Modified endaural approach for the treatment of condylar fractures: A review of 75 cases

Balaji SM

ABSTRACT

Background: There are several treatment approaches for mandibular condyle fractures. Type of fracture, clinical experience, and preference of the operating surgeon dictate the approach. Given this highly varied outcome, this manuscript intends to document the treatment experience of 75 patients with extracapsular condyle fractures using author’s modification of the traditional endaural approach in the region.

Materials and Methods: A retrospective chart review was performed on patients with mandibular condylar fractures who visited the author’s center between 2004 and 2014. For the surgical reduction and fixation, an endaural (ear) approach via the author’s modification of Al-Kayat Bramley’s incision in the superficial temporal region was used. Postoperative clinical parameters were evaluated which include the degree of mouth opening, chin deviation during mouth opening, occlusal relationship, temporomandibular joint function, radiographic stability, and other postoperative complications of condylar fractures such as infection, plate fracture, and permanent paralysis of facial nerve. Adolescence/adult patients with unilateral/bilateral condylar fracture who underwent open reduction with the follow-up of at least 1 year were included in the study. Edentulous and patients <15 years who underwent closed treatment were excluded from the study.

Results: The study group consisted of 75 cases of mandibular condyle fractures, of which 55 cases were of unilateral condyle fractures and 20 cases were of bilateral condylar fractures. Postoperative follow-up of patients ranged from 1 to 10 years with the mean of 3.04 ± 1.93 years. The occlusal relationships were excellent in all with the mean degree of mouth opening of 40.11 mm (maximum 4.5 cm and minimum 2.9 cm), of which four patients reported restricted mouth opening. Orthopantomogram and computed tomography showed complete anatomical reduction of the condyle fracture in all patients. Nine out of 75 patients developed transient facial weakness, with no other postoperative complications of condylar fractures such as infections, plate fracture, and permanent paralysis of facial nerve were noted. The overall success rate was 92%.

Conclusion: Surgery for mandibular condyle fractures with modified approach allows direct vision of the fracture and reduces surgical trauma to the site while avoiding permanent facial nerve injury. Hence, the author’s modified Al-Kayat Bramley incision via endaural approach could be considered as the best approach for open reduction and internal fixation of condylar neck and subcondylar mandibular fractures.

Key words: Al-Kayat Bramley’s incision, condylar fracture, endaural approach, open reduction, plate fixation

Address for correspondence:
Dr. Balaji SM
E-mail: smbalaji@gmail.com

Received: 11-05-16
Review completed: 16-06-16
Accepted: 17-06-16

This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as the author is credited and the new creations are licensed under the identical terms.

For reprints contact: reprints@medknow.com

How to cite this article: Balaji SM. Modified endaural approach for the treatment of condylar fractures: A review of 75 cases. Indian J Dent Res 2016;27:305-11.
The most common mandibular fractures are the condylar, condylar neck, and subcondylar fractures, which account for 17.5–52% of all mandibular fractures. Various factors influence the treatment decisions which include age of the patient, unilateral or bilateral, presence of any other mandibular fractures, the level and displacement of the fracture, the presence of teeth, and the degree to which occlusion is disturbed.

However, controversy over how to treat mandibular condyle fractures – conservative closed reduction and functional therapy versus open surgical reduction – has existed since the first mandibular condyle neck surgery was performed in 1925.

In the past, closed reduction with concomitant active physical therapy that is conducted after intermaxillary fixation during recovery period had been mainly used. Many researchers recommended closed reduction because of the problems of surgical approach, such as infection, injury of nerve and blood vessels, and scar formation. However, as it has disadvantages such as malalignment of the fractured bone by muscle strength, abnormal occlusion due to inappropriate fixation, and inappropriate function of the temporomandibular joint (TMJ) due to disuse muscular atrophy caused by long-term intermaxillary fixation, open reduction has recently drawn attention.

Several studies have focused on the absolute and relative indications for the open reduction of mandibular condylar fractures. Zide and Kent described what was considered the “gold standard” treatment during the early 1980s. Obviously, the indications for surgery versus conservative treatment were based on the materials and surgical techniques available at that time.

