Temporomandibular Joint Ankylosis Consequent to Ear Suppuration

Rajeev Kumar · Ashutosh Hota · Kapil Sikka ·
Alok Thakar

Received: 4 May 2013 / Accepted: 18 June 2013 / Published online: 10 July 2013
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Abstract The objective of this study is to describe the complication of temporomandibular joint (TMJ) ankylosis consequent to otitis media. The method applied is prospective case series and data collection done in tertiary referral centre from April 2012 to April 2013. Case description of three adolescent male patients with unilateral TMJ ankylosis consequent to ipsilateral chronic suppurative otitis media. Further literature review of TMJ ankylosis in relation to otitis media for evaluation for predisposing conditions. Surgical treatment by ipsilateral canal wall down mastoidectomy and concurrent TMJ gap arthroplasty. Surgical exposure confirmed ipsilateral bony ankylosis in all three. Two cases with long standing trismus had developed contralateral disuse fibrous ankylosis and required bilateral gap arthroplasty. Relief of trismus achieved in all three cases. Literature review indicated three similar cases secondary to otitis media. A universal feature among all previous case reports and the current case series was the age at onset of trismus, being at 10 years or less in all. TMJ ankylosis is a rare but potential complication of paediatric ear suppuration. Dehiscence along the tympanosquamosal fissure, tympanic plate and the foraminae of Huschke and Santorini in the paediatric population may predispose to extension of tympanic suppuration to the TMJ.

Keywords Chronic suppurative otitis media · Temporomandibular joint ankylosis · Gap arthroplasty

Introduction

Temporomandibular joint (TMJ) ankylosis consequent to ear suppuration is most unusual in current times. Contemporary standard textbooks of Otorhinolaryngology do not list TMJ ankylosis among the complications of otitis media [1]. This report describes three young males with such ankylosis secondary to ear infection. Similar cases in the reported literature are reviewed and the predispositions and mechanisms for such spread reviewed.

Description of Cases

The case group includes three consecutive patients of chronic suppurative otitis media with TMJ ankylosis treated at our tertiary referral centre from April 2012 to April 2013. Data pertaining to each patient has been recorded prospectively from the time of the first inpatient admission.

The clinical characteristics and treatment details of all three patients are summarized in Table 1. All patients were male adolescents with ages ranging from 12 to 18 years. Ear suppuration preceded trismus in every case by periods of 1–5 years. The age of onset of trismus ranged from 1 to 10 years, and the one patient with early onset trismus also had secondary effects of mandibular retrusion, dental malocclusion and facial asymmetry.

Radiological evaluation indicated ipsilateral bony ankylosis of the TMJ in all three patients (Fig. 1). The pre-operative inter-incisor distance ranged from 0 to 4 mm (Table 1).

All patients underwent canal wall down mastoidectomy for clearance of the ear disease, and ipsilateral TMJ exploration with condyloidectomy for ankylosis release (Table 1). Cases 1 and 3 had suffered very long term

R. Kumar · A. Hota · K. Sikka · A. Thakar (✉)
Department of Otolaryngology & Head-Neck Surgery, All India
Institute of Medical Sciences, New Delhi 110029, India
e-mail: drathakar@gmail.com

Table 1 Summarizing all three cases

Patient no.	1	2	3
Age/sex	18/M	12/M	15/M
Duration of ear suppuration	13 years	3 years	9 years
Duration of trismus	10 years	2 years	8 years
Laterality	Left	Right	Right
ASOM/CSOM	CSOM	CSOM	CSOM
TMJ status	Bony ankylosis	Bony ankylosis	Bony ankylosis
Trismus	Present	Present	Present
Inter-incisor distance (pre-operative) (mm)	0	4	3
Surgical procedure	Left mastoidectomy with bilateral condyloidectomy	Right MRM with Rt. condyloidectomy	Right radical mastoidectomy with bilateral condyloidectomy and coronoidectomy
Inter-incisor distance (post-operative) (mm)	17	32	15

Fig. 1 Reconstructed image showing left sided complete canal stenosis, large condylar process and severe ankylosis

trismus for durations of 10 and 8 years respectively and also required additional contralateral TMJ condyloidectomies for the secondary disuse fibrous ankylosis of the contralateral joint.

Surgical Procedure

The patients were taken up for mastoid exploration with TMJ ankylosis release. Surgical access was via a Heerman's C incision (combined post-aural and endaural incision—Fig. 2) for ipsilateral diseased ear and TMJ so as to expose the tympano-mastoid area, zygomatic process, glenoid fossa, and TMJ in all cases and anterior question mark incision for contralateral TMJ in two cases. An initial canal wall down mastoidectomy was done in all cases along with complete disease clearance. The canal wall down mastoidectomy was supplemented with a conchoplasty and a meatoplasty.

