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RESEARCH ARTICLE

DOES ENDOSCOPIC ASSISTED OPEN REDUCTION AND INTERNAL FIXATION OF CONDYLAR FRACTURES RESULT IN LESSER PAIN AND EDEMA THAN CONVENTIONAL RETROMANDIBULAR APPROACH?

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ABSTRACT

Background: endoscopic assisted open reduction and internal fixation (EAORIF) viatransoral incision was introduced as alternative to the traditional retromandibular approach with least intra, early and long term complications. The intraoperative and long term complications such facial nerve injury and facial scar respectively was proved to be less likely with EAORIF. However, the early complications in terms of edema and pain were not compared.
Aim: The current study aimed to compare EAORIF versus conventional ORIF regarding early postoperative complications interms of pain and edema.
Methodology: 12 patients suffering unilateral extracapsular condylar fractures were included in our study. Patients were divided in to two groups according to surgical approach used for ORIF (group 1: retromandibular approach. Group 2: EAORIF via transoral incision). Postoperatively pain and edema were evaluated through 2 weeks then compared among two groups.
Results: Most patients of both groups suffered moderate edema as well as pain that relived gradually through 2 weeks without statistical significant difference between the treatment groups.
Conclusion: EAORIF via transoral incision did not have an advantage over the retromandibular approach in minimizing edema or pain following open treatment of condylar fractures.

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INTRODUCTION

Endoscopic assisted open reduction and internal fixation (EAORIF) of mandibular condylar fractures was introduced in the last two decades as a comparable approach to the traditional extra-oral techniques 1,2. It was claimed that EAORIF has decreased postoperative complications including facial nerve injury and facial scar3-6. Despite, postoperative complications including pain in the surgical site and swelling are immediate commonproblems associated with most surgical interventions the literature was devoid from studies that compared this in the context of various approaches used in condylar fractures management 7. Conventional extraoral surgical approaches were thought they induce more complications than intraoral incisions due to the more traumatized tissues and longer time elapsed to access the fractured segments than transoral incisions 8,9. However this was not proved on the basis of evidence based medicine.

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The current study aimed to compare EAORIF and Conventional ORIF regarding the early postoperative complications in terms of pain and edema.

MATERIALS AND METHODS

The study was conducted on 12 patients suffering unilateral mandibular condylar fractures either isolated or accompanied by other mandibular fracture. The patients were selected from Oral and Maxillofacial Department Outpatient Clinics-Minia University-Minia Governorate- Egypt, Naser City Insurance Hospital and Shifa OMS Center- Cairo governorate- Egypt. The condylar fractures were treated by open reduction and internal fixation (ORIF). The patients were divided into two equal groups according the surgical approach used to reduce the condylar segments either conventional retromandibular incision (group 1) or endoscopic assisted transoral approach (group 2). Patients were randomly distributed through groups using the sealed envelope protocol10. Patients of 18 to 45 years old from both genders suffering from extracapsular displaced condylar fractures were enrolled in our study.

Meanwhile, patients were below 18 years, suffering from condylar head (intracapsular) fractures, condylar fractures without functional impairment or accompanied by more than one other mandibular fractures were excluded from the study.Patient acceptance was obtained and patient or the patient relative signed an informed consent form approved by the ethical committee of Faculty of Dentistry, Minia University before initiating any treatment.All patients were operated under general anesthesia. Patients were followed clinically and radiographically for 6 months. Post-operative pain and edema were evaluated through two weeks post-surgery. While the last follow up period was considered for TMJ functions and other parameters of anatomic reduction of the fractures. Considering pain, the average pain experienced in the surgical site was assessed by means of a visual analog scale(VAS) at 1, 3 days, one and two weeks .To indicate the intensity of pain, the following categorization was used: 0 = no pain; 2 = mild pain; 4 = moderate pain; 6 = severe pain; 8= very severe pain; and 10 = unbearable pain11. Regarding edema, it was assessed by a modification of a 3 line measurements using 5 fixed points on surgical side of the face and finding the average. The fixed points used were (A); the most posterior point at the midline on the tragus,(B); lateral canthus of the eye, (C); the most lateral point on the corner of the mouth, (D); soft tissue pogonium which is the most prominent point at the midline on the chin and (E); most inferior point on the angle of the mandible (Fig 1). The 3 lines were AC, AD and BE109. A baseline measurement was carried out just before the surgery and similar measurements were carriedout on days 2, 3, 7 and 14 days post-surgery.

The difference between the postoperative and preoperative measurements was calculated. All data collected, tabulated then analyzed statistically.