### Zide and Kent's indications for open reduction (1983)

**Absolute**
- Displacement into middle cranial fossa
- Impossibility of obtaining adequate occlusion by closed reduction
- Lateral extracapsular displacement
- Invasion by foreign body

**Relative**
- BL condylar fractures in an edentulous patient without a splint
- Unilateral or BL condylar fractures where splinting cannot be accomplished for medical reasons or because physiotherapy is impossible
- BL condylar fractures with comminuted mid-facial fractures, prognathia, or retrognathia
- Periodontal problems
- Loss of teeth
- Unilateral condylar fracture with unstable base

BL = Bilateral

Several approaches have been proposed: The preauricular approach followed by retroauricular, submandibular, coronal, or intraoral incision or a combination of these approaches. Each of these approach have their own merits and demerits.

With regard to fracture fixation, the use of numerous devices and methods has been reported, ranging from external fixation to rigid internal fixation. Only a few authors have reported the long term clinical and radiological follow-up details exclusively after the surgical treatment of mandibular condylar fractures. After performing the routine surgical treatment of mandibular condylar fractures for several years, case series were reviewed and a retrospective study is done to present the long term clinical and radiological findings.

### MATERIALS AND METHODS

This retrospective study was performed from the archival records of the center from January 2004 to December 2014. Only those cases with condylar fractures of age more than 15 years treated by open reduction with internal fixation with at least 1 year follow-up were included in the study. Only patients of either gender, who have not been previously operated upon, were included in the study. Those cases with condylar fractures treated by closed reduction, patients under 15 years, and edentulous patients were excluded from the study. For the surgical reduction and fixation, an endaural (ear) approach via the author’s modification of Al-Kayat Bramley’s incision in the superficial temporal region was used. Measurement of the amount of mouth opening, asymmetry, and type and side of fracture was routinely noted down in the records, which were collected. Besides patient’s demographic data, postoperative mouth opening, chin deviation during mouth opening, malocclusion, TMJ function, radiographic stability, and other postoperative complications of condylar fractures such as infection, plate fracture, and permanent paralysis of facial nerve were noted down. Patients without such data were excluded from the study. Descriptive results of the study are presented and discussed.

### Surgical procedure

The temporal scalp is shaved and the head is prepared and draped for sterile surgery. After naso-endotracheal intubation, general anesthesia is administrated.

The incision line is mapped out with marking ink. The incision starts at the temporal region, just within the hairline about a pinna’s length above the ear. It then curves backward and downward well behind the main branches of the temporal vessels to the upper most skin attachment of the pinna, following this anteriorly to the tragus, and then moving endaurally. At this point, it crosses the notch between the helix and the tragus and passes posterolaterally to the tragus in the anterior wall to the external auditory meatus, where it can be cosmetically concealed. The incision then traverses inferiorly within the external auditory meatus adjacent and parallel to the tragus till its inferior border and finally out again to the skin crease in front of the lobe of the ear. At the anterior end of this incision, an inferior-lateral releasing incision is placed for about 5–8 mm (author’s modification) [Figure 1]. This facilitates easier reflection and
Endaural approach for Condylar fractures

Balaji

view of the fracture site to surgeon, in lieu of the direction of retraction of flap. This modification, to the best of my knowledge, has never been described.

Local anesthetic-containing vasoconstrictor injected beneath the line of incision not only reduces bleeding if given time to work but also can be useful in defining tissue planes.

The depth of the incision is till the cartilage in the external auditory meatus and the periosteum in the temporal region. Using blunt and sharp dissection, superficial fascia and preauricular fascia are lifted as a part of the skin flap. At the level of the tragus, the skin is dissected off the cartilage of the tragus and its continuation off the cartilage of the external auditory canal. Care is taken not to incise the tragus or meatal cartilage. At the zygomatic arch, the pocket between the lateral and medial layers of the temporal fascia is identified, once inside this pocket the periosteum of the malar arch on its deeper surface is safely incised and raised as one flap.

