition of autogenous cartilage is superior to alloplastic materials because cartilage cells survive when transplanted within the body¹².

CONCLUSION

The bicoronal flap provides an excellent superior approach to TMJ and temporalis fascia interpositional arthroplasty is an excellent method that can be utilised to prevent re-ankylosis.

REFERENCES

1. Rowe NL. Ankylosis of the temporomandibular joint. Eleventh William Guy Memorial Lecture. Royal College of Surgeons of Edinburgh, Edinburgh 1983.
2. Topazian RG. Comparison of gap and interpositional arthroplasty in the treatment of temporomandibular joint ankylosis. J Oral Surg 1966;22:405.
3. Munro IR, Chen YR, Parl BY. Simultaneous total correction of temporomandibular ankylosis and facial asymmetry. Plast Reconstr Surg 1986;77:517.

4. Feinberg SE, Larsen PE. The use of pedicled temporalis muscle-pericranial flap for replacement of the TMJ disc: preliminary report. J Oral Maxillofac Surg 1989;47:142-6.
5. Lello G. Surgical correction of temporomandibular joint ankylosis. J Craniomaxillofac Surg 1990;18:19-26.
6. Al-Khayat A, Bramley P. A modified preauricular approach to the temporomandibular joint and malar arch. Br J Oral Surg 1979;17:91-103.
7. Shepherd DE, Ward-Booth RP, Moos KF. The morbidity of bicoronal flaps in maxillofacial surgery. Br J Oral Maxillofac Surg 1985;23:1-8.
8. Young AH. A follow-up of twelve cases of ankylosis of the mandibular joint treated by condylectomy. Br J Plast Surg 1963;16:75.
9. Narang R, Dixon RA. Temporomandibular joint arthroplasty with fascia lata. Oral Surg 1975;39:65.
10. Popescu V, Vasiliu D. Treatment of temporomandibular ankylosis with particular reference to the interposition of full thickness skin autotransplant. J Max Fac Surg 1977;5:3.
11. Porgel MA, Perott DH, Kaban LB. Bicoronal flap approach to the temporomandibular joints. J Oral Maxillofac Surg 1991;20:219-22.
12. Longacre JJ, Gilby RF. The use of autogenous cartilage graft in arthroplasty for true ankylosis of temporomandibular joint. Plast Reconstr Surg 1951;7:271.
13. Kennet S. Temporomandibular joint ankylosis: The rationale for grafting in the young patient. J Oral Surg 1973;31:1181.
14. Poswillo D. Experimental reconstruction of mandibular joint. Int J Oral Surg 1974;3:400.
15. Kent JM, Lavelle WE, Dolan KD. Condylar reconstruction. Treatment planning. J Oral Surg 1974;37:489.