Management of Extra-Capsular Temporomandibular Joint Ankylosis: Does Conservative Approach to Treatment Have a Role?

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Abstract

Background The conventional management of fibrous extracapsular temporomandibular joint (TMJ) ankylosis, a debilitating disease, is associated with surgical complications and financial burden on the patients.

Objective To assess the outcome of conservative approach to the management of fibrous extracapsular TMJ ankylosis.

Patients and methods This is a prospective study of patients who presented at the Dental and Maxillofacial Surgery Clinic of the University of Calabar Teaching Hospital, Nigeria, during the period from January 1999 to December 2012 with a history of inability to open the mouth diagnosed as fibrous extracapsular TMJ ankylosis.

Results Twenty-one subjects were treated and their ages ranged from 11 to 22 years with mean at 15.0 years. There were 13 (61.9 %) males and 8 (38.1 %) females with male:female ratio of 1.6:1. The aetiological factor that predisposed to formation of extracapsular TMJ ankylosis was facial trauma. There was no facial asymmetry and the side distribution of the affliction showed that 1 (4.8 %) was bilateral while 20 (95.2 %) were unilateral. Eight cases (38.1 %) were incomplete ankylosis while the rest (n = 13, 61.9 %) were complete. The shorter the duration of fibrous ankylosis and the greater the initial inter-incisal distance before treatment, the better the treatment outcome.

Conclusion The outcome of treatment suggests that the conservative approach to management of this condition was beneficial to these patients because they presented

early. However, randomized controlled clinical trials are needed to validate this treatment option.

Keywords Temporomandibular joint · Extracapsular ankylosis · Early presentation · Conservative treatment

Introduction

Temporomandibular joint ankylosis (TMJ) is a debilitating clinical condition which often results in aesthetics and functional impairment around the orofacial region [1–4]. This ankylosis is classified as intracapsular or extracapsular; fibrous, bony or fibro-osseous; complete or incomplete; and unilateral or bilateral [5–7]. The main stay of treatment has been surgery irrespective of the type of ankylosis, and this includes gap arthroplasty, interpositional arthroplasty and TMJ reconstruction with autogenous or alloplastic materials [4, 8, 9]. The literature is replete with several surgical approaches to the TMJ with its attendant morbidities and complications. While the preauricular incision is the most popular surgical approach to the TMJ, the others include postauricular, endaural, Alkayat-Bramley, Popowich, postramal, submandibular and intraoral incisions [10, 11]. The major complications commonly associated with TMJ surgeries are injuries to the facial and inferior alveolar nerve with associated facial deformity and numbness respectively; Frey's syndrome, and damage to the parotid gland [12, 13].

Also, ankylosis of the TMJ is a public health issue among impoverished children and adolescents in the developing world, and especially in sub-saharan Africa where the incidence in most countries is estimated to be 12/1000 cases in the most affected communities [14]. With the economic down turn being experienced in most

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countries of the world resulting in poor socio-economic status, the problem of these patients afflicted with this condition in our environment is compounded when you have to add to the challenge of having to pay for the medical bills to be accrued in the course of treatment of this condition which would not have arisen if our health facilities including skilled manpower for the management of oro-facial diseases were at their disposal. Consequently, a less invasive approach to the management of TMJ ankylosis especially the fibrous extracapsular type may help avoid these complications and reduce the financial burden on these patients.

To the authors' knowledge a conservative approach to the management of extracapsular fibrous ankylosis has not been previously described. This study presents the outcome of conservative management of fibrous extracapsular TMJ ankylosis in a Nigerian Teaching Hospital over a period of 14 years.

Patients and Methods

This is a prospective study of patients who presented at the Dental and Maxillofacial Surgery Clinic of the University of Calabar Teaching Hospital (UCTH) Nigeria, during the period from January 1999 to December 2012 with a history of inability to open the mouth. This study followed the Declaration of Helsinki on medical protocol and ethics, and the regional Ethical Review Board of UCTH, Calabar, approved the study. The inclusion criteria were patients with unilateral or bilateral extracapsular fibrous TMJ ankylosis with palpable movement at one condylar head or both, and the restricted mouth opening would have lasted within duration of 1 year. Patients' with extracapsular fibrous TMJ ankylosis that have lasted for more than 1 year, and those with intracapsular or extracapsular TMJ bony ankylosis were excluded from the study. Information on demographic and clinical characteristics such as aetiology, side distribution, facial symmetry, initial and final inter-incisal distance (mouth opening) during the follow-up period were recorded.