The skin is then reflected along with the superficial fascia, preauricular fascia, the temporalis, the temporal fascia, and the periosteum, elevating the terminal (temporal and zygomatic) branches of the facial nerve and superficial temporal vessels along with it.

The branches of the facial nerve are well protected within the soft tissue flap. The position of the most posterior twig of the temporal branch of the facial nerve as it crosses the malar arch is the limiting factor for forward extension of the exposure of the joint.

The condylar fracture site is thus exposed via this endaural incision passing through the postero-lateral aspect of the tragus, without excising the tragus. Care is taken not to penetrate too deeply as the main trunk of the facial nerve passes within a few centimeters of the ear lobe. The flap is exposed as a single unit, exposing the joint capsule and temporomandibular ligament.

Periosteum from the lateral aspect of the zygomatic arch is reflected, and the parotid gland is retracted anteriorly with the facial skin flap, thus protecting the gland and the facial nerve. Prior to opening the capsule, meticulous hemostasis is achieved to allow optimal visibility.

The fractured condyle is easily identified when it is laterally, anteriorly, or medially displaced. Posteriorly displaced condylar head is sometimes difficult to handle. When the condyle head is more significantly displaced or dislocated from the fossa, the condylar process is rotated prior to traction to prevent damage to the walls of the jugular and carotid vessel walls or branches of the maxillary artery by sharp bony edges resulting from the oblique fractures of the condylar process.

The mandible is then held in open protrusive traction to visualize the fractured half of the mandibular ramus. A 4-holed miniplate is fixed to the ramus, the mandible is then held in the key of occlusion, and the other half of the 4-holed miniplate is screwed to the fractured, relocated condyle in anatomic position.

Care is taken to preserve the insertion of the pterygoid muscles. When the condyle is brought into position, the posterior border should be verified before 4-holed miniplate is adapted and fixed to the condylar fragment. The opening, closing, protrusive, and retrusive excursions of the mandible are gently verified. Hemostasis is secured, wound is closed in layers, and a suction drain is used.[14] [Figures 2 and 3].

After this checkup, elimination of posterior open bite and achievement of appropriate vertical dimension should be double checked. This ensures proper occlusion. Furthermore, after retrieval from general anesthesia (GA), eye movements are to be checked to ensure that no damage to the facial nerve has occurred.

No active physical jaw exercise is performed in the immediate postoperative period. Mouth opening, overbite and overjet, mandibular mobility, and TMJ function are evaluated. Postoperative radiographic examination includes assessment of direct measure of total height of the rami and TMJ regions.

RESULTS

In the present study, 55 patients had isolated unilateral condylar fractures and condylar fractures associated with other fractures were included and 20 had bilateral condylar fractures. Out of 75 patients, 64 (85.34%) were males and 11 (14.67%) were females in this study. The right condyle involved in 32 cases and left condyle involved in 23 cases. The maximum interincisal opening ranged from 29 to 45 mm (an average of 40.11 mm); 4 (5.34%) out of 75 patients had restricted mouth opening. Radiographically, all the patients had stable vertical ramus height with no marked reduction in height postoperatively. Nine out of 75 (12%)
patients developed transient facial nerve weakness, which got improved in the follow-up period [Tables 1-3].

DISCUSSION

Numerous attempts have been made over the years to identify the indications for the surgical treatment of condylar fractures, with the relative and absolute indications of Zide and Kent\(^5\) being the most widely cited and used. However, none of these indications has been fully accepted until now, and the choice of treatment is currently still widely debated. Although Troulis and Eckelt \textit{et al.} reported that closed treatment remains the preferred approach in several centers\(^{15,16}\), many surgeons now favor the open treatment of displaced condylar fractures as the method involving reduction and rigid fixation, which allows good anatomic repositioning. Surgical therapy is generally adopted in cases where a conservative treatment would not ensure a suitable anatomical reduction of the fracture site.

In addition, in borderline cases or when the deformity is established, employing closed reduction facilitates the establishment of open bite in bilateral cases and midline deviation in unilateral fracture cases. However, in case of open reduction, by virtue of secure repositioning and proper reduction, these complications are avoided. In addition, the chance of injuring vital vessels including facial nerve is higher. In the hands of a skilled surgeon and adequate planning, the success rate of the approach would be higher.

