

Original Article

TMJ function after partial condylectomy in active mandibular condylar hyperplasia

Sergio Olate^{1,2}, Felipe Martinez¹, Francisca Uribe¹, Leandro Pozzer³, Lucas Cavalieri-Pereira³, Marcio de Moraes³

¹Division of Oral and Maxillofacial Surgery, Universidad de La Frontera, Chile; ²Center for Biomedical Research, Universidad Autónoma de Chile, Chile; ³Division of Oral and Maxillofacial Surgery, State University of Campinas, Brazil

Received January 19, 2014; Accepted February 22, 2014; Epub March 15, 2014; Published March 30, 2014

Abstract: Condylar hyperplasia is a frequent pathology that causes severe facial asymmetries. The partial condylectomy generally halts the disease. The aim of this research was to examine post-condylectomy TMJ function; 14 patients were included in this study, 6 male and 8 female. The average age was 21 years old. In all, the partial condylectomy was performed with preauricular or endaural access and the osteotomy were performed with drills, saw or an ultrasonic system. The patients were assessed with 3 or more time after surgery and were considering maximum mouth opening, right and left lateralities, presence of pain, noises, alterations in the facial nerve (VII) and esthetic alteration from the scar. The analysis was performed with the visual analog scale (VAS) and with a 7 cm metallic rule. Data analysis was descriptive plus chi-square test considering p value < 0.05 for statistical differences. With an average of 11 month after surgery, the results showed that the open mouth (over 35 mm) and lateralities (average 9 mm for the both right and left side) were normal and without statistical differences between the right or left side. Noise was observed in 3 patients and pain was observed in two patients with level 2 and 1 (VAS score). Scar was not related to problem with patient and the temporal branch of facial nerve was observed with limitations but without problem for patients. It can be concluded that the condylectomy is a safe and effective procedure with low morbidity for patients.

Keywords: Condylar hyperplasia, TMJ, facial asymmetry

Introduction

Condylar hyperplasia is a recurrent pathology that frequently causes facial asymmetry [1]. It is estimated that almost 30% of patients with facial asymmetry exhibit active condylar hyperplasia [2], which determines the need for the partial removal of the upper segment of the mandibular condyle.

The condylectomy has been used to manage this disease with for some surgeons [3]; although there have been variations in the surgical technique [4], the surgery has essentially not modified substantially. The technique consists of a preauricular or endaural access that reaches the mandibular condyle in order to then perform the condylar osteotomy, removing the upper segment [5].

The surgery is currently performed without complications and with techniques that optimize the procedure [4]; however, postoperative TMJ function has been a matter of limited research [6].

The few studies show good results without complication [7, 8], whereas others have indicated postoperative complications such as pain and TMJ dysfunction [9]. The aim of this study was to identify the conditions that patients present who undergo a condylectomy.

Materials and methods

This study was conducted in the Oral and Maxillofacial Surgery Division of the Universidad de La Frontera, Temuco, Chile. All of patient signed a consent informed protocol and the

TMJ function in mandible condilectomy

Table 1. Distribution of 14 patient with condilectomy and his situation in relation to function of mandible

Patient	Age	Sex	Time from surgery (month)	Side of condilectomy	Open mouth (mm)	Right laterality (mm)	Left laterality (mm)
1	24	m	14	Left	35	8	6
2	18	m	15	Right	35	7	8
3	17	f	24	Left	38	12	12
4	25	m	5	Left	42	12	13
5	24	f	19	Right	36	9	7
6	17	f	3	Right	43	4	5
7	21	f	3	Right	44	10	7
8	16	f	3	Right	42	12	10
9	20	m	12	Right	40	11	12
10	24	m	11	Left	38	9	10
11	18	f	7	Left	42	9	10
12	30	m	13	Right	44	9	11
13	21	f	17	Right	36	10	12
14	22	f	8	Right	39	6	9
$\bar{X} \pm SD$	21.2 ± 3.9		11 ± 6.51		39.6 ± 3.29	9.14 ± 2.38	9.43 ± 2.50

X = Average; SD = Standard Deviation; m = Male; f = Female.

ethical committee of Universidad de La Frontera approved this research with number 066/13. 14 consecutive patients, 6 male and 8 female, were studied. Patients included were between 16 and 30 years of age diagnosed with condylar hyperplasia determined by cone beam CT analysis and by SPECT study, which showed a percentage difference with more than 10% in the uptake between both condyles. The diagnosis and treatment of the cases was based on the protocol previously published by Olate [6].

The surgical protocol was realized with the conventional approach with preauricular or endaural access. The surgical layers were followed in routine fashion until arriving at the condylar neck, where an incision was made in the capsule that enabled observation of the head of mandibular condyle. Then, the condyle was detached to measure and position the place to perform the osteotomy. At this point, the cut was made with a reciprocating saw, surgical drill or piezoelectric system to obtain an adequate and accurate osteotomy. The condylar fragment was subsequently removed and the articular disc repositioned without suturing or capturing it. The surgical access was closed in layers up to skin level. All the cases in this study were operated on by two surgeons to control the variable operator.