RESULTS

The current study included 12 patients suffered from mandibular traumatic injuries that were diagnosed as unilateral condylar fractures either isolated or accompanied with another mandibular fracture. Patients treated by ORIF either through retromandibular incision (Group 1) or endoscopic assisted transoral approach (Group 2). Patient's age ranged from 18 to 43 years with mean age 27.5 years (Table 1). Eleven from twelve patients were males (91.7%) (Fig. 2). There were no statistical significance differences regarding age and sexbetween both groups (Table 1). Patients of both groups came with ipsilateral facial swelling at the 2nd and 3rd day post-surgery. After one week post-operatively the edema resolved substantially in all patients. There was no statistical significant difference in the measures of edema between the two groups (Table 2, 3 and 4) Regarding the postoperative pain, most of patients experienced moderate pain within the 72 hours following surgery (58.3% and 50 % at 48 and 72 hrs. respectively), but these pains began to decline in the later days to become mild in the next week of surgery (66.7%) and all patients reported complete pain relief at the end of the second week of surgery. There was no statistical significant difference regarding progression of pain between the two groups (Table 5).

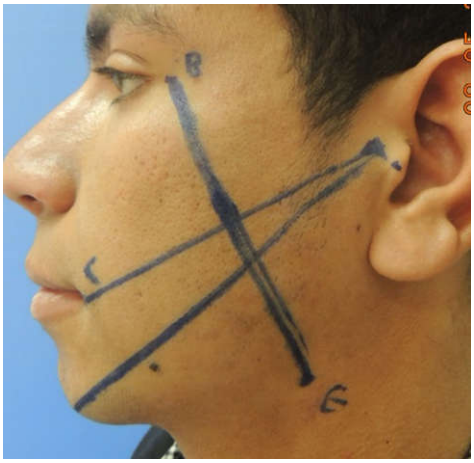

Figure 1. Clinical photograph showing 3 lines measures of edema

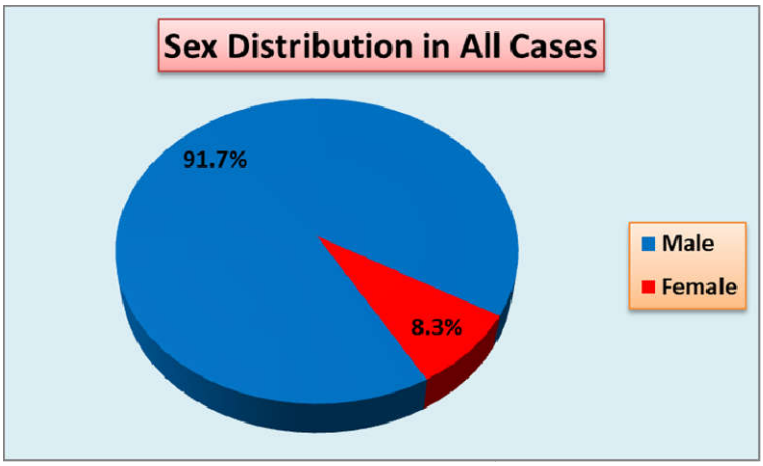

Figure 2. Pie chart revealing gender distribution among both groups

Table 1. Patients ages among both groups

CORIF (n=6)	Age	Mean &SD	EAORIF (n=6)	Age	Mean &SD	P Value
1	37	27.3±8.7	1	40	27.7±10.9	0.954
2	26		2	20		
3	21		3	43		
4	18		4	18		
5	23		5	23		
6	29		6	22		

-Independent samples T test for quantitative data between the two groups.
**: Significant level at P value < 0.05*

Table 2. Comparison of edema (AC line) between the two groups

AC Line	CORIF (n=6)	EAORIF (n=6)	P value
Pre-operative			0.411
Range	(10.5-12)	(11-12)	
Mean ± SD	11.2±0.5	11.4±0.5	
48h postoperative			0.395
Range	(12-13)	(12-13)	
Mean ± SD	12.3±0.4	12.5±0.5	
72h postoperative			1
Range	(11.5-13.5)	(11-13)	
Mean ± SD	12.3±0.8	12.3±0.8	
1W postoperative			0.765
Range	(10.5-12)	(11-12)	
Mean ± SD	11.3±0.5	11.2±0.4	
2W postoperative			1
Range	(10.5-12)	(11-12)	
Mean ± SD	11.2±0.5	11.2±0.4	

-Independent samples T test for quantitative data between the two groups.
**: Significant level at P value < 0.05*

Table 3. Comparison of edema (AD line) between the two groups

AD Line	CORIF (n=6)	EAORIF (n=6)	P value
Pre-operative			0.083
Range	(11-12.5)	(12-14)	
Mean ± SD	11.8±0.5	12.6±0.8	
48h postoperative			0.272
Range	(12-14)	(13-15)	
Mean ± SD	13.3±0.8	13.9±0.9	
72h postoperative			0.758
Range	(12-14)	(12-15)	
Mean ± SD	13.3±0.8	13.5±1	
1W postoperative			1
Range	(11-13)	(12-12.5)	
Mean ± SD	12.1±0.7	12.1±0.2	
2W postoperative			0.296
Range	(2-12.5)	(12-12.5)	
Mean ± SD	10.2±04	12.1±0.2	