Over the period of 10 years, 75 cases of mandibular condylar fractures had been treated by open reduction and internal...
### Table 1: Patient details

| Serial number | Age/sex | Side | Follow-up | Facial symmetry | Occlusion | Degree of mouth opening (mm) | Postoperative complication | Radiographic presentation |
|---------------|---------|------|-----------|----------------|-----------|------------------------------|---------------------------|---------------------------|
| 1             | 22/female | BL   |  6        | Stable         | 32        | Restricted mouth opening    | Stable                    | Stable                    |
| 2             | 25/male  | Right |  5        | Asymmetry Corrected | 38        | None                         | Stable                    | Stable                    |
| 3             | 30/male  | Right |  3        | Stable         | 40        | None                         | Stable                    | Stable                    |
| 4             | 32/male  | Left  |  7        | Asymmetry Corrected | 42        | None                         | Stable                    | Stable                    |
| 5             | 16/male  | BL    |  2        | Stable         | 30        | Restricted mouth opening    | Stable                    | Stable                    |
| 6             | 18/male  | Right |  6        | Stable         | 38        | None                         | Stable                    | Stable                    |
| 7             | 23/male  | Right |  6        | Asymmetry Corrected | 40        | None                         | Stable                    | Stable                    |
| 8             | 26/female | BL   |  7        | Stable         | 38        | None                         | Stable                    | Stable                    |
| 9             | 42/male  | Right |  1        | Stable         | 38        | None                         | Stable                    | Stable                    |
| 10            | 38/male  | Left  |  2        | Stable         | 41        | None                         | Stable                    | Stable                    |
| 11            | 39/female | BL   |  2        | Stable         | 42        | None                         | Stable                    | Stable                    |
| 12            | 42/male  | BL    |  1        | Stable         | 30        | Restricted mouth opening    | Stable                    | Stable                    |
| 13            | 45/male  | BL    |  1        | Stable         | 45        | None                         | Stable                    | Stable                    |
| 14            | 46/male  | Right |  1        | Asymmetry Corrected | 40        | None                         | Stable                    | Stable                    |
| 15            | 23/male  | Right |  4        | Stable         | 39        | Transient facial weakness   | Stable                    | Stable                    |
| 16            | 28/male  | Left  | 10       | Asymmetry Corrected | 42        | None                         | Stable                    | Stable                    |
| 17            | 23/male  | BL    |  4        | Stable         | 40        | None                         | Stable                    | Stable                    |
| 18            | 26/male  | BL    |  2        | Stable         | 45        | None                         | Stable                    | Stable                    |
| 19            | 25/male  | Left  |  3        | Stable         | 43        | None                         | Stable                    | Stable                    |
| 20            | 42/male  | Left  |  2        | Stable         | 38        | None                         | Stable                    | Stable                    |
| 21            | 38/male  | Right |  2        | Asymmetry Corrected | 39        | None                         | Stable                    | Stable                    |
| 22            | 39/male  | Right |  1        | Stable         | 40        | None                         | Stable                    | Stable                    |
| 23            | 42/male  | Right |  2        | Stable         | 42        | None                         | Stable                    | Stable                    |
| 24            | 45/male  | Left  |  2        | Asymmetry Corrected | 43        | Transient facial weakness   | Stable                    | Stable                    |
| 25            | 30/male  | BL    |  5        | Stable         | 40        | None                         | Stable                    | Stable                    |
| 26            | 32/male  | Left  |  3        | Stable         | 42        | None                         | Stable                    | Stable                    |
| 27            | 16/male  | Left  |  4        | Stable         | 38        | None                         | Stable                    | Stable                    |
| 28            | 18/male  | Right |  2        | Asymmetry Corrected | 38        | None                         | Stable                    | Stable                    |
| 29            | 39/male  | BL    |  1        | Stable         | 40        | Transient facial weakness   | Stable                    | Stable                    |
| 30            | 42/male  | BL    |  2        | Stable         | 42        | None                         | Stable                    | Stable                    |
| 31            | 45/male  | BL    |  5        | Stable         | 42        | Transient facial weakness   | Stable                    | Stable                    |
| 32            | 32/male  | Right |  4        | Stable         | 45        | None                         | Stable                    | Stable                    |
| 33            | 16/male  | Right |  8        | Stable         | 43        | None                         | Stable                    | Stable                    |
| 34            | 18/male  | Left  |  6        | Stable         | 38        | None                         | Stable                    | Stable                    |
