

COMPARISON OF GAP ARTHROPLASTY AND INTERPOSITIONAL GAP ARTHROPLASTY ON THE TEMPOROMANDIBULAR JOINT ANKYLOSIS

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Abstract- Temporomandibular joint ankylosis causes limitation in mouth opening and establishes severe deformity and asymmetry in patient's face, especially in children. Surgery is the only treatment. This study was conducted to compare the effect of two surgical approaches, gap arthroplasty and interpositional gap arthroplasty, on rate of maximum interincisal opening in temporomandibular joint ankylosis. We also evaluated the relapse rate of these two surgical approaches. A total of 48 patients were enrolled in this cross-sectional experimental study. Range of mouth opening was evaluated before and during and one year after surgery. All other related information was also recorded. Mean age of the study population was 19.5 ± 8.9 years. Of those, 21 (41%) were male and 27 (59%) were female. For 26 patients (54.2%) interpositional gap arthroplasty was accomplished and for 22 patients (45.8%) gap arthroplasty was performed. Mean range of mouth opening before and after surgery was 10.3 ± 3.9 and 33.9 ± 5.2 in interpositional gap arthroplasty, 8.7 ± 4.9 and 32.1 ± 7.8 in gap arthroplasty, respectively. The results showed that the range of mouth opening significantly increases after ankylosis surgery in both surgical approaches but improvement was less in interpositional gap arthroplasty. In regards to recurrence, results of interpositional gap arthroplasty were superior to gap arthroplasty.

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Key words: Ankylosis, temporomandibular joint, gap arthroplasty, interpositional gap arthroplasty, maximum interincisal opening

INTRODUCTION

Temporomandibular joint is one of the most important and sensitive joints in of human body. Its injuries and infections can cause many problems and complications for the patient. One of these

complications is ankylosis which occurs following trauma or infection that causes the mandible to get fuse to the base skull (1). This complication results in gradually decreasing mouth opening down to 5 mm, or less. Obviously, inability to open the mouth in long term can cause serious problems for the patient, including problem in nutrition, oral hygiene and problem in normal facial growth which results in facial asymmetry (especially in children) and sometimes is followed psychological problems (2).

The definitive treatment of ankylosis is surgery, which sometimes is followed by relapse. On of the primary surgical approaches was "condylectomy" through which the condyle is removed in accordance

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with the ankylosed bony callus. There is a high incidence of relapse (reankylosis) with this approach (3). Surgeons offer many newer surgical approaches to solve this problem, restore the function of the condyle and minimize the occurrence of relapse (4).

One of these approaches is osteoarthrotomy which is accomplished in two ways: gap arthroplasty (GA) and interpositional gap arthroplasty (IPGA) (5). In the first approach, an approximately 1 cm gap is made between the two bony segments (ramus of mandible and base of skull), but nothing will placed in this gap. In the second approach materials like vital graft (muscular fascia, skin, cartilage, *etc*) is placed in the gap. The advantages of the latter are decreasing the incidence of relapse and maintaining the length of condylar and ramus area. It is important to remember that the factors affecting the incidence of relapse are: 1) technique of surgery; 2) inadequate intraoperative maximum interincisal opening (< 35 mm) and 3) neglecting postoperative physiotherapy. In this study these three factors were noticed. Our purpose was comparison of relapse and change in rate on maximum interincisal opening between GA and IPGA approaches.

MATERIALS AND METHODS

This study was performed on patient's with temporomandibular joint ankylosis in oral and maxillofacial ward in Shariati Hospital from October 2000 up to the end of June 2004. The samples were all of the patients whom were operated on due ankylosis. We obtained informed consent from all patients.

A total of 48 patients were chosen and enrolled in this study. The documents of all these patients were evaluated and preoperative findings were recorded. This findings included personal information, etiology of ankylosis, the side of effected condyle, duration of involvement, date of operation, technique of surgery, preoperative, intraoperative and postoperative maximum interincisal opening which were measured with calipers.

The mean values of maximum interincisal opening in preoperative, intraoperative and

postoperative and also at time of follow up was calculated and were compared by Friedman test and Paired test.

The mean of maximum interincisal opening between the different groups of age and sex were compared by *t* test ANOVA test.

RESULTS

The mean age of samples was 19.5 ± 8.9 years. Twenty-one patients (41%) were male and 27 patients (59%) were female. The etiology of ankylosis was trauma in 32 patients (67%), congenital in 9 patients (17%), infection in 3 patients (6%) and other unusual causes in 4 patients (10%). Temporomandibular joint ankylosis was unilateral in 44.5% of patients (14% right, 31.5% left). The mean duration of temporomandibular joint ankylosis was 8.4 ± 7.6 years. The mean of preoperative maximum interincisal opening was 10.7 ± 4.8 mm (table 1).