-Independent samples T test for quantitative data between the two groups.
**: Significant level at P value < 0.05*

Table 4. Comparison of edema (BE line) between the two groups

BE Line	CORIF (n=6)	EAORIF (n=6)	P value
Pre-operative			0.535
Range	(11-12.5)	(11-13)	
Mean ± SD	11.7±0.5	11.9±0.8	
48h postoperative			0.845
Range	(12.5-15)	(13-14)	
Mean ± SD	13.5±0.9	13.6±0.5	
72h postoperative			0.587
Range	(12.5-15.5)	(11.5-14)	
Mean ± SD	13.6±1.1	13.3±1	
1W postoperative			0.355
Range	(11-13.5)	(11-12.5)	
Mean ± SD	12.1±0.9	11.7±0.6	
2W postoperative			1
Range	(11-12.5)	(11-12.5)	
Mean ± SD	11.7±0.5	11.7±0.6	

-Independent samples T test for quantitative data between the two groups.
**: Significant level at P value < 0.05*

DISCUSSION

Mandibular condylar fractures represent a common fracture site that occurs in wide range of incidence about (29 - 52%) of cases13-15. In the past, closed treatment was the main choice for such fractures. With the development of ORIF techniques, ORIFcame to be the standard treatmentin most cases of condylar fractures, which allows faster and better functional recovery than conservative treatment16-18. Unfortunately, most extra oral approaches that almost used to access the fracture site during ORIFcounteract these advantages in terms of considerable postsurgical pain and facial edema that actually upset the patient life quality.

Table 5. Measures of post-operative pain in the two groups

VAS	CORIF (n=6)	EAORIF (n=6)	P value
VAS 48h			0.545
No pain	0(0%)	0(0%)	
Mild	1(16.7%)	2(33.3%)	
Moderate	3(50%)	4(66.7%)	
Severe	2(33.3%)	0(0%)	
VAS 72h			1
No pain	0(0%)	0(0%)	
Mild	3(50%)	3(50%)	
Moderate	3(50%)	3(50%)	
Severe	0(0%)	0(0%)	
VAS 1W			1
No pain	2(33.3%)	2(33.3%)	
Mild	4(66.7%)	4(66.7%)	
Moderate	0(0%)	0(0%)	
Severe	0(0%)	0(0%)	
VAS 2W			----
No pain	6(100%)	6(100%)	
Mild	0(0%)	0(0%)	
Moderate	0(0%)	0(0%)	
Severe	0(0%)	0(0%)	

Fisher exact test for qualitative data between the two groups
**: Significant level at P value < 0.05*

It was claimed that endoscopic assisted techniquesoffered several advantages over the traditional ORIF in favor of minimizing most potential complications accompanying this maneuver4-6. Postoperative pain and edema are most common outcomes of the extraoral incisions that it was expected to be minimized by endoscopic assisted surgery that use limited incisions opposed to the conventional incisions. However, the results of the current research refuted this hypothesis. Regarding edema, there are several methods used in literature to measure post-operative facial swelling. From those methods we adopted the 3 lines method to assess the facial edema. Simplicity and reliability of this method prompted us to elect it from the other sophisticated techniques. This technique was quoted from a study that compared post-operative edema in dentoalveolar surgery19.Postoperatively, facial edema was observed at the second and third days post-surgery. This was in line with the fact reporting that postoperative edema reach the maximum within 72 hours post-surgery19. No group had major edema than the other, this may attributed to the major dissection of masseter muscle which was similar in the two techniques as well as the bony manipulation during condylar fracture reduction and fixation. Considering pain evaluationat the site of surgery, we elected one of the most valid methods in the literature; VAS score. It is a simple straight ford technique that can describe the degree of perceived pain. In our research, most of patients experienced moderate pain within the (72) hours following surgery (58.3% and 50 % at 48 and 72 hrs. respectively). It was worth noting that there was no statistical significant difference regarding progression of pain between the two groups other than expected. It was expected that the minimally invasive approach would result in minimal pain than the retromandibular incision. It may be due to forceful soft tissue retraction employed through the closed tight space of trans-oral approach result in tissue trauma similar to cutting through multiple layers in the conventional approach. From the current study we can conclude that using endoscopy with the transoral incision might not result in lesser postoperative pain and edema retromandibular incisions in case of ORIF of

condylar fractures. However, further studies with larger sample sizes are recommended to confirm these results.

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