| 35            | 16/male  | Right |  2        | Asymmetry Corrected | 39        | None                         | Stable                    | Stable                    |
| 36            | 23/male  | Left  |  3        | Stable         | 40        | None                         | Stable                    | Stable                    |
| 37            | 25/male  | Right |  2        | Stable         | 42        | None                         | Stable                    | Stable                    |
| 38            | 26/female | BL   |  3        | Stable         | 43        | None                         | Stable                    | Stable                    |
| 39            | 18/male  | Left  |  1        | Asymmetry Corrected | 40        | None                         | Stable                    | Stable                    |
| 40            | 23/male  | BL    |  2        | Stable         | 42        | None                         | Stable                    | Stable                    |
| 41            | 26/female | BL   |  2        | Malocclusion   | 38        | None                         | Stable                    | Stable                    |
| 42            | 18/male  | BL    |  3        | Stable         | 34        | Transient facial weakness   | Stable                    | Stable                    |
| 43            | 23/male  | Left  |  4        | Asymmetry Corrected | 40        | None                         | Stable                    | Stable                    |
| 44            | 26/female | Left |  2        | Asymmetry Corrected | 42        | None                         | Stable                    | Stable                    |
| 45            | 19/male  | Right |  5        | Stable         | 42        | None                         | Stable                    | Stable                    |
| 46            | 39/male  | Right |  2        | Stable         | 45        | None                         | Stable                    | Stable                    |
| 47            | 44/male  | Right |  3        | Asymmetry Corrected | 43        | None                         | Stable                    | Stable                    |
| 48            | 43/male  | Left  |  2        | Asymmetry Corrected | 38        | None                         | Stable                    | Stable                    |
| 49            | 32/male  | Right |  1        | Stable         | 39        | None                         | Stable                    | Stable                    |
| 50            | 18/male  | Right |  6        | Asymmetry Corrected | 40        | None                         | Stable                    | Stable                    |
| 51            | 35/male  | Left  |  5        | Asymmetry Corrected | 42        | None                         | Stable                    | Stable                    |
| 52            | 32/male  | Right |  2        | Asymmetry Corrected | 43        | None                         | Stable                    | Stable                    |
| 53            | 25/male  | Left  |  2        | Stable         | 40        | None                         | Stable                    | Stable                    |
| 54            | 26/female | Left |  1        | Stable         | 42        | None                         | Stable                    | Stable                    |
| 55            | 19/male  | Left  |  3        | Stable         | 38        | None                         | Stable                    | Stable                    |
| 56            | 38/male  | Right |  2        | Stable         | 38        | None                         | Stable                    | Stable                    |
| 57            | 44/male  | BL    |  2        | Stable         | 40        | Transient facial weakness   | Stable                    | Stable                    |
| 58            | 28/male  | Left  |  2        | Stable         | 42        | None                         | Stable                    | Stable                    |
| 59            | 25/male  | Right |  1        | Asymmetry Corrected | 42        | None                         | Stable                    | Stable                    |
| 60            | 29/female | BL   |  2        | Stable         | 42        | None                         | Stable                    | Stable                    |
| 61            | 18/male  | Right |  2        | Stable         | 45        | Transient facial weakness   | Stable                    | Stable                    |
| 62            | 23/male  | Right |  1        | Stable         | 43        | None                         | Stable                    | Stable                    |
| 63            | 23/male  | Right |  3        | Asymmetry Corrected | 38        | None                         | Stable                    | Stable                    |
| 64            | 25/male  | Left  |  2        | Asymmetry Corrected | 39        | None                         | Stable                    | Stable                    |
fixation (ORIF) via endaural approach (author’s modification of Al-Kayat Bramley incision). This incision changes the plane of retraction. In traditional incision, flap is reflected at about 45° to ala-tragal line while by author’s modification, this is reduced to about 15–20° depending on the length of the releasing short incision. This ensures a more downward reflection of flap facilitating more visibility of the area. Though the modified incision of flap appears to be against the basic diction of wide base of flap, the deep knowledge of local vasculature would reveal the following. The deep temporal artery, the major arterial supply to the region, runs well away from the line of incision, just in front of tragus. This vessel is damaged in temporal area; this ensures that the entire flap has rich vasculature. All those 75 patients had an average follow-up of 3 years, with at least 1 year follow-up. As specified in various studies,9,17-19 a satisfied occlusion was observed in all patients except in 2 cases who developed postoperative occlusal interference due to premature contact. Selective grinding of premature contact was necessary as in other studies.9,17,18

