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RESEARCH ARTICLE

RECURRENT TEMPOROMANDIBULAR JOINT ANKYLOSIS AMONG YEMENIS: A PROSPECTIVE STUDY

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Abstract

Background and aims: Recurrence of ankylosis is one of the most common complication following surgery especially during gap arthroplasty without interposition material. The main aim of these current study was to obtain a comparison between three different methods in prevent of recurrent temporomandibular joint ankylosis.
Methods: A number of 15 patients with (2-22 years) age ranged between were obtained from those attending to Al-kawait Hospital, clinic of Oral and Maxillofacial Surgery Department, Sana'a University, Yemen. All patients in the present study that have ankylosis in the temporomandibular joint (TMJ) were included in period time from March 2017 to April 2020. The temporomandibular joint ankylosis Diagnosis was obtained through history of a chief complain, medical history, clinical and radiographic examinations. All patients were divided into three groups based on the type of treatment.
Results: No any signs of surgical site infection in or around the incision. In group I: three cases of recurrence ankylosis were happened, while one case was dislodging of cartilage from harvested rib in group II. However, in group III, there were no complications observed after the end period of follow-up.
Conclusion: The most effective procedure to prevent recurrence of temporomandibular joint ankylosis was the temporalis fascia as interpositional material, also produce a good esthetic and function results.
Keywords: Interpositional material, reankylosis, TMJ ankylosis.

INTRODUCTION

The primary goals of managing temporomandibular joint ankylosis are to re-establish joint function, prevent re-ankylosis and restoration of mouth opening[1,2]. Recurrence of ankylosis is one of the most common complication following surgery especially during gap arthroplasty without interposition material[3]. Children patients more liable to recurrence of ankylosis were found when compared with adults patients[4]. According to Hegab[5] bony fragments and dust generated during surgery are unintentionally implanted into the soft tissues around the surgical field after performing the space between two osseous surfaces. Additionally, perivascular connective tissue cells are activated to differentiate into specialized osteoprogenitor cells or chondroprogenitor cells by postoperative hematoma rich in "Wandering histiocytes" or inductor cells. Progenitor cells begin to make cartilage or bone tissue at that site, which is later calcified to form mature bony tissue. A pool of receptive cells surrounded by a profusion of capillaries and advancing osteoblast fronts were also evident where bone induction occurred[6]. Re-ankylosis is caused by a combination of causes, including close approximation of the articular components and decreased joint motion as a result of the action of the atrophied muscles[5].

Growing period, physical exercises, severity of the ankylosis. amount of ankylotic mass removed, wound infection, and a foreign body reaction represent the etiological factors causing reankylosis of temporo-mandibular joint[7,8]. For many surgeons the biggest challenging surgical procedure is a treatment of TMJ ankylosis due to difficulty that encountered during the surgical techniques and high rate of re-ankylosis. Condylectomy, gap arthroplasty, interpositional arthro-plasty, mandibular distraction osteogenesis, and joint replacement with bone grafts or joint prosthesis are a variety of the surgical techniques used. But no technique has ever been approved as a novel surgical intervention[9,10,11].

The main aim of these current study was to obtain a comparison between three different methods in prevent of recurrent temporomandibular joint ankylosis.

MATERIALS AND METHODS

A number of 15 patients with (2-22 years) age ranged between were obtained from those attending to Al-kawait Hospital, clinic of Oral and Maxillofacial Surgery Department, Sana'a University, Yemen. All patients in the present study that have ankylosis in the temporomandibular joint (TMJ) were included in period time from March 2017 to April 2020. The temporomandibular joint ankylosis Diagnosis was obtained through history of a chief complains, medical history, clinical and radiographic examinations by computerized tomography (Figure 1).

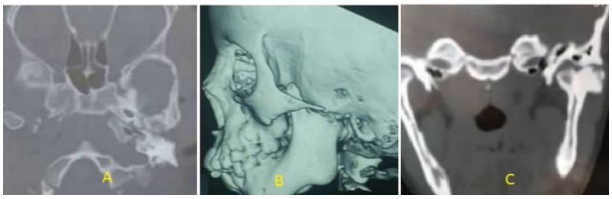

Figure 1: Showing left condylar reankylosis. A: Axial view; B: 3D; C: Coronal view.

Before the scheduled surgery the diagnosis and surgical procedure explained to the patients and the parents, a written informed consent was obtained.

