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Original Article

The retromandibular transparotid approach vs. retromandibular retroparotid approach for the mandibular condyle: our clinical experience

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Aim: The mandible is regarded as a frequently fractured bone in patients who present with maxillofacial trauma accounting for almost 15.5% to 59% of all facial fractures. Managing condylar trauma has remained to be a point of contention amongst experts, regardless of the advances in surgical modalities and methodologies, and the treatment plan is often determined by the preference and the experience of the surgeon. There exist various approaches in the literature, each with its own specific benefits and drawbacks. With this study, we aimed to evaluate the prevalence of post-operative complications in patients who experienced ORIF by means of the retromandibular approach, by comparing the outcomes of one group having undergone transparotid surgery, with another that underwent retroparotid surgery. **Methods:** An experimental trial was undertaken. Convenience sampling was done from among the cases of condylar neck and base fracture visiting the department of OMFS, Dow University of Health Sciences from January 2017 to December 2019. An overall 26 patients were divided into 2 groups of 13 members each; one was managed using Open Reduction Internal Fixation (ORIF) by means of a retromandibular transparotid approach while the other group was treated with ORIF by means of a retromandibular retroparotid approach. A 6 month follow-up was done to assess range of active motion, occlusion, and complications such as deviation/deflection, neural injury, infections, sialocele, salivary fistulae and Frey's syndrome in both groups. **Results:** There was no statistically significant difference between the two groups in terms of inter-incisal opening, right and left lateral movements, or protrusion. One patient in the retroparotid group had deviation on mouth opening (7.69%), while one in the transparotid group reported with infection (7.69%), and 2 developed post operative seromas (15.38%). None had persisting facial nerve palsy at 6 months. **Conclusion:** We find no significant disparity between the 2 approaches at a follow-up of 6 months; therefore, the primary determining factor for selection of either technique is surgeon preference and appropriate case selection.

Keywords: Mandibular fractures. Mandibular condyle. Oral surgical procedures.

Introduction

The mandible is a frequently fractured bone in maxillofacial trauma, accounting for almost 15.5% to 59% of all facial fractures. The condyle accounts for 20% to 43% of all mandibular fractures. Condylar fractures are intricate due to the articulation of the mandible with the temporal bone (squamous part). Fractured condyles as well as the protracted immobilization employed as the conventional management of the aforementioned fractures, may result in disturbed occlusion, internal derangement, ankylosis, and alterations in the growth pattern of the mandible. Patient may present with a myriad of complaints, ranging from chronic pain, restricted jaw mobility and compromised functionality to facial asymmetry, and traumatic occlusion. In fact, 13 – 100% of all TMJ ankylosis cases are a direct sequelae of condylar trauma[1], specially trauma that results in medially displaced condylar fractures[2].

The management of condylar trauma has remained a point of contention amongst experts, regardless of the advances in surgical modalities and methodologies, and the treatment plan is often determined by the surgeon's preference and experience[3]. Owing to the composite anatomical site, surgical approaches in this area should provide good visualization and allow the surgeon to precisely reduce the fracture and provide stable internal fixation[4]. Various approaches have been employed for this purpose in the past, each with its own specific benefits and drawbacks.

The retromandibular approach was initially defined by Hinds and Girotti in 1967; its outstanding benefit is the provision of forthright access to low condylar fractures[5]. However, certain complications are linked to Hinds' approach as well: infection, neurological deficits, seromas, sialoceles, salivary fistulae, Dupuy's syndrome etc.[6] Several modifications of the retromandibular approach have emerged over time to counteract these complications, ranging from anteroparotid to a high cervical transmasseteric approach[7]. With this study, we aimed to evaluate the prevalence of post-operative complications in patients who underwent Open Reduction and Internal Fixation (ORIF) of condylar neck and base fractures by means of the retromandibular approach, by comparing the outcomes of one group having undergone transparotid surgery, with another that underwent retroparotid surgery.