Follow-up radiograph showed stable and completed anatomical reduction of mandibular condylar fracture in all patients. Three-month postoperative follow-up showed excellent improvement in mouth opening except in four cases (5.34%) of bilateral condylar fractures where the mouth opening was reduced to about 29–32 mm, which has been re-gained by active physiotherapy postoperatively. The mean degree of mouth opening was 40.11 mm.

All patients had good healing postoperatively with no symptoms of intraoperative ipsilateral facial nerve injury such as incomplete eye closure, decreased depth of forehead wrinkles, or difficulty in raising eyebrows, except nine patients who had mild facial weakness on the operated side which gradually recovered in 6 months during the follow-up period.

According to Ellis et al., who compared the results of open and closed reduction of condyle and published the result in about nine series publication,20-27 the most common complication of open reduction is the scar and transient paralysis of facial nerve, whereas the closed approach had numerous complications such as malocclusion, chronic pain, asymmetry, and limited mobility, with radiographic abnormalities. Haug and Assael28 reported the long-term postoperative results of ten patients treated with closed reduction and ten patients by ORIF. In their study, there was no statistically significant differences observed between the ORIF and closed reduction. Satisfactory results do not always require exact anatomical repositioning. Even though the impaired mandibular ramal growth was apparent on the fractured side, it is possible to achieve the good esthetic and functional results. The ORIF group was associated with perceptible scars and the closed reduction group with chronic pain.

In the present study, few cases had temporary facial nerve weakness which subsequently resolved in 6–7 weeks. This complication may be the result of intraoperative soft tissue stretching, probably caused by the rapid recovery of facial

---

**Table 1: Contd...**

| Serial number | Age/sex | Side   | Follow-up | Facial symmetry | Occlusion | Degree of mouth opening (mm) | Postoperative complication | Radiographic presentation |
|---------------|---------|--------|-----------|----------------|-----------|-----------------------------|---------------------------|-------------------------|
| 65            | 26/female | Right  | 2         | Stable         |           | 40 None | None | Stable |
| 66            | 22/male | BL     | 6         | Stable         |           | 29 Restricted mouth opening | Stable | Stable |
| 67            | 23/male | Left   | 2         | Stable         |           | 38 None | None | Stable |
| 68            | 39/male | Right  | 5         | Stable         |           | 40 None | None | Stable |
| 69            | 42/male | Left   | 2         | Asymmetry Corrected | Stable | 42 None | None | Stable |
| 70            | 45/male | Right  | 2         | Asymmetry Corrected | Stable | 42 None | None | Stable |
| 71            | 32/male | BL     | 4         | Stable         |           | 42 Transient facial weakness | Stable | Stable |
| 72            | 16/male | BL     | 5         | Stable         |           | 45 Transient facial weakness | Stable | Stable |
| 73            | 23/male | Right  | 2         | Stable         |           | 43 None | None | Stable |
| 74            | 39/male | Left   | 2         | Stable         |           | 35 None | None | Stable |
| 75            | 42/male | Right  | 1         | Asymmetry Corrected | Stable | 38 None | None | Stable |