The fused TMJ-zygomatic arch complex was then exposed and the periosteum over the same elevated. Two

Fig. 2 Schematic representation of Heerman's incision a, b, c **Fig. 3** Showing left condyloidectomy and left internal maxillary artery after condyloidectomy

horizontal and parallel bony cuts were made through the full thickness of the ankylosed complex, and a 8–10 mm block of bone removed to create a mobile joint space (Fig. 3). An improvement in trismus resulted, but this was

Table 2 Summarizing previously reported case of TMJ ankylosis consequent to ear pathology

Case no.	Age (year)/sex	Age at onset of ear pathology	Duration of trismus	Ear pathology	Ref.
1.	6/F	15 months	35 months	ASOM	Faerber et al. [2]
2.	7/F	2 years	60 months	Acute mastoiditis	Wetted et al. [8]
3	21/M	5 years	15 years	CSOM	Kim et al. [9]

not complete in case 1 and 3 and it was therefore judged that the contra-lateral TMJ too had probably developed a disuse fibrous ankylosis. Exploration and condyloectomy of the contralateral TMJ was thus undertaken in case 1 and 3. Also in case 3, bilateral coronoidectomy was performed to achieve immediate and significant mouth opening.

Appropriate physiotherapy and mouth opening exercises were initiated in the immediate post-operative period so as to maintain the correction and prevent re-ankylosis at the joints.

Post-operatively significant mouth opening was achieved in all patients. The post-operative inter-incisor distance was 1.7, 3.2 and 1.5 cm, respectively. In the follow-up period, there was no recurrence of TMJ ankylosis.

Discussion

TMJ ankylosis in current era is almost exclusively caused by trauma [2, 3]. TMJ suppuration is unusual and generally noted in association with immunosuppressive conditions [4]. Involvement of the TMJ space by effusion or abscess secondary to otitis media has been very occasionally reported [5–7], but the progression of such initial involvement to TMJ ankylosis is most unusual and outside the experience of contemporary otolaryngologists. A Pubmed and Google search for TMJ ankylosis secondary to ear suppuration yielded three such possible cases as reported in the otolaryngology and maxillofacial literature (Table 2)[2, 8, 9].

Infection of the middle and external ear space may spread to the TMJ through three potential routes (a) a dehiscence squamotympanic fissure; (b) congenital dehiscence in the cartilaginous EAC (Santorini's fissure); and (c) patency or failure of closure of Huschke's foramen in the bony EAC [10, 11].

The squamotympanic fissure in the temporal bone may often remain open as it extends medially into the tympanic cavity and divided into petrotympanic and petrosquamosal fissures by the presence of tegmen tympani [2]. Also the tympanic plate separating the joint space from middle ear may have incomplete or delayed ossification resulting in potential route to the spread of ear infection. Tympanic plate ossification completes approximately around 5 years of age. However incomplete ossification presenting as tiny

perforation in the central part of tympanic plate has been noted consistently below 10 years of age and approximately in 20 % of adults [12]. The foramen of Huschke's normally closes by the fifth year of life. However, Santorini's fissures are patent till late life.

The risk of infection from the middle ear to the TMJ seems therefore to be limited to early childhood. The three reported cases in the literature, along with our series, all report of ear infection in childhood.

Inflammation of the joint space and joint surfaces leads to bone erosion and periosteal reaction and subsequent scarring with consequent bony or fibrous ankylosis. TMJ ankylosis at a young age also leads to secondary effects on mandibular growth with resultant dental malocclusion, facial asymmetry and mandibular retrusion [13, 14].

The management of TMJ ankylosis is surgical [15]. The surgical techniques for its treatment include gap arthroplasty, interpositional arthroplasty and joint reconstruction [16]. Gap arthroplasty including condyloectomy with or without coronoidectomy, as undertaken in the our cases, is a simple and effective technique. The technique however runs the risk of recurrent ankylosis if vigorous post-operative physiotherapy is not employed.

This case series highlights a very unusual and forgotten potential complication of otitis media. These cases and the literature also indicate that such spread from the middle ear to the TMJ is probably seen exclusively in young children.

Conclusion

TMJ ankylosis is an unusual and rare complication of otitis media exclusively seen in young children due to patent or dehiscence anatomical barriers. Surgical management including gap arthroplasty is simple and effective for established TMJ ankylosis consequent to otitis media.

Conflict of Interest None.

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