Temporomandibular Joint Ankylosis (A prospective clinical study)

Alan H. Mawlood* Ali F. Al-Zubaidee** Ahmed A. Haider***

ABSTRACT

Background and objectives: To study the correlation between etiology, sex, side and time of TMJA, to evaluate and compare two different surgical techniques and their postoperative complications.

Methods: Twenty-one patients (15 female , 6 male) were treated in Rizgary Teaching Hospital in Hawler during the period May 2007-October 2008. The patients were referred from Hawler and Duhok governorates, and operated on by two surgeons each adopted one surgical technique, either gap arthroplasty with temporalis muscle flap (technique A) or horizontal ramus osteoctomy with masseter muscle flap (technique B).

Results: We found 95.65% of patients had TMJA before the age of ten years and 96% was due to trauma (57% was bilateral TMJA and 43% unilateral), technique (B) was easier and of shorter duration than technique (A) which was more functional. The most common postoperative complication was neural deficit (33.33%). Anterior open-bite occurred in 36.3% of patients with bilateral ankylosis.

Conclusions: The earlier the onset of ankylosis, the more the extent of deformity and the more complicated surgical technique was required. Both techniques were effective with good immediate out come.

Keywords: TMJ, Ankylosis, Gap arthroplasty, Horizontal ramus osteoctomy, Flap.

INTRODUCTION:

Ankylosis is a Greek word meaning “stiff joint”, refers to bone or fibrous adhesion of the anatomic joint components and the ensuing loss of their function [1]. Rowe in 1972 classified limited mandibular mobility into the following categories:

1. Trismus (muscle spasm)
2.Pseudo-ankylosis(mechanical interference)
3. False ankylosis (extracapsular in origin)
4. True ankylosis (intracapsular in origin)[2] .

Ankylosis is most commonly associated with trauma, local or systemic infection, and systemic diseases, such as ankylosing spondylitis, rheumatoid arthritis, or psoriasis [3-6]. At present, the surgical procedures mainly used for treatment of ankylosis are gap arthroplasty and interpositional arthroplasty[7]. Gap arthroplasty refers to those operations in which a joint space is recreated, either at the site of the pre-existing space or a level below this, in which no substance is interposed between the recreated bony surfaces [4,8,9]. Interpositional arthroplasty recreates a joint space but, in addition, an autogenous or alloplastic material is introduced into the gap [10,11].Various interpositional materials have been used in TMJ arthroplasty, including temporalis muscle and fascia, skin, dermis, auricular cartilage, fat, silastic and silicone[12-14].Alternatively, if the gap is created at a lower level near the angle of the mandible, the masseter and medial pterygoid muscles may be sewn together through the gap [15].

*B.D.S H.D.D, M.Sc / Department of Oral Surgery, Specialized Dental Center.
**B.D.S FFDRCS (Irel), FDSRCS (Eng) Professor, Department of Oral and Maxillofacial Surgery, College of Dentistry, HMU.
***B.D.S F.D.S, Lecturer,, Department of Oral and Maxillofacial Surgery, College of Dentistry, HMU.

MATERIALS AND METHODS:

In a clinical prospective study, twenty-three patients (36 joints) with true TMJA (16 female and 7 male) were seen in Rizgary teaching hospital in Hawler during the period from May 2007 up to the end of October 2008. The patients were referred from health centers and other hospitals in Hawler and Duhok governorates.

Preoperative assessment: All patients underwent thorough clinical assessment and radiographic examination (OPT, Coronal CT scan) to study the degree of deformity and the size and extent of the ankylosed mass.

Operative protocol: We were able to treat twenty-one patients (32 joints) during the study period by either one of two surgical techniques according to the surgeon who did the operation, one adopted technique A, (Figure 1) which is gap arthroplasty with interposition of temporalis muscle flap and the other adopted technique B, (Figure 2) which is horizontal ramus osteoctomy with interposition of masseter muscle flap. Distribution of cases was done according to whom surgeon the patient was referred.