Materials and Methods

An experimental trial was undertaken; ethics approval was acquired from the university institutional review board (REF: IRB-1130/DUHS/Approval/2019). The study sample was acquired according to convenience sampling from among the cases visiting the department of Oral and Maxillofacial Surgery (OMFS), Dow University of Health Sciences, from January 2017 to December 2019. After obtaining informed consent, patients were counselled regarding the management options available, as well as the disadvantages and advantages associated with each option. This communication was done in a clear and coherent manner. An overall 26 patients were selected for ORIF, of whom 22 were males and 4 were females.

Patients were placed into 2 groups of 13 members each; one group was managed using ORIF by means of a retromandibular transparotid approach which has recently been well described by Parihar et al.[3], while the other group was treated with ORIF by means of the retromandibular retroparotid approach described by Ebenezer et al in 2014[8].

After inclusion into our trial, all of the patients had a standard panoramic radiograph (OPG), a plain lateral and posteroanterior radiograph, or Computed Tomography (CT) of the face done in order to classify the condylar fracture according to the Arbeitsgemeinschaft für Osteosynthese Cranio-Maxillo-Facial (AOCMF) classification into head, neck and base, as well as to assess its severity, and the amount of dislocation and displacement of the condylar segment[9]. Pre operatively, the nerve function was also assessed in accordance with House & Brackmann's grading system. The inter-incisal mouth opening and maximum lateral excursion was noted in millimeters (mm). The preoperative evaluation was done by the same examiner for all patients.

All patients were operated by the same surgical team which included two professors, who were the primary surgeons, assisted by two residents. Functionally stable osteosynthesis was applied via two miniplates in accordance with Meyer's tensile strain lines of the mandibular condyle in all cases[10].

Inclusion Criteria

1. Age above 18 years
2. Condylar neck and base fractures (unilateral/bilateral both)
3. No fragmentation/ minor fragmentation
4. All amounts and directions of displacement
5. 0-45 degrees of angulation, medially or laterally, as seen on a PA view or anterioposteriorly, as seen on a lateral view.
6. Undisplaced or displaced fractures (condylar head in relation to fossa)

Exclusion Criteria

1. Inadequate dentition for reproduction of occlusion
2. Condylar head fractures
3. Major fragmentation
4. >45 degrees of angulation in any direction
5. Dislocated fractures (condylar head in relation to fossa)
6. Existing facial nerve deficits
7. Previous TMJ surgeries
8. Sjogren Syndrome or other coexisting autoimmune disorder
9. Preexisting diseases of the parotid

Follow Up Protocol

Post operatively, the patients were assessed by one resident and one professor from the surgical team at one week, one month, three months and six months to assess:

1. Range of active motion by measuring the maximum inter-incisal distance, maximum protrusion, and lateral movements.
2. Deviation/deflection on opening the mouth (clinical assessment)
3. Imperfect occlusion (clinical assessment)
4. Presence of neural injury (CN VII) using House-Brackmann facial nerve grading system
5. Infections
6. Seromas
7. Sialocele and salivary fistulae
8. Frey's syndrome
9. Unaesthetic scars

Statistical Analysis

All statistical analyses were done using SPSS Statistics for Windows, version 23 (SPSS Inc.). Probabilities of <0.05 were considered to be significant. Independent sample T test was applied to compare the means of the two groups and a CONSORT 2010 flow chart of the trial is also shown in Figure 1.

Results

A total of 10 males and 3 females were included in the Transparotid (TP) group and 12 males and 1 female were included in the Retroparotid (RP) group. The mean age of the TP group was 32.6 while that of the RP group was 37.5 years. The TP group included 10 fractures of the right condyle, 5 of the left (2 were bilateral cases); of these 7 patients had neck fractures and 4 had condylar base fractures and the bilateral cases had a neck and base, and neck and neck fractures on the right and left side respectively. 11 fractures were displaced in relation to the fossa, 8 were nonangulated and 7 were anteromedially angulated. In the RP group, 9 fractures were found on the right condyle, 5 on the left (1 was a bilateral case); of these 6 patients had neck fractures while 6 had condylar base fractures and the bilateral case had a condylar neck fracture on the right and base fracture on the left. 10 fractures were displaced in relation to the fossa, 9 were nonangulated and 5 were anteromedially angulated. There were no laterally or posteriorly angulated fractures in our study, incidentally.

