Case Report

Treating of old dislocation of mandibular condyle into the middle cranial fossa by gap arthroplasty combined with temporalis myofascial flap implanting: a case report

Pan Liu¹, Fujun Li¹, Liwei Peng²

¹Department of Oral and Maxillofacial Surgery, The First Affiliated Hospital, College of Clinical Medicine of Henan University of Science and Technology, Luoyang City, Henan Province, China; ²Department of Oral and Maxillofacial Surgery, Henan Provincial People’s Hospital, Zhengzhou City, Henan Province, China

Received July 20, 2017; Accepted August 23, 2017; Epub September 15, 2017; Published September 30, 2017

Abstract: Objective: To report a new therapeutic tactic for the old dislocation of intact mandibular condyle into the middle cranial fossa, which is extremely rare while the reported treatment methods are varied. Methods: The subject was a 29-year-old female who was diagnosed with old dislocation of intact left mandibular condyle into the middle cranial fossa and left zygomatic arch fracture. Gap arthroplasty combined with implanting the temporalis myofascial flap to the gap was performed. Results: Both her mouth opening ability and mandibular movement almost restored to normal level six months after surgery. Conclusion: The gap arthroplasty combined with temporalis myofascial flap implanting is useful in the treatment of old dislocation of condyle into the middle cranial fossa.

Keywords: Dislocation of the condyle, middle cranial fossa, gap arthroplasty, temporalis myofascial flap implanting, open reduction

Introduction

Clinically, complete traumatic anterior dislocation of the mandibular condyle from the glenoid fossa is common; conversely, condyle dislocation into the middle cranial fossa is a rare event [1]. To date, only about 50 such cases were reported in English literatures, especially, few of them were aimed at old dislocation [2, 3]. Among these documents, even though a variety of therapeutic methods have been reported, such as closed reduction and open reduction, it is still a challenge for the treatment of the old dislocation of the condyle into the middle cranial fossa [2]. Herein, we presented a case of 29-year-old female who suffered from old and severe dislocation of her left intact mandibular condyle into the middle cranial fossa and a new therapeutic tactic on such injury.

Case report

A 29-year-old female consulted in our department with complaints of difficulty in her mouth opening for five weeks. 5 weeks ago, she suffered from coma caused by a traffic accident that struck her jaw on the ground. She was taken to a local hospital immediately and examined by computed tomography (CT) with three-dimension reconstruction of skull, maxilla and mandible. When awake, her chief complaints were limitations of mouth opening, malocclusion, and chin deviation to the left. Therefore, intermaxillary elastic traction (IMT) was performed to try to repair the dislocated condyle. After 5 weeks' IMT, chin deviation, malocclusion, restricted movement of mandible still existed.

Then she was transferred to our hospital. The physical exam indicated that the chin deviation to the left side, meanwhile, malocclusion with anterior open bite and limited mouth opening could be observed (Figure 1), additionally, mandibular lateral motion was limited. The primary CT scan showed that her left zygomatic arch was fractured and left condyle had broken and dislocated through the glenoid fossa into the
A case report of dislocation of mandibular condyle into the middle cranial fossa

middle cranial fossa (Figure 2A, 2B). CT reexamination showed that the left condyle was remaining in the intracranial space as before. Moreover, neurosurgical consultation showed no intracranial complication.

After signing informed consent, she was taken to operation room for further treatment. The patient first underwent closed manual reduction of dislocated left condyle, however, the mandibular ramus was as motionless as a statue. Then following induction of anesthesia, a 3 cm incision was made in the left submandibular region to exposed left mandible angle. We dragged and gripped mandible angle with a fracture clamp combined with intraoral pressure. However, the whole condylar head which had already almost dislocated into the fossa resulted in the failure of the surgery. In addition, open reduction and rigid internal fixation were also carried out for the fracture of the left zygomatic arc. During operation, the condylar stump was found to tightly stick in the middle cranial fossa.