Anesthesia: Anesthesia was administered according to the anesthetic choice either via blind nasotracheal intubation (Anesthetist A) , or via tracheostomy tube (Anesthetist B) .

Surgical approaches:

♦ In technique A, *Temporofacial* (*Preauricular incision with temporal extension).*

♦ In technique B, *Modified sub mandibular incision (Kent approach)* [16].

Release of ankylosis

♦ In technique A, approximately 2 cm of ankylosed mass was removed with or without ipsilateral coronoidectomy depending on the ability to open the jaw passively to achieve inter maxillary distance (IMD) of 3.5-4cm.

♦ In technique B, A rectangular full thickness bony segment of about 2cm was removed from the ramus after isolation of

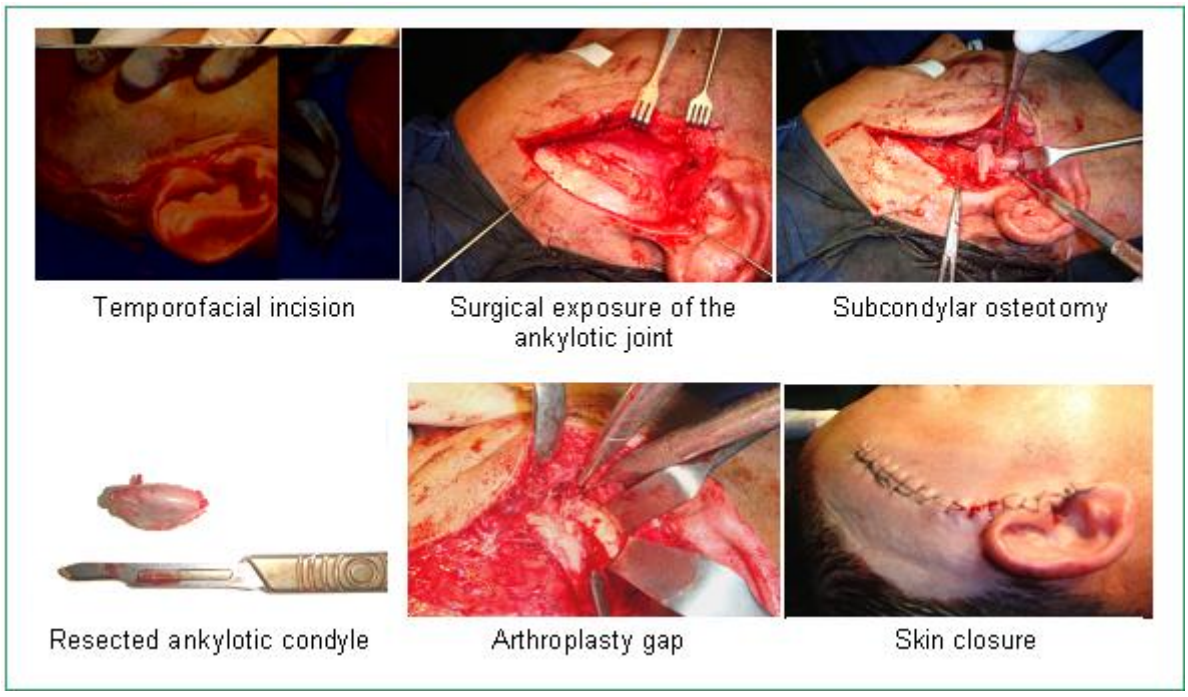

Figure (1): Technique A.

Figure (2): Technique B

inferior alveolar nerve (IAN), which is achieved after removing its outer cortex.

Interpositional muscle:

♦ In technique A the flap was taken as a full thickness pedicle from the posterior third of temporalis muscle crossed over the zygomatic arch and sutured with tissues surrounding the gap.

♦ In technique B the inner layer of masseter was dissected out to the level that allowed us to suture it via the gap to the medial pterygoid muscle.

