Communication

Extraoral versus endoscopic-assisted transoral treatment modalities for mandibular condylar fractures: a current opinion

Manish Anand[1], Shreya Panwar[2]

[1]*Department of Oral and Maxillofacial Surgery, Meenakshi Ammal Dental College and Hospital, Chennai;* [2]*Department of Oral and Maxillofacial Surgery, Subharti Dental College, Swami Vivekanand Subharti University, Meerut, India*

Correspondence: Manish Anand
Department of Oral and Maxillofacial Surgery, Meenakshi Ammal Dental College, Chennai 600095, India
Tel: +91-8056246581, Fax: +91-7003435098, E-mail: manishanand028@gmail.com

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Introduction

The management of mandibular condylar process fractures is one of the most contentious subjects in the specialty of oral and maxillofacial surgery. From an epidemiological standpoint, condylar fractures account for 29%–40% of all facial fractures [1]. Perhaps the most debated topic is the decision to perform open versus closed treatment for condylar fractures. At present, with advances in technology and healthcare, there has been a clear paradigm shift from closed treatment to open treatment, which involves open reduction and rigid internal fixation. Now that is clear that open treatment is favored by most surgical teams, the second argument relates to choosing the approach of open treatment, and in particular whether to choose an extraoral approach or an intraoral/transoral approach. Although the literature has presented relevant indications for choosing an approach, the maxillofacial surgical community is becoming more inclined towards the intraoral approach using an endoscope. A possible explanation for this trend relates to the complications of open surgical treatment. Perhaps the most dreaded complication of the extraoral approach is the risk of damage to the facial nerve, as the facial nerve branches are directly encountered in this approach [2]. In contrast, using an intraoral approach, the facial nerve is not encountered during dissection, obviating that risk. Furthermore, the extraoral approach also leaves an unesthetic scar on the face, which can be unpleasant for patients [2,3]. With the intraoral approach, the surgical incision is made transorally; hence, the problem of the surgical scar is handled. Although the intraoral approach seems to have quite favorable benefits, the surgical procedure with an endoscope is complicated and requires a steep learning curve.

Controversies regarding the extraoral and intraoral approaches

The first use of endoscopy for craniomaxillofacial trauma dates back to 1991 when a group of German surgeons successfully treated a malar fracture with the aid of an endoscope [4]. However, the endoscopic technique was not initially widely adopted because of its increased technical demands and limited knowledge about its application. The extraoral approach remained a mainstay modality of condylar fracture reduction because of its straightforward access to the fracture site and the bony segment's fixation under visualization by the naked eye. Nevertheless, iatrogenic injuries to the facial nerve, facial scars, and postoperative complications such as parotid fistula and sialocele have always been concerns with the extraoral approach. With technological advances and a better understanding of pathology, those complications have drastically reduced in recent years. However, the intraoral approach has no such complications because the facial nerve and surrounding relevant anatomical structures, such as the parotid gland and parotidomasseteric fascia, are rarely exposed during surgery [2,5]. However, in the intraoral approach, the fracture segment is seen via an endoscopic lens that might be disorienting relative to the actual visualization, hampering the final fracture reduction.

The successful surgical outcome of any condylar fracture treatment must be evaluated according to the following parameters.

Postoperative facial nerve status

As per a systemic review by Al-Moraissi et al. [2], the extraoral approach is used for approximately 8%–14% of facial nerve injuries, which may involve transient to permanent damage of the nerve bundles. Interestingly, when analyzing various techniques with the extraoral approach, the author reported no cases of paraesthesia when using a transmasseteric anteroparotid approach, a retromandibular incision with preauricular extension, and a transmasseteric anteroparotid approach. On the contrary, the intraoral approach is used in only 0.72% of facial nerve injuries, reaching 4.2% when an endoscope or transbuccal trocar is introduced with an intraoral approach.

Ease of fracture reduction and fixation

In the extraoral approach, a surgeon can continuously see the surgical field, which allows the surgical team to manipulate and fixed the fracture segment with high levels of precision and accuracy. However, in the intraoral approach, handling the fractured bony segment requires an additional set of instruments, such as an angled screwdriver, a transbuccal trocar, and an endoscope. This necessitates technical skills and experience, and the manipulation of these instruments in a closed cavity makes it highly challenging for the surgical team to operate [3]. Nevertheless, an endoscope offers a magnified view of the

fractured segment, which aids surgeons in placing hardware on the osteosynthesis line.