The patients were hospitalized for 24 h or less and after 10 days from surgery, began with

physiotherapy to mobilize the jaw and facial muscles in order to restore mandibular function early; physiotherapy was maintained for 7 to 13 sessions according to the case. The physiotherapy was performed by 3 different professionals.

The patient was assessed according to the study variables: i) measurement in millimeters of the maximum mouth opening (7 cm metallic rule), ii) right and left laterality, and iii) protrusion. The presence of postoperative joint pain was also assessed (visual analogue scale), as was the presence of joint noises (with examination of mandible mobility and bilaterally palpation of tmj) and the function of the facial nerve in its zygomatic and temporal branch (0: without limitation; 1: minor limitation; 2: middle limitation; 3: severely limitation or no movement). The surgical scar was studied with questions directed by an operator different from the team who performed the surgery. The variables were studied using SPSS 20.0 (Chicago, USA) using ANOVA and chi-squared, considering statistical significance when $p < 0.05$.

Results

The patients were operated without complications. The surgical time was estimated between 60 and 90 minutes, progressively decreasing the surgical time from the first surgery. The hospital stay was 24 hours or less in 12 of the

TMJ function in mandible condilectomy

Table 2. Distribution of 14 patients with condilectomy in relation to condition of facial nerve, pain and tmj noise

Patient	Age	Time from surgery (month)	Pain (0 to 10)	Noise in function	VII Function
1	24	14	0	None	1
2	18	15	0	None	1
3	17	24	0	None	0
4	25	5	0	None	0
5	24	19	0	None	2
6	17	3	2	None	2
7	21	3	0	Crepitus in open mouth process	1
8	16	3	1	None	0
9	20	12	0	None	0
10	24	11	0	None	1
11	18	7	0	None	1
12	30	13	0	Crepitus in open and close mouth process	2
13	21	17	0	None	3
14	22	8	0	None	0

cases and was 12 hours or less in two cases; these last two cases were done on an outpatient basis.

The patient shows a follow-up from 3 to 24 months with an average of 11 ± 6.51 months. The age was between 16 and 30 years old with 6 male and 8 female. In terms of mandibular dynamics, an average of 39.6 mm (± 3.29 mm) in maximum opening was observed. The laterality was observed with 9.14 mm (± 2.38 mm) to the right side and 9.43 mm (± 2.50 mm) to the left side without statistical differences ($p > 0.05$) (**Table 1**).

None of the patients had pain at time of evaluation; with the VAS score was observed interpretations 2 in one patient and 1 in two patients; none of patient present any comments about pain in daily activities. TMJ noises of the operated condyle were present in 3 patients (21.4%) with crackles in the opening movement or crepitus in open and close movement; however, this condition was not related to pain.

The scar was not significant for any of the patients; no patient reported esthetic changes due to the incision. The function of the facial nerve was observed with mayor complications when compared with the other analysis in this research. In the 64.2% of the cases was observed some complications, all of them related to temporal branch; in one patient was

observed total limitation, in 3 patient moderate limitation and in 5 patients minor limitations. For patients, this condition was not relevant for daily. No limitations of zygomatic branch were observed at the time of evaluation (**Table 2**).

Discussion

Joint function is relevant in every aspect of orofacial stability. Few investigations have studied post-condylectomy joint function, which limits comparison with our results [6]. From a morphological point of view, a condyle with hyperplasia undergoes significant modifications including the condyle, the articular fossa and coronoid process being integrally affected by the disease and determining the growth of the entire mandible structure [10]. This anatomic condition may be the first factor for intervening in alterations of preoperative and postoperative tmj function.

From the functional point of view, the mandibular dynamic is maintained with no significant changes when the high condylectomy is performed [5, 7]. Brusati [8] determined in a follow-up study of 15 patients who underwent a high condylectomy that they presented no significant differences between the pre- and postoperative stages in either the objective or subjective evaluations, indicating excellent function in 53.3%, good function in 40% due partially to the reduced laterality of the affected side, whereas in one patient (6.7%) presented a suf-

ficient function because this patient abandoned the physiotherapy that is the protocol for patients in the postoperative stage.

Our results observed adequate mouth opening (over 35 mm) with no significant restrictions and adequate laterality. One complication observed postoperatively is the decrease in the vertical dimension of the operated side of the mandible, which causes immediate premature contact in the ipsilateral molars, resulting in a contralateral open bite. Treatment with arch bars and elastics associated to compensatory or corrective orthodontics in conjunction with orthognatic surgery are possible alternatives in these cases [11, 12].

Saridin [9] observed that patients undergoing a condylectomy for condylar hyperplasia with an average follow-up of 4.6 years presented no differences in disc displacement or myofacial pain compared to patients without condylar hyperplasia; however, the patients who underwent surgery had higher rates of TMJ osteoarthritis, which could be linked either to the nature of the disease or to the surgical procedure. Nevertheless, this clinical condition did not affect the daily activities of the patients studied. In our patients it was not possible to observe characteristics of osteoarthritis, perhaps due to the short follow-up time, but we confirmed normal mandibular function in terms of dynamics and daily life conditioners. Saridin [9] also reported that there were no depression-type changes in the patients after the condylectomy, which means the surgery carries no risk of causing depression in the postoperative stage.