BL=Bilateral, SD=Standard deviation

**Table 2: Demographic data of the study group**

| Parameters | Values |
|------------|--------|
| Age (in years) |        |
| Mean       | 29.48  |
| SD         | 9.5    |
| Range      | 16-46  |
| Female: male ratio (%) | 11:64 (14.67:85.34) |
| Unilateral (%) | 55 (73.33) |
| Right: left ratio | 32:23 |
| BL (%)     | 20 (26.67) |
| Follow-up (years) |        |
| Mean       | 3.04   |
| SD         | 1.93   |
| Range      | 1-10   |

BL=Bilateral, SD=Standard deviation

**Table 3: Study parameters in the study group**

| Parameters | Values |
|------------|--------|
| Mouth opening (in mm) |        |
| Mean       | 40.11  |
| SD         | 3.4    |
| Range      | 29-45  |
| Transient facial paralysis (%) | 9 out of 75 (12) |
| Restricted mouth opening (%) | 4 out of 75 (5.34) |
| Radiographic stability (%) | 100 |

SD=Standard deviation
nerve functionality. However, none of the patients showed permanent damage to the facial nerve which correlated with the study of Eckelt et al.\textsuperscript{[15]} Though mild facial weakness occurred, none of the patients had permanent damage to the facial nerve resulting in improvement within a period of 6 months. Our results show a low incidence of permanent facial nerve injury associated with this approach, meaning it is the preferable approach when there is an indication for ORIF in mandibular condylar fractures.

Almost all patients were asymptomatic for facial pain around 4th week of postoperative period. Thus, we can confirm that facial pain is not a common consequence of ORIF.

Postoperative complications were at a very low rate compared to that reported by other authors.\textsuperscript{[9,17,18,29]} furthermore, no plate fracture was observed.\textsuperscript{[19]} The aforementioned points suggest that this type of surgery requires a detailed knowledge of the relevant anatomical region and a team that is experienced and highly specialized in the surgical treatment of mandibular condylar fractures. These conditions are a prerequisite for reducing the likelihood of postoperative complications, as shown by our results.