Clinical outcomes

The clinical factors in terms of the postoperative kinematics of mandibular movement are relatively similar in both approaches, as stated in most clinical papers [3,5,6]. This is because postoperative occlusion and mandibular movement depend on the anatomically accurate reduction of fractured segments and postoperative physiotherapy. However, the intraoral approach requires minimal soft tissue dissection in terms of morbidity, which results in less edema and allows an early return to function. On the contrary, in the extraoral approaches, dissection is carried out extensively near the parotid gland, resulting in a chance of postoperative parotid fistula and sialocele, which may jeopardize the patient's final clinical outcomes [2].

Overview and closing statement

Facial nerve injuries and surgical scars were the two primary considerations behind the introduction of the intraoral approach. Facial nerve injuries depend on the surgeon's skill and, to some extent, on the choice of technique. These iatrogenic injuries can be easily avoided by a good knowledge of anatomy and by choosing less anatomically hazardous extraoral approaches to the mandibular condyle, such as the peri-angular approach, transmasseteric anteroparotid approach, and retromandibular approach [7]. A surgical scar resulting from the extraoral approach can now be easily managed by a smaller incision and subcuticular suturing. Moreover, the surgical incision in the extraoral approach is placed on a relaxed skin tension line, which provides excellent camouflage of the incision. The surgical outcomes with both approaches are excellent in terms of clinical or functional consideration. However, in a developing nation, the intraoral approach is still not a viable option because of the additional requirement for expensive instruments, prolonged operating time, and non-coverage by medical insurance, which increases the financial burden to patients and hospitals. To conclude, open reduction and internal fixation with an extraoral approach will remain a gold standard as it has withstood the test of time.

Future outlooks

The two discussed treatment approaches serve as excellent methods for fracture reduction and fixation. However, the surgical team's ultimate decision must be made based on their experiences and the nature of the injury. In the near future, it will be possible to combine the advantages of both approaches and create a novel technique that will supersede the two discussed approaches. For example, the poor visibility of the intraoral approach can be overcome by using intraoperative 3-dimensional (3D)-arm cone-beam computed tomography and intraoperative navigation that enables surgeons to monitor fracture reduction in all three anatomical planes continuously [8,9]. Virtual surgical planning with a digital template is another innovative option that has a proven ability to facilitate precise intraoperative reduction of the fracture segment [10]. Increased surgical accessibility during the intraoral approach can be achieved by modifying the design of the instruments. Recently, a fragment manipulator has been introduced, which acts as a "joystick" and facilitates optimal manipulation of the fracture fragments in all three planes. In terms of plate osteosynthesis, two plates are always preferred over one plate, as stated by Strasbourg, and it must be placed over an ideal line of osteosynthesis. It is often challenging to fix two plates with an intraoral approach because of inadequate surgical access. To overcome this challenge, an angulated screwdriver and the transbuccal system have been introduced, allowing surgeons to accurately place two plates along the ideal line of osteosynthesis via an extraoral stab incision. Another significant advancement has been made in the design and biomechanics of the plates used for fixation; for instance, 3D plates such as delta, strut, and lambda plates have shown optimal results in terms of anatomical reduction and fixation [11,12]. The main advantage of 3D plates is that they require only one plate, unlike two straight plates in conventional fixation. However, multiple studies have reported inconsistent clinical outcomes with the use of 3D plates [13-15]. Researchers are modifying 3D plates to have more versatile dynamics through finite element analysis, which might lead to superior outcomes in comparison to traditional mini-plates.

Notes

Conflict of interest

No potential conflict of interest relevant to this article was reported.

Author contribution

Conceptualization: M Anand, S Panwar. Project administration: S Panwar. Data curation, formal analysis: M Anand. Writing - review & editing: M Anand. Approval of final manuscript: all authors.

ORCID

Manish Anand https://orcid.org/0000-0002-6897-6312
Shreya Panwar https://orcid.org/0000-0003-4069-2809

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