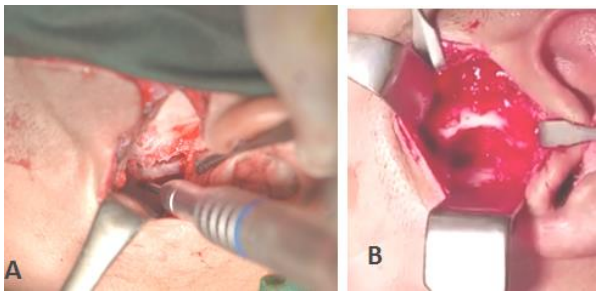

Figure 2: A. Removal of ankylotic mass by osteotomy cut; B. A gap more than 10 mm.

In these present studies the Ethical approval was obtained from the Research Ethics Committee of the Faculty of Dentistry, Sana'a University, Yemen prior to the study under number of 5/2-3-2017. A number of three groups were divided of included Patients based on type of surgical procedure.

Group I: patients treated only by gap arthroplasty alone.

Group II: patients treated with gap arthroplasty and costochondral grafting utilized as an interpositional material.

Group III: patients treated with gap arthroplasty and temporalis fascia as interpositional material.

Five patients were obtained for each group, scheduled for gap arthroplasty and preauricular incision was done for all patients of all groups. The wound healing was followed up clinically twice a week for two weeks and radiographically at intervals of two weeks and six months using CT.

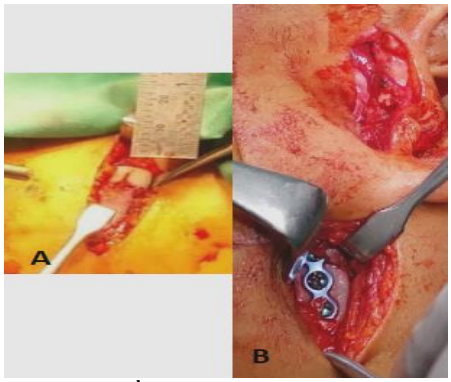

Figure 3: A. harvested of 6th rib; B. fixation with mini plate and screw.

Instruct patients to aggressive exercise immediately after surgical procedure and follow-up every three months until the end of the two years under general anesthesia with nasoendotracheal intubation or retrograde intubation or tracheostomy performed for all of the surgical procedures. The surgical field was scrubbed and draped to isolate operative site in routine way. For all groups the preauriculartmj approach was preformed to removal ankylotic mass and making a gap more than 10mm by using surgical burrs, chisel and mallet and ipsilateral sidecoronoidectomy to enable patients to achieve mouth opening more than 35mm (Figure 2).

In group I: after excision of ankylotic bony mass and ipsilateralcoronoidectomythe interincisal opening increased. Finally, copious irrigation and suturing in layers.

In group II: after removal of ankylotic mass, the costochondral graft harvested from the 6th rib approximately 6 cm of bone with cartilage. The patient

should be placed in intermaxillary fixation, then the retromandibular approach was done in the ipsilateral side to facilitate the fixation of rib into its position. (Figure 3). Finally, copious irrigation and suturing to cover all incision in layers.

Figure 4: Harvested of temporalis fascia into gap between fossa and mandible.

In group III: after removal of ankylotic mass, Al-khayat and Bramley incision was done to exposure the temporalis fascia. Then fascia was harvested and secured between the gaps created by suturing to the adjacent tissues (Figure 4).

Finally, in all groups, copious irrigation, the wound was closed in layers and a pressure dressing applied. physiotherapy was started immediately after the operation and it was advised to continue for at least two years. Patients were encouraged to be discharged from the hospital on the seventh postoperative day after removal of skin sutures.

RESULTS

Current study was carried out on 15 patients. Details of age, gender and surgical procedure are distributions in Table 1. The main causative factor for ankylosis in all patients was Traumatic injury. While the etiological factor of recurrence was unknown. According to type of surgical procedure, 15 patients were divided into three groups.

Table 1: Summary of the age, sex, and surgical procedure.

Age	Sex		Surgical procedure		
	Male (%)	Female (%)	Gap arthroplasty	Gap arthroplasty and costochondral graft	Gap arthroplasty and temporalis fascia
2-5	3 (20)	1(6.67)	2	1	1
6-12	5(33.33)	3(20)	2	3	3
13-22	2(13.33)	1(6.67)	1	1	1

In all patients, the surgical wounds healed spontaneously without any signs of surgical site infection and after surgery the patients showed no signs of complications such as facial nerve paralysis, infection, hematoma, and others. All patients underwent rigorous physiotherapy exercises immediately after the operation. Satisfactory results achieved were 35 mm interincisal opening in all cases intraoperatively. These results were stable after the first year. However, in the final of the second year confirmed the results with no recurrence of ankylosis except three cases in group I, the maximum mouth opening was less than 10 mm. While, in group II, one case had dislodged of cartilage from harvested rib, and then fixed with stainless steel wire (Figure 5).