In the same direction, Lippold [7] followed 6 patients with condylectomy for 2 years without functional changes or complications in daily life. Brusati [8] performed a condylar osteotomy in conjunction with orthognatic surgery in 15 patients; in every case intermaxillary fixation was used for 10 days and joint function was assessed after 4.5 years, showing a mouth opening over 40 mm and lateralities with differences of 0.5 to 1 mm in 14 of the 15 patients. In our patients the laterality not present statistical difference showing that in this short follow-up, the condylar dynamic is normal and without pain.

Important findings in our research are the absence of pain and the absence of joint noise;

the VAS score performed for this study showed values of 2 and 1 level in three patients, demonstrating that the postoperative pain is not a problem for this surgery. For other hand, Brusati [8] indicated that 1 patient presented joint noise and only 3 patients had slight pain in function.

One point that has not been sufficiently analyzed in the international literature is the function of the facial nerve (VII), which did not exhibit any significant sequelae in our patients. Where neuropraxia was indeed present, it was possible to improve the clinical conditions in all the patients. However, 9 patients presented limitations of the temporal branch of the facial nerve (VII); when zygomatic branch was involved in neuropraxia, the initial protocol with physiotherapy was sufficient for improve this function showing without problem after 3 month. The temporal branch was present with minor limitations for most patient and mayor limitations were observed in one patient; even so, for this patients was not problem in his daily activities.

Finally, we conclude that the condylectomy is a safe procedure with minor mobility. For these patients series, the potential complications are related to the temporal branch of facial nerve and not for mandible dynamic or pain after surgery.

Disclosure of conflict of interest

The authors declare that they have no competing financial interests.

Address correspondence to: Dr. Sergio Olate, Facultad de Odontología, Universidad de La Frontera, Claro Solar 115, 4to Piso, Oficina 20, Temuco, Chile. Tel: (56) 45-2325000; E-mail: sergio.olate@ufrontera.cl

References

- [1] Olate S, De Moraes M. Deformidad facial asimétrica. Papel de la hiperplasia condilar. *Int J Odontostomatol* 2012; 6: 337-347.
- [2] Olate S, Almeida A, Alister JP, Navarro P, Duque Netto H, De Moraes M. Facial asymmetry and condylar hyperplasia: considerations for diagnosis in 27 consecutives patients. *Int J Clin Exp Med* 2013; 6: 937-41.
- [3] Norman J, Painter D. Hyperplasia of the mandibular condyle. *J Maxillofac Surg* 1980; 8: 161-75.
- [4] Olate S, Unibazo A, Almeida A, De Moraes M. Mandibular condylectomy revisited: technical

TMJ function in mandible condilectomy

- notes concerning the use of an ultrasonic system. *J Oral Maxillofac Surg* 2014 Mar; 72: 481-4.
- [5] Wolford LM, Mehra P, Reiche-Fischel O, Morales-Ryan C, García-Morales P. Efficacy of high condylectomy for mangement of condylar hiperplasia. *Am J Orthod Dentofacial Orthop* 2002; 121: 136-51.
- [6] Olate S, Duque Netto H, Rodriguez-Chessa J, Alister JP, Albergaria-Barbosa JR, de Moraes M. Mandible condylar hyperplasia: a review of diagnosis and treatment protocol. *Int J Clin Exp Med* 2013; 6: 727-737.
- [7] Lippold C, Kruse-Losler B, Danesh G, Joos U and Meyer U. Treatment of hemimandibular hiperplasia: the biological basis of condylectomy. *Br J Oral Maxillofac Surg* 2007; 45: 353-360.
- [8] Brusati R, Pedrazzoli M and Colletti G. Functional results after concylectomy in active laterognathia. *J Craniomaxillofac Surg* 2010; 38: 179-184.
- [9] Saridin C, Gilijamse M, Kuik D, te Veldhuis E, Tuinzing D, Lobbezoo F and Becking A. Evaluation of temporomandibular function after high partial condilectomy because of unilateral condylar hyperactivity. *J Oral Maxillofac Surg* 2010; 68: 1094-1099.
- [10] Olate S, Cantin M, Alister JP, Uribe F, Navarro P, Olate G, De Moraes M. Relación entre el tamaño condylar y la asimetría facial transversal en individuos con hiperplasia condylar. *Int J Morphol* 2013; 31: 937-941.
- [11] Villanueva-Alcojol L, Monje F and González-García R. Hyperplasia of the mandibular condyle: clinical, histopathologic, and treatment considerations in a series of 36 patients. *J Oral Maxillofac Surg* 2011; 69: 447-455.
- [12] Wolford LM, Mehra P, Reiche-Fischel O, Morales-Ryan C and García-Morales P. Efficacy of high condylectomy for mangement of condylar hiperplasia. *Am J Orthod Dentofacial Orthop* 2002; 121: 136-151.