Drain and suturing:

A drain was put in four cases because of reactionary bleeding (3 in gap arthroplasty cases). The wounds were sutured using 3/0 vicryl for subcutaneous tissues and 4/0 silk for the skin.

Post operative Physiotherapy:

Early mobilization was started in the first post operatively week by soft chewing gum followed by active physiotherapy in the second postoperative week using a bundle of wooden tongue spatula at least 10 times daily. The patients were reviewed every 2 weeks during the first postoperative two months and then reviewed monthly. The number of wooden tongue spatula was increased by one every other day until the decided MID was reached (35-40 mm).

Twenty-three patients (15 female and 8 male) with an average age at the time of the onset of ankylosis 5.5 year with range of 2-15 year. In addition, at the time of surgery the age was 21.3 year with a range of 8-34 year.

RESULTS:

Seven patients (30%) were male and sixteen patients (70%) were female. Twenty-two patients (96%) had history of trauma and one patient (4%) had history of ear infection during early childhood. Thirteen patients (57%) had bilateral TMJA and ten patients (43%) with unilateral TMJA, six of the patients (60%) were in right side and four patients (40%) in the left side. Seven patients (30%) were referred from the governorates (Hawler, Duhok) and sixteen patients (70%) were referred from the medical centers in the rural areas.

The average preoperative MID was (4.90mm) with a range of (-2-18mm), for bilateral cases (3.81mm) with a range of (-2-18mm) and for unilateral case(5.8mm) with a range (-1-15mm) We were able to treat 21 patients during the study period who had an average MID (27.57mm) with a range of (21-32mm) postoperatively, one week postoperatively (30.85mm) with a range of (20-35mm) and one month postoperatively (33.1mm) with a range of (29-41mm). Six patients were treated by gap arthroplasty with interposition of temporalis muscle flap (two bilateral and four unilateral), ten patients treated by horizontal ramus osteoctomy with interposition of masseter muscle flap (four bilateral and six unilateral). Five of the bilateral patients were treated by both surgeons each performed the technique he adopted on the side he worked on.

The most common postoperative complication seen in this study were neural deficit (numbness of lower lip and nerve weakness). Four patients developed weakness of the zygomatic branch of facial nerve in technique A, while three patients developed temporary weakness in mandibular nerve and four patients developed temporary numbness in the lower lip in technique B. Anterior open-bite occurred in four patients with bilateral cases.

DISCUSSION:

In this study, twenty patients had developed TMJA before the age of ten years which is agreed with those authors who stated that children under the age of ten years have greater disposition to post-traumatic ankylosis than adults, especially during the first two years of age, when there is thin cortical plate, broad condylar neck and highly vascular subarticular layer [17-19]. Females were affected more than males. This finding is in agreement with some studies[20-22] and is possibly because the females in our society (especially in rural areas) are socially reluctant to complain and so there is delay in the management of cases. Twenty-two patients (96%) had his--story of trauma [23-27].

However, this is disagreed with a study stated that infection was the most common cause of TMJA [28]. Such study was done in the pre antibiotic period when infection was the most common cause of TMJ ankylosis. Thirteen patients (57%) had bilateral involvement and ten patients (43%) had unilateral involvement [22, 29]. It seems that our bilateral cases possibly sustained severe trauma to the chin.

The present study showed that high incidence of ankylosis was seen in cases referred from rural areas where early diagnosis and primary care of fracture TMJ condyles are either missed or treated inappropriately [30].Ipsilateral coronoidectomies were done for patients treated by gap arthroplasty with interposition of temporalis muscle flap technique when needed. This is in agreement with authors who stated that coronoidectomy were not performed in all cases but only if the coronoid process represents an obstacle to a wide mouth opening checked intraoperatively [11, 29]. In this study a full thickness pedicled temporalis muscle flap from the posterior third as far back to the temporal line in the temporal fossa was taken [31-32]. Full thickness flap has its blood supply from the deep and middle temporal arteries, while partial thickness flap depends on the deep temporal arteries only, keeping in mind that the dissection through the muscle fibers will affect its blood supply.