The diagnostic criteria used for fibrous extracapsular TMJ ankylosis were: (1). Restricted mouth opening, (2). Palpable movement at one or both condylar head, and (3). Absence of bony consolidation in the region of the TMJ, on postero-anterior, lateral oblique mandible, and TMJ radiographic views. Under conscious sedation using combination of parenteral diazepam 10 mg and pentazocine 30 mg, the mouth was opened using graded sizes of dental surgical instruments such as periosteal elevator, Coupland elevator and handle of dental extraction forceps. These instruments were padded with a piece of gauze when deemed necessary, and were placed in between the incisor

Table 1 Reasons for exclusion of patients (n = 37)

Reason for exclusion	Frequency	Percentage
Duration > 1 year	22	59.5
Bilaterally immobile condylar head/ bony consolidation on radiographs	8	21.6
Restricted mouth opening due to untreated zygomatic fracture	6	16.2
Rejected procedure	1	2.7
Total	37	100.0

teeth and distracted until appreciable mouth opening big enough to accept a Fergusson's mouth gag was obtained. This first stage of the procedure was excluded for those patients with very minimal mouth opening that will accommodate the mouth gag. The Fergusson's mouth gag was then placed in between the molar teeth as far as it can go posteriorly, and the mouth was propped open by activating the mouth gag. The activated mouth gag was left in situ for a period of 30 min to 1 h, and then re-applied repeatedly more posteriorly to further increase the extent of mouth opening to an acceptable limit. When a satisfactory mouth opening (35–45 mm) measured with a calibrated caliper was obtained, the Fergusson mouth gag was replaced with stacks of wooden spatula, and this was allowed to act for another 1 h. Those patients who could not tolerate the conscious sedation because of apprehension/fear or pain (or both) were treated under general anaesthesia. The patients were later placed on oral Naproxen sodium 550 mg 12 hourly for the first 2 weeks, and then subsequently oral paracetamol 1000 mg 6 hourly when necessary. They were discharged the same day and instructed to continue with the mouth exercises using stacks of wooden spatula applied for about 30 min to 1 h, four to five times daily until another visit to the clinic. Also between the intervals of these exercises, they were instructed to chew sugar-free gum. They were recalled at 1 week, then fortnightly in the next 3 months and finally at 3 months, 6 months and subsequently yearly.

Results

Out of the 58 patients seen within the study period, 37 (63.8 %) patients were excluded for the reasons outlined in Table 1; leaving a total of 21 subjects who met the inclusion criteria and consented to undergo the procedure. The age of subjects ranged from 11 to 22 years with mean at 15.0 years. There were 13 (61.9 %) males and 8 (38.1 %) females with male:female ratio of 1.6:1.

The aetiological factor leading to injury that predisposed to extracapsular TMJ ankylosis was facial trauma. The distribution of trauma is as follows: Gunshot (n = 1, 4.7 %),

Table 2 Subjects' demographic and clinical characteristics

S/no.	Age (years)	Gender	Aetiology	Side	Duration (months)	Mouth opening (mm)		Complications
						Initial	Final	
1.	11	Male	RTA	Left	3	6.2	37.4	
2.	11	Male	RTA	Right	2	5.1	36.3	
3.	11	Female	Sports	Left	2	6.3	38.9	
4.	11	Male	RTA	Right	2	4.8	35.8	
5.	12	Male	RTA	Left	3	5.7	36.8	
6.	12	Female	Sports	Right	2	6.5	37.4	
7.	12	Male	Sports	Right	3	5.6	34.2	
8.	13	Male	Fall	Left	3	3.6	30.2	–
9.	13	Female	DV	Left	4	2.5	30.5	–
10.	14	Female	DV	Left	2	4.6	35.6	
11.	15	Male	RTA	Bilateral	2	5.8	34.7	–
12.	15	Male	Fall	Right	9	0	28.3	–
13.	16	Female	RTA	Right	8	0	29.1	–
14.	16	Female	RTA	Left	7	4.8	33.4	–
15.	16	Male	RTA	Left	5	4.1	32.1	–
16.	17	Female	RTA	Right	3	3.9	33.3	–
17.	18	Female	RTA	Left	2	6.2	34.5	–
18.	20	Male	DV	Right	3	3.2	32.2	–
19.	21	Male	Fall	Left	11	0	27.6	Incisor avulsion
20.	21	Male	RTA	Right	8	0.6	28.1	–
21.	22	Male	Gunshot	left	6	2.0	28.7	–