CONCLUSION

The experience of a single center with extracapsular fracture of mandibular condyle head using a modified endaural approach has been presented. With accurate diagnosis, planning, and surgical dexterity, remarkable outcome is achieved in reduction of condylar fractures using a modified approach of endaural incision.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Villarreal PM, Monje F, Junquera LM, Mateo J, Morillo AJ, González C. Mandibular condyle fractures: Determinants of treatment and outcome. J Oral Maxillofac Surg 2004;62:155-63.
2. Zachariades N, Papavassiliou D. The pattern and aetiology of maxillofacial injuries in Greece. A retrospective study of 25 years and a comparison with other countries. J Craniomaxillofac Surg 1990;18:251-4.
3. Zachariades N, Mezitis M, Mourouzis C, Papadakis D, Spanou A. Fractures of the mandibular condyle: A review of 466 cases. Literature review, reflections on treatment and proposals. J Craniomaxillofac Surg 2006;34:421-32.
4. Silverman SL. A new operation for displaced fractures at the neck of the mandibular condyle. Dent Cosmos 1925;67:876-7.
5. Zide ME, Kent JN. Indications for open reduction of mandibular condyle fractures. J Oral Maxillofac Surg 1983;41:89-98.
6. Goss AN, Bosanquet AG. The arthroscopic appearance of acute temporomandibular joint trauma. J Oral Maxillofac Surg 1990;48:780-3.
7. Wood GO. Assessment following fracture of the mandible. Br Dent J 1980;149:137-41.
8. Pereira MD, Marques A, Ishizuka M, Keira SM, Brenda E, Wolosker AB. Surgical treatment of the fractured and dislocated condylar process of the mandible. J Craniomaxillofac Surg 1995;23:369-76.
9. Iizuka T, Lädrach K, Geering AH, Raveh J. Open reduction without fixation of dislocated condylar process fractures: Long-term clinical and radiologic analysis. J Oral Maxillofac Surg 1998;56:533-61.
10. Choi BH, Yi CK, Yoo JH. Clinical evaluation of 3 types of plate osteosynthesis for fixation of condylar neck fractures. J Oral Maxillofac Surg 2001;59:734-7.
11. Gerbino G, Boffano P, Tosco P, Berrone S. Long-term clinical and radiologic outcomes for the surgical treatment of mandibular condylar fractures. J Oral Maxillofac Surg 2009;67:1009-14.
12. Chen CT, Feng CH, Tsay PK, Lai JP, Chen YR. Functional outcomes following surgical treatment of bilateral mandibular condylar fractures. Int J Oral Maxillofac Surg 2011;40:38-44.
13. Spinizia A, Patrone R, Belli E, Dell’Aversana Orabona G, Ungari C, Filici F, et al. Open reduction and internal fixation of extracapsular mandibular condyle fractures: A long-term clinical and radiological follow-up of 25 patients. BMC Surg 2014;14:68.
14. Balaji SM. Condylar fractures – Open vs closed reduction – Review of 39 cases. J Maxillofac Oral Surg 2003;2:16-24.
15. Eckelt U, Schneider M, Erasmus F, Gerlach KL, Kuhlisch E, Loukota R, et al. Open versus closed treatment of fractures of the mandibular condylar process – A prospective randomized multi-centre study. J Craniomaxillofac Surg 2006;34:306-14.
16. Troulis MJ. Endoscopic open reduction and internal rigid fixation of subcondylar fractures. J Oral Maxillofac Surg 2004;62:1269-71.
17. Jensen T, Jensen J, Nørholt SE, Dahl M,Lenk-Hansen L, Svensson P. Open reduction and rigid internal fixation of extracapsular mandibular condyle fractures by an intraoral approach: A long-term follow-up study of 15 patients. J Oral Maxillofac Surg 2006;64:1771-9.
18. González-García R, Sanromán F, Goizuetada-Adame C, Rodríguez-Campo FJ, Cho-Lee GY. Transoral endoscopic-assisted management of subcondylar fractures in 17 patients: An alternative to open reduction with rigid internal fixation and closed reduction with maxillomandibular fixation. Int J Oral Maxillofac Surg 2009;38:19-25.
19. Leiser Y, Peled M, Braun R, Abu-El Naaj J. Treatment of low subcondylar fractures – A 5-year retrospective study. Int J Oral Maxillofac Surg 2013;42:716-20.
20. Ellis E 3rd, Dean J. Rigid fixation of mandibular condyle fractures. Oral Surg Oral Med Oral Pathol 1993;76:6-15.
21. Ellis E 3rd, Palmieri C, Throckmorton G. Further displacement of condylar process fractures after closed treatment. J Oral Maxillofac Surg 1999;57:1307-16.
22. Ellis E 3rd, Throckmorton GS, Palmieri C. Open treatment of condylar process fractures: Assessment of adequacy of repositioning and maintenance of stability. J Oral Maxillofac Surg 2000;58:27-34.
23. Ellis E 3rd, Simon P, Throckmorton GS. Occasional results after open or closed treatment of fractures of the mandibular condylar process. J Oral Maxillofac Surg 2000;58:260-8.
24. Ellis E 3rd, Throckmorton GS. Bite forces after open or closed treatment of mandibular condylar process fractures. J Oral Maxillofac Surg 2001;59:389-95.
25. Ellis E, Throckmorton GS. Treatment of mandibular condylar process fractures: Biological considerations. J Oral Maxillofac Surg 2005;63:115-34.
26. Ellis E 3rd, Walker RV. Treatment of malocclusion and TMJ dysfunction secondary to condylar fractures. Craniofacial Trauma Reconstr 2009;2:1-18.
27. Haug RH, Assael LA. Outcomes of open versus closed treatment of mandibular subcondylar fractures. J Oral Maxillofac Surg 2001;59:379-85.
28. Parascandolo S, Spinizia A, Parascandolo S, Piombino P, Califano L. Two load sharing plates fixation in mandibular condylar fractures: Biomechanical basis. J Craniomaxillofac Surg 2010;38:385-90.