The temporalis muscle is usually atrophied in patients with TMJA due to disuse, especially with longstanding ankylosis [33]. In this study, the bone cut (2cm width) in horizontal ramus osteoctomy with interposition of masseter muscle flap was done beneath the sigmoid notch and above the angle of mandible [15]. Some authors did the technique at the angle of the mandible [15,34]. In our study, early mobilization was encouraged in the first week postoperatively using soft chewing gum. The active physiotherapy was started one week postoperatively, by using a bundle of wooden tongue spatula that were placed between the occlussal

surfaces of the molar teeth on the surgical side. However some authors prefer to wait 5 to 7 days for pain and edema to subside as early mandible mobilization may cause bleeding and hematoma, which would delay healing [35]. Four patients with bilateral TMA had post operative anterior open bite, because there may be bilateral superioposterior displacement of the ramus which will lead to anterior open bite. This is due to the muscle function being limited to the pterygomasseteric sling and the depressor group of muscles [21]. This was managed in our cases by using upper and lower arch bars and elastic traction with physiotherapy for at least four weeks.

REFERENCES:

1. Valentini V, Vetrano S, Agrillo A, Torroni A, Fabiani F, Iannetti G: Surgical treatment of TMJ ankylosis. J Craniofac Surg. 2002; 13(1): 59-67.
2. Rowe N L: Surgery of the Temporomandibular Joint. Proc. Roy. Soc. Med; 1972; 65: 383-388.
3. Martins WD: Report of ankylosis of the temporomandibular joint treatment with a temporalis muscle flap and augmentation genioplasty. J Contemp Dent Pract. 2006; 15; 7(1):125-33.
4. Vasconcelos BC, Bessa-Nogueira RV, Cypriano RV: Treatment of temporo-mandibular joint ankylosis by gap arthroplasty. Med Oral Patol Oral Cir Bucal. 2006; 11(1):66-9
5. Ujpal M, Bogdan S, Fulop E, Barabas J: Report of a rare case of temporomandibular ankylosis as a result of rheumatoid arthritis. Fogorv Sz; 2007; 100(1):23-6.
6. Parmar J: Septic arthritis of the temporo- mandibular joint in a neonate. Br J Oral Maxillofac Surg. 2008; 46 (6):505-6.
7. Tanrikulu R, Erol B, Görgün B, Söker M: The contribution to success of various methods of treatment of temporomandibular joint ankylosis. Turk J Pediatr. 2005; 47(3):261-5.
8. Erol B, Tanrikulu R, Görgün B: A clinical study on ankylosis of the temporomandibular joint. J Craniomaxillofac Surg. 2006; 34(2):100-6.
9. Ramezanian M. and Yavary T: Comparison of gap arthroplasty and interpositional gap arthroplasty on the temporomandibular joint ankylosis. Acta Medica Iranica; 2006; 44(6): 391-394.
10. Li Z, Li ZB, Li JR: Surgical management of post-traumatic temporomandibular joint ankylosis by functional restoration with disk repositioning in children. : Plast Reconstr Surg; 2007; 119 (4):1311-6.
11. Turco M, Di Cosola M, Faccioni F, Cortelazzi R: Treatment of severe bilateral temporomandibular joint ankylosis in adults: Minerva Stomatol. 2007; 56(4):181-90
12. Arun M, Roger B: Suture of temporalis fascia and muscle flaps in temporo mandibular joint surgery. British J Oral and Maxillof Surg, 2004; 42(4) 357—359.
13. Akhtar MU, Abbas I, Ali A: Use of silastic as interpositional material in the management of unilateral temporo- mandibular joint ankylosis. J Ayub Med Coll Abbottabad. 2006; 18(2):73-6.
14. Huang IY, Lai ST, Shen YH, Worthington P: Interpositional arthroplasty using autogenous costal cartilage graft for temporomandibular joint ankylosis in adults. Int J Oral Maxillofac Surg.; 2007; 36(10):909-15.
15. Toller PA (the late), {Towers JF (ed.)} Surgery of temporomandibular joints. In: Moore J.R*: Surgery of the Mouth & Jaws*. Oxford. 1st ed, Blackwell Scientific Publications: 1985; pp 624-625.
16. Robert H: Treatment of temporo- mandibular joint ankylosis. In: Langdon JD; Patel MF: Operative maxillofacial surgery (1st ed), London. Chapman and Hall Medical. 1998: pp 178-179.
17. Ferretti C, Bryant R, Becker P, Lawrence C: Temporomandibular joint morphology following post-traumatic ankylosis in 26 patients. Int J Oral Maxillofac Surg. 2005; 34(4):376-81.
18. Qudah MA ,Qudeimat MA ,Al-Maaita J :. Treatment of TMJ ankylosis in Jordanian children a comparison of two surgical techniques. J Craniomaxillofac Surg; 2005; 33(1):30-6.
19. Shashikiran ND, Reddy SV, Patil R, Yavagal C: Management of temporo-mandibular joint ankylosis in growing children. J Indian Soc Pedod Prev Dent; 2005; 23(1):35-7.
20. El-Sheikh MM, Medra AM, Warda MH: Bird face deformity secondary to bilateral temporomandibular joint ankylosis. J Craniomaxillofac Surg. 1996; 24(2):96-103.
21. Dimitroulis G: The interpositional dermis-fat graft in the management of temporomandibular joint ankylosis. Int J Oral Maxillofac Surg. 2004; 33 (8):755-60.
22. Abbas I, Jamil M, Jehanzeb M, Ghous SM.: Temporomandibular joint ankylosis. J Ayub Med Coll Abbottabad. 2005; 17 (4):67-9.
23. Kummoona R: Functional rehabilitation of ankylosed tmporomandibular joints. J Oral Surg ; 1978; 46 :495.
24. Kummoona R: Chondro-Osseous iliac crest graft for one stage reconstruction of the ankylosed TMJ in children. J Maxillofac Surg : 1986; 14:215.
25. Rattan V: Temporomandibular joint morphology following post-traumatic ankylosis in 26 patients. Int J Oral Maxillofac Surg; 2006; 35(3):287-8.
26. He D, Ellis E, Zhang Y: Etiology of temporomandibular joint ankylosis secondary to condylar fractures. J Oral Maxillofac Surg; 2008; 66(1):77-84
27. Saleh N.H (1984-1985): The relation of condylar fractures with the temporo