Afterwards, we then performed gap arthroplasty on her left condyle to avoid probable intracranial injury and temporalis myofascial flap was prepared and filled into the gap to avoid ankylosis of the joint. Briefly, the osteotomy was performed between the neck of the left condyle and the sigmoid notch while the width was about 1 cm. A temporalis fascial flap with a size about 6 cm×3 cm was prepared, of which the anatomy and surgical technique has been well documented [4]. Then the prepared flap was filled and sutured in the space as an inter-positional graft (Figure 3A, 3B). After these procedures, the patient’s left mandible was released and the jaw movement was successfully restored.

The patient was satisfied with the surgical treatment outcomes as the preinjury occlusion disappeared and chewing movement got easier immediately after surgery. We performed IMT on postoperative day 2 for a half month to maintain her postoperative occlusion. At 17th day after the surgery, postoperative images of both frontal picture and CT scans showed that the occlusion was well recovered, and the condylar head has got back to the primary site (Figure 4A-C). Six months after surgery, the patient had restored her normal occlusion and mouth opening (Figure 5A, 5B). There was no intracranial complication after the surgery.

Discussion

Dislocation of mandibular condyle into the middle cranial fossa is a kind of rare cases, which may be due to the anatomical features of mandible [5]. The self-protection mechanisms of the mandible play an important role in resisting condyle intracranial dislocation, which mainly work in three different ways: first, the condylar neck trends to fracture under appropriate force, thus to prevent the force is directly upwards transmitted against the glenoid fossa; second, the improvement of mediolateral length of the scroll-shaped condyle for most adult mandibles may assist to transmit the force across the fossa in the region with large surface area; last, posterior teeth may cushion the force so as to decrease occurrence of secondary condyle dislocation, moreover, the meniscus and musculature of the joint may additionally help reduce the impact forces [6-11]. Therefore, dislocation of condyle into the middle cranial fossa only occurs when such self-protection mechanisms were absent or abnormal. For example, a small and round condyle and an open mouth on impact combined with a posterior-superiorly directed blow to the jaw may lead to this intracranial dislocation [12-15]. In addition, children who lack mature medial and lateral poles of mandibular condyle are susceptible for such kind of injury [16-18].

The clinical findings of mandibular condyle dislocation into the middle cranial fossa were vary with each individual, including asymmetry of the face like shortening of the facial height on the injured side, occlusal disorders in the form.
A case report of dislocation of mandibular condyle into the middle cranial fossa

of premature contact on posterior teeth and anterior teeth open bite, limited mouth opening, mandibular motion limitation, pain in the preauricular region, and intracranial tissue complications such as cerebrospinal fluid leakage, intracranial hematomas, facial nerve paralysis and so on [19, 20]. And these clinical findings are quite similar to that of subcondyle fracture, which may lead to misdiagnose when the doctor only diagnoses by clinical findings and routine radiographic images such as CT which has a prominent significance in diagnosing such injury, especially its coronal image and three-dimension reconstruction [18-22].

The treatment of this injury should be individualized and should consider the patient’s age, growth potential, the degree of glenoid fossa destruction, the risk of ankylosis, and the risk of further intracranial injury [21]. Thus, the therapeutic goals in mandibular condyle dislocation into the middle cranial fossa mainly were to restore the normal function of mandibular movement, acquire preinjury occlusion, avoid further damage to the intracranial tissue, and prevent recurrent dislocations and long-term complications, such as joint ankylosis [13, 19, 23].

In the previous reports, various therapeutic methods have been presented, such as closed reduction and open reduction [21, 22, 24]. Among them, closed reduction with intermaxillary fixation has been proposed by many authors as the simplest and least traumatic method for intracranial dislocation of the condyle. That’s because closed reduction is easy to perform and it can restore and maintain the physiological function of the mandible condyle extremely, especially for children whose condyles are serving as growing centers [19]. However, it is crucial to perform open reduction when condylar fracture occurs, the proper interventions are delayed or dislocation is involved in cerebral injuries [19, 20].

Open reduction includes craniotomy, condylectomy, condylotomy, subcondylar osteotomy, reposition without osteotomy, and combining with intracranial bone implantation or glenoid fossa reconstruction [18-20, 24], among which open reduction combined with glenoid fossa reconstruction can be performed after the condyle has been exposed intracranially by craniotomy or after the condylar neck and glenoid fossa have been exposed through extracranial approach [5]. Even though this method can ensure the postoperative function of the mandible, it is involved with more risk. Meanwhile, the close collaboration between the surgeons

Figure 2. The CT image showing that left glenoid fractures and condyle penetrates into the middle cranial fossa. A. Three-dimension reconstruction image; B. Coronal image.