mm millimetre, DV domestic violence, RTA road traffic accident

sports ($n = 3$, 14.3 %), domestic violence ($n = 3$, 14.3 %), fall ($n = 3$, 14.3 %) and road traffic accident ($n = 11$, 52.4 %). On the side distribution of the affliction, 1 (4.8 %) was bilateral while 9 (42.8 %) were on the right and 11 (52.4 %) on the left side of the mandible. The duration of the lesions before treatment was between 2 and 11 months. The initial and final inter-incisal distances (mouth opening) are shown in Table 2. Eight cases (38.1 %) were incomplete ankylosis while the rest ($n = 13$, 61.9 %) were complete. The result also revealed that the shorter the duration before treatment and the wider the initial inter-incisal distance (mouth opening), the better the treatment outcome (Table 2). Furthermore, 13 (61.9 %) of the subjects were treated under conscious sedation while the rest ($n = 8$, 38.1 %) could not tolerate it and were treated under general anaesthesia. The Fergusson's mouth gag in situ and the stack of wooden spatula are shown in Figs. 1 and 2. Figure 3 shows the pre-treatment mouth opening on presentation at 12 years, and post-treatment mouth opening 6 years later, at 18 years respectively. Clinically, there was no facial deformity. The duration of follow-up lasted between 2.3 and 8.5 years with mean at 5.7 years. Only one case of tooth avulsion was recorded during the treatment procedure.

Discussion

Extracapsular or false TMJ ankylosis involves peri-articular tissues. The most common cause of this condition is peri-articular fibrosis, occurring as a sequel to trauma, infection, radiotherapy or neoplasm [3, 8]. Because the development of TMJ ankylosis is slow and concealed, it is sometimes overlooked or neglected by the patients and the dental/medical professionals until the mouth opening is completely restricted. As documented in previous reports [4, 6], the cases in the present study were all trauma induced. This is to be expected as trauma is the leading cause of facial fractures and related diseases in this environment [15, 16]. The combination of ignorance, lack of early access to treatment and poverty resulting in delayed treatment of these fractures have resulted in extracapsular ankylosis. In addition, the health facilities available in this environment are not adequate to cater for the majority of the people as most patients travel long distances to access them [17]. However, the persistence of this condition in our environment seems to be a result of factors associated with poverty.

Inter-incisal distance is an indicator of the severity of TMJ ankylosis, and clinically, complete ankylosis is

Fig. 1 Fergusson's mouth gag in situ (a) before and (b) after activation

Fig. 2 Stack of wooden spatula in situ after achieving maximum inter-incisal distance

defined as when mouth opening is less than 5 mm [9]. In this study, 38.1 % of the cases were incomplete ankylosis while the rest, 61.9 % were complete. In unilateral cases of ankylosis and sometimes in bilateral cases, the mandible can be forced to open because of its elasticity in the young age group and minimal mobility of the cranial sutures [9, 18]. In this study, it may also be attributed to the immature fibrous tissues formed because of early presentation by the

Fig. 3 (a) Patient on presentation before treatment at 12 years with inter-incisal distance of 6.5 mm. (b) Mouth opening (inter-incisal distance) of 37.4 mm at 6 years post-operative follow-up for the same patient in a

subjects and the consequent short duration of the condition. These factors acting together may have accounted for the increased inter-incisal distances obtained using the Fergusson's mouth gag which when activated resulted in the stretching and later fatigue of the fibrous ankylotic mass.

In the present study none of the patients presented with facial deformity because the facial injuries occurred during the adolescent age and above. This is consistent with previous reports [12, 13]. It has been observed that the age of patients' when exposed to injury is an important factor in the assessment of maxillofacial deformities particularly in ankylosis of the TMJ. When children, especially below the age of 5 years are exposed to these injuries, it results in defective osteogenesis of the damaged cartilage of the mandibular condyle by the ankylotic process, and also in the loss of muscular guidance over mandibular growth process resulting in severe facial deformity [19, 20]. As a consequence of this, patients present with severe maxillofacial alteration that will lead to TMJ ankylosis. As obtained in this study and in consistent with previous reports, it is slightly commoner in males than females [3, 4]. Likewise unilateral ankylosis is reported to be commoner than the bilateral type [4].

Only one case of tooth avulsion was recorded during treatment which was immediately re-planted and splinted with interdental eyelet wire. It healed satisfactorily, and later root canal therapy was carried out.

Conclusion

The outcome of treatment in this study suggests that the conservative approach to management of this condition was beneficial to these patients because they presented early. However, careful patient selection before commencement of treatment is advocated. Also, randomized controlled clinical trials are needed to validate this technique as a treatment option in the management of extra-capsular TMJ ankylosis.

Conflict of interest The authors declare no conflict of interest in the execution of the study and in the instruments and products used.

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