For 26 patients (54.2%) IPGA was accomplished and for 22 patients (45.8%) GA was performed. Only 3 patients had systemic disease which had no relation to temporomandibular joint ankylosis or surgery. For all the patients post operative physiotherapy was performed.

The mean duration of follow up was 4.9 years. In time of follow up visit maximum interincisal opening was 33 ± 6.5 mm. Tables 2 and 3 demonstrate results of pre-inter-postoperative (follow up visit) measurements of mean of maximum interincisal opening regarding the sex and surgical technique. Success and recurrence rates of two above mentioned surgical techniques are shown in table 3.

Table 1. Maximum interincisal opening (mm) before and after operation in different sides*

Timing	Bilateral	Left	Right
Preoperative	8.9 ± 5.1	10.3 ± 2.1	11.7 ± 4.5
Intraoperative	37.1 ± 5.5	34.6 ± 2.2	39.6 ± 4.2
Postoperative	37.4 ± 7.6	34.1 ± 3.4	37.1 ± 4.9

Abbreviation: MIO, maximum interincisal opening.

* Data are given as mean \pm SD.

Table 2. Maximum interincisal opening (mm) before and after operation in different surgical techniques*

Timing	IPGA	GA
Preoperative	10.3 ± 3.9	8.7 ± 4.9
Intraoperative	36.5 ± 4.5	36.9 ± 5.3
Postoperative	33.9 ± 5.2	32.1 ± 7.8

Abbreviations: MIO, maximum interincisal opening; IPGA, interpositional gap arthroplasty; GA, gap arthroplasty.

* Data are given as mean ± SD.

DISCUSSION

In 2002 a study was accomplished by Piero and co-workers through which 4 patients were operated on via IPGA using temporalis fascia (6). Coincidentally interoral osteodistraction was used in order to increase the length of the effected ramus. Duration of follow up was 12 months, through which maximum interincisal opening was approximately 35 mm. In 1996 another study was accomplished by Molla and co-workers (7). In that study, 14 patients were selected. On 4 patients condylectomy was achieve. The result of surgery in 3 patients was poor and in one of them was moderate. On 4 patients were poor and in one of them was moderate. On 4 other patients IPGA was performed, using ear cartilage between gap. The result of surgery in 2 patients were excellent, in one of them was moderate and in the other was poor. IPGA were accomplished for the remaining 6 patients using temporalis muscle fascia. The results of surgery in 5 patients were excellent and in the other was poor.

In a research performed by by Valentini and co-workers in 2002, 60 patients (25 female, 35 male) with average age of 30 years were chosen (8). There were 21 bilateral ankylosis; 21 right unilateral ankylosis and 19 left unilateral ankylosis. In this study the etiology was trauma in 48 cases and

infection in 5. In 7 cases an autoimmune response was suspected. For 36 patients GA was performed and the remaining underwent IPGA, in which in 10 cases temporalis muscle fascia, in 11 cases Silastic block and in 2 cases lyophilized dura were used. During follow ups in 12-24 and 48 months later, only 7 postoperative relapses was found, which all belong to GA. In 5 cases Silastic had to be removed due to infection. The researchers offered IPGA using temporalis muscle fascia as the best approach.

The main goal of present study was to evaluate and assess the success of gaining adequate maximum interincisal opening after the two described surgical approaches to make a comparison between these two, to introduce the best approach with minimum relapse and to standardize a surgical approach for patients being managed in centers of education and treatment.

In this study, postoperative maximum interincisal opening was significantly improved postoperatively compared to preoperative time. In all other studies ankylosis treatment by surgery had been of great success in approximately all the cases (9). According to textbooks, the success of surgery has no relation to the sex (similar to this study). Also in this study like other studies there were no meaningful correlations between the success of treatment and occupation, etiology of ankylosis and the side affected. According to our findings, the success of IPGA is greater than GA which is similar to the result of Valentini.

On the basic of result of the present study we suggest these recommendations: 1) because ankylosis can cause functional and esthetic problems due to impairment of normal growth in affected side with time, surgery for treatment of ankylosis should be done once ankylosis was diagnosed, and 2) this point must be considered: rate of maximum interincisal opening during operation is more important than the type of surgical technique, which must be at least 35 mm. The major cause of failure in treatment or "reankylosis" is little intraoperative maximum interincisal opening.

Conflict of interests

We have no conflict of interests.

Table 3. Comparison of success and recurrence rate in different surgical techniques*

Result	IPGA (n = 26)	GA (n = 22)
Success rate	20 (41.7%)	12 (25.0%)
Recurrence rate	6 (12.5%)	10 (20.8%)

Abbreviations: IPGA, interpositional gap arthroplasty; GA, gap arthroplasty.

* Data are given as number (percent).

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