Figure 3. Intraoperative views. A. The temporalis fascial flap was prepared; B. The temporalis fascial flap was filled into the space as an inter-positional graft.
A case report of dislocation of mandibular condyle into the middle cranial fossa

In both maxillofacial surgery and neurosurgery was essential as well. Moreover, intracranial complications such as intracranial infection, leakage of cerebrospinal fluid may happen and the possibility of ankylosis exists because of the damaged articular disk [5, 21].

Including this case, about 50 such cases have been reported in English literature [25]. Compared with most of other cases, this case has two characteristics: first, it is an old dislocation of mandibular condyle into the middle cranial fossa as the patients was put off the proper treatment for 5 weeks from she got injury to transferred to our hospital; second, the protrusion of the dislocated condyle that stuck in the middle cranial fossa was nearly beyond the neck of the condyle, of which the depth was more than that of most published cases.

For the patient in this case whose treatment is extensively delayed, closed reduction is not a suitable therapeutic method, because the ossification developed between the condylar neck and skull base during the five-week delay. Moreover, as the patient’s intracranial tissue has not been damaged, open reduction combined with glenoid fossa reconstruction is also unnecessary because of the longer surgical operative time and the higher possibility of damaging the intracranial tissue of open reduction combined with glenoid fossa reconstruction.

Gap arthroplasty, as a special therapeutic method for this unique case, can reduce the intracranial complications to the utmost. He et al proposed that gap arthroplasty could apply for the patients with delayed treatment who had extensive adhesion between the skull base and the condyle [21]. Although gap arthroplasty may influence the function of the posterior mandible, it can shorten the operative time and reduce the treatment complexity than open reduction with glenoid fossa reconstruction. Additionally, the patient’s chewing function and occlusion after gap arthroplasty will not be impacted too much.

Temporalis myofascial flap, as a very reliable regional flap, has already been applied for defects reconstruction in the oral and maxillofacial region, such as mandible, orbit and eyelids, chin, cheek, maxilla, tongue, palate, and the base of skull [26-28]. It has also been used for the surgical treatment of temporomandibular joint ankylosis as an inter-positional graft [29, 30]. The less complications in the donor-site and the better adaptability in the recipient site both contribute to the good promotion of the temporalis flap application. However, the combination of gap arthroplasty and temporalis myofascial flap implanting has not been reported to be applied for the surgical treatment of

Figure 4. Postoperative images at 17th day after the surgery. A. The occlusion was well recovered; B. Coronal image from CT scan; C. Three-dimension reconstruction image showed that the condyle head has got back to the primary site.

Figure 5. Frontal views of the patient six months after surgery. A. The patient’s occlusion was good; B. The patient’s mouth opening was over 3 cm.
A case report of dislocation of mandibular condyle into the middle cranial fossa

old dislocation of mandibular condyle into the middle cranial fossa. Considering all the characters of this case, this combined treatment was adopted to treat the patient, which showed a satisfied result during the half-year follow-up. We suspect that the implanting of temporalis myofascial flap can effectively prevent the occurrence of the temporomandibular joint ankylosis.

In conclusion, gap arthroplasty combined with temporalis myofascial flap implanting can be regarded as an ideal therapeutic method for the old and severe dislocation of condyle into the middle cranial fossa without intracranial damage.

Acknowledgements

This paper was supported by Medical Science Research Project of Henan Province (2013-04040).

Disclosure of conflict of interest

None.

Address correspondence to: Liwei Peng, Department of Oral and Maxillofacial Surgery, Henan Provincial People's Hospital, No.7 Weiwu Road, Zhengzhou City, 450003, Henan Province, China. Tel: +86-18538298135; E-mail: lwp17770@163.com

References

[18] Rosa VL, Guimeares AS and Marie SK. Invasion of the mandibular condyle into the middle