-mandibular joint ankylosis. Diploma dissertation, College of Dentistry, University of Bagdad.
28. Kazanjian VH: Ankylosis of the temporomandibular joint. Am J Orthod Oral Surg, 1983; 24: 1181.
29. Ansari SR, Khattak SA, Nishtar S: Gap arthroplasty versus interpositional arthroplasty in the management of temporomandibular joint ankylosis. JPMI; 2004; 18(1): 80-87.
30. El-Sheikh MM: Temporomandibular joint ankylosis. Ann R Coll Surg Engl. 1999; 81(1):12-8.
31. Matsuura H: Costochondral graft reconstruction in temporomandibular joint ankylosis after condylectomy. B J O M S; 2001; 39; 189-195.
32. Al-Kamali R., Al-Zubaidi A: Experience with the prevention of Reankylosis of the temporomandibular joint; Iraqi Dent. J; 2002; 31: 245-256.
33. Su-Gwan K: Treatment of temporo mandibular joint ankylosis with temporalis muscle and fascia flap. Int. J. Oral Maxillofac. Surg; 2001; 30: 189–193.
34. Esmarch Cited by Silagi Schow. Temporomandibular joint arthroplasty J. of Oral Surg. 1970; 28(12): 920.
35. Belmiro CD, Egito V, Gabriela GP, Ricardo VC: Temporomandibular joint ankylosis. Rev. Bras. Otorrinolaringol. ; 2008; 74(1): 244-250.