The mean operative time in the TP group was 29.33 minutes while that of the RP group was 30.13 minutes. No significant intraoperative complication was encountered in any case of either group.

Facial nerve dysfunction at one-week post op was encountered in 3 cases from the TP group; 2 involving the buccal branch (House Brackmann grade III and IV), and 1 involving the marginal mandibular branch (House Brackmann grade III). 2 cases of nerve dysfunction at one week post op were also found in the RP group; 1 involving the buccal branch (House Brackmann grade III) and 1 involving the marginal mandibular branch (House Brackmann grade IV). All of these dysfunctions related to the nerve were transient and had resolved by the 6 month follow-up appointment.

No evident malocclusion was found in patients in either group. However, one patient from the RP group complained of premature contacts on the ipsilateral side that were resolved by selective occlusal adjustment. No patient had any malocclusion at 6 months post op.

Of the overall complications seen, the cases in the TP group had a higher incidence of infection (7.69%) and seroma (15.38%) while those in the RP group had more deviation on mouth opening (7.69%).

The 6 month post-operative mobility was similar in both groups; there was no statistically significant difference in the interincisal opening, right and left lateral and protrusive movements in either group (Table 1).

Table 1. 6 Month postoperative mobility in both study groups (in millimeters)

VARIABLES	STUDY GROUPS	MEAN	p value
INTER INCISAL OPENING	TRANSPAROTID	34.02	0.928
	RETROPAROTID	35.6	
LEFT LATERAL MOVEMENT	TRANSPAROTID	5.17	0.427
	RETROPAROTID	5.04	
RIGHT LATERAL MOVEMENT	TRANSPAROTID	5.38	0.47
	RETROPAROTID	5.36	
PROTRUSION	TRANSPAROTID	5.33	0.577
	RETROPAROTID	6.0	