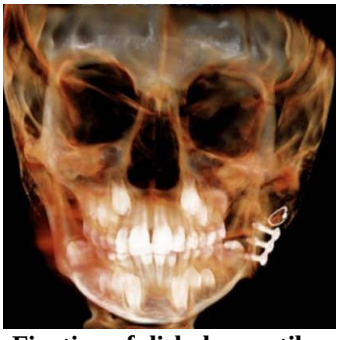

Figure 5: Fixation of dislodge cartilage by wire.

DISCUSSION

The most common complication occur after surgical intervention for management of ankylosis is recurrence temporomandibular ankylosis. This was in accordance with Chossegros *et al.*,[12]. However, this was in opposition to Liu *et al.*,[13], proposed that the facial nerve injury is the most common complication. There are many etiological factors that play role in recurrent temporomandibular joint ankylosis to avoid recurrence of ankylosis, it is essential to radical removal of the TMJ bone[14]. On the other hand, the prevent recurrence of temporomandibular joint depend on type of interpositional material and early physiotherapty[12].

Moreover, some conditions such as recurrent TMJ operations, severe ossification, and soft tissue fibrosis increase the risk of reankylosis[15]. In heterotopic ossification, progenator cells are induced to differentiate into fibroblasts which will produce collagen fibers, chondroblasts which will produce cartilage and osteoblasts which will produce bone. This leads to reankylosis of the articulation between the two bony surfaces with an increase in pain and progressive limitation in mouth opening[16]. In current study, intensive physiotherapy started immediately after the operation and continued for 2 years with parents instructed to follow up every three months to prevent recurrence. This agreement with Mishra *et al.*,[17] who reported early physiotherapy after surgery, strict follow-up is necessary to prevent adhesions after surgery. High rate of recurrence with gap arthroplasty alone was reported, and the result of this operation was mouth deviation[18]. The current study recorded three cases have reankylosis with gap arthroplasty alone. In the current study, the costochondral graft is the most widely accepted autogenously technique especially in children which provides growth potential, biological

compatibility, a cartilaginous articulating surface and decrease the incidence of reankylosis. However, the option of harvesting a rib graft had precluded due to lack of parental acceptance and consent on that method. This agreed with MacIntosh[19] and Sharma *et al*.,[20]. However, it was contradicting the study of Balaji[21] who reported care should be taken to ensure a satisfactory postoperative functional therapy results and in young patients much care to examine the role of amount thickness of cartilage on future growth to ensure a normal growth pattern, as it considered as secondary growth center at that site.

Unfortunately, in this study there was one case in group II presented with dislodge of cartilage from harvested rib, and as stated by Baek and Song[22] and Mishra *et al.*,[10] many complication are occlusion changes with time, possibility of cartilage separated, infection and reankylosis has been reported in 5-39%.

In the present study, the fascia of the temporalis muscle are autologous nature; Least immune reactive against it, proximity to the surgical field near the joint, allowing excellent movement and coverage of bony gap, morbidity to the donor site is minimized for both cosmetically and functionally, minimal injury to the temporal branch of the facial nerve, good tolerance and blood supply, not evident of hollowing in the temporal area, minimal amount of blood loss intraoperatively, low friction, good stability at the surgical gap and prevent chance of recurrent ankylosis. This agreed with those of Bajpai and Saikrishna[23] and Suday *et al.*,[24].

Limitations of the study

For these patients with limited mouth opening lack of fiberoptic for general anesthesia as it is too expensive for the hospital considered as critical limitation for anesthesia. Lack also of nickel titanium (ni-ti) cad cam 3d milling machine for joint replacement option of treatment, the parental acceptance and, consent on harvesting a rib graft had precluded that option and difficulty in follow up as the lack of cooperation or difficulty in some patients to come again because they live in faraway cities or village.

CONCLUSIONS

There are many methods can be used to prevent recurrent reankylosis of temporomandibular joint depend on removal of large amount of ankylotic mass, early aggressive and longer time of physiotherapy and place of interpositional material. The most effective procedure to prevent recurrence of temporomandibular joint ankylosis was the temporalis fascia as interpositional material, also produce a good esthetic and function results and to avoid complication which occurs with costochondral graft.

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AUTHOR'S CONTRIBUTIONS

Da'er SAA: writing original draft, methodology, surgical procedure, supervision. **Farhan AH:** editing, methodology, formal analysis. **Nasher AT:** formal analysis, conceptualization. **Alareqi NR:** methodology, investigation. **Juain AA:** review, conceptualization. All the authors approved the finished version of the manuscript.

DATA AVAILABILITY

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest associated with this work.

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