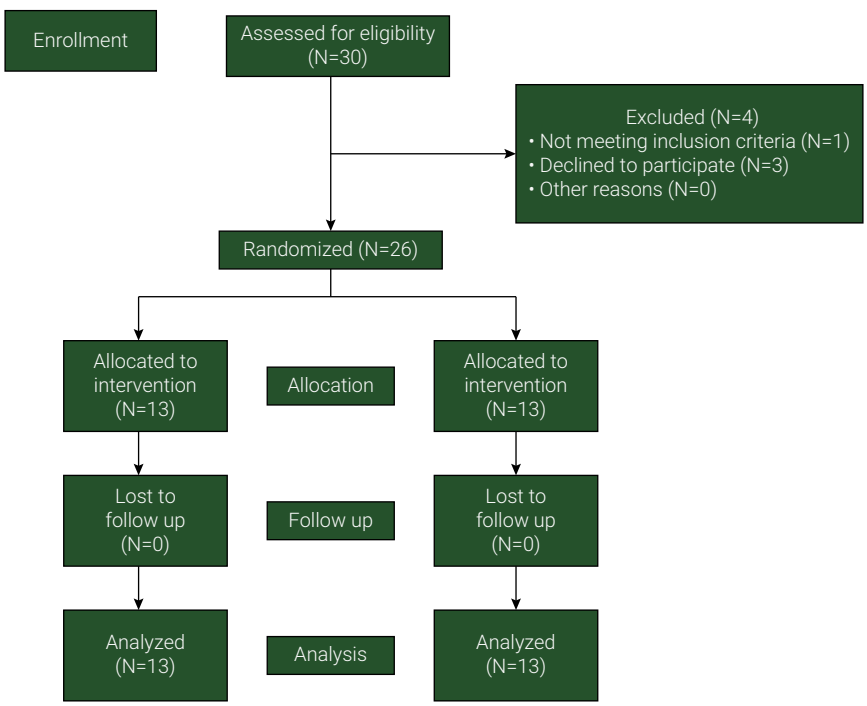

Figure 1. Consort flow diagram of the study

Discussion

The clinical relevance of condylar fractures is well known in terms of their effect on the temporomandibular joint mobility, occlusion, facial symmetry, function and esthetics, and a long debate existed concerning the pros and cons of open versus closed management of the condyle. Traditionally, fractures of the mandibular condyle, ranging in frequency from 14% to 30%[9,11] have almost wholly been addressed by closed or "conservative approaches" such as MMF, due to complications attributed to open approaches such as limited access, danger to the facial nerve branches, and to anatomic structures such as the parotid[12]. Lately however, there has been a paradigm shift towards the consideration of open approaches to condylar fractures as the gold standard of treatment[13], owing in part to the advent of functionally stable osteosynthesis in the 1980s and to the multitude of benefits associated with early mobilization and loading of the temporomandibular joint. While open reduction and internal fixation of condylar fractures is gaining traction in the OMFS world, there is yet to be a standardized protocol of approaches to the condyle[14]. This study was undertaken in order to examine two different approaches to the condylar neck and base, the transparotid and retroparotid modifications of the retromandibular approach, in order to establish which of the two had a more favorable outcome in terms of function, aesthetics and lower post-surgical complications.

The majority of patients in our study were male, with a male to female ratio of 5.5:1, a circumstance reported by other studies as well[15,16], owing largely to the higher incidence of RTAs and interpersonal violence in Pakistan. The right condyle was more frequently fractured than the left side, and the majority of fractures in our study were either not angulated or anteromedially angulated, a substantiation of findings by Lindahl[17] who noted that adults with condylar fractures tend to have medially angulated proximal segments. All the participants of our study were in the 4th decade of life.

No incidence of permanent 7th cranial nerve paresis was seen in either group in our study; our results reflect those of other studies that state the transient palsy of the facial nerve in the range of 13 to 22% in both approaches collectively[18], with permanent paralysis limited to 5% or less[19]. Some studies, however, have reported a higher incidence of transient nerve dysfunction after the transparotid approach as compared to a non-transparotid approach, with the nontransparotid approach leading to a more permanent paralysis[12,20]. Rozeboom et al.[19] (2018) have proposed excessive stretching and traction on the nerve to be a contributing factor to permanent dysfunction.

A mean difference of 1.58 mm in the interincisal opening was found between the two approaches in our study, which is not statistically significant; this finding also corroborates reports by Rozeboom et al who found no difference in mouth opening, lateral deviations or pain across different transcutaneous approaches to the condyle, including retromandibular transparotid and non transparotid[20].

Post-operative occlusal discrepancies though rare, are still encountered after ORIF of condylar fractures. No patient in either of our groups had occlusal disturbance at 6 months post op, a finding reflected by other studies as well[19].

Development of seroma is a relatively rare complication; however, 2 cases of seroma developed in the TP group in our study. There were no cases of sialocele or salivary fistula formation in the TP group, though different studies report a 2.6% incidence of sialocele and a ≥4.8% incidence of salivary fistula with the transparotid approach[19]. Appropriate layered closure is required to prevent both sequelae.

Frey's syndrome occurs as a result of condylar fracture management due to the intimate relationship of the capsule of the condyle with the auriculotemporal nerve. In our study, none of the patients reported with Frey's Syndrome[21,22], in contrast to different studies quoting a 1.1% incidence after the retromandibular approach[19].

In conclusion, we find no statistically significant disparity between the 2 approaches at a follow-up of 6 months; therefore, the primary determining factor for selection of either technique is surgeon preference and appropriate case selection.

Strengths

Our study contributes significantly to the existing literature regarding the pros versus cons of retroparotid and transparotid approaches to the mandibular condyle.

Limitations

Our study was limited to one university setting only, and the sampling technique was convenience sampling.

Conflicts of Interest

The authors state no conflicts of interest.

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