Dislocation of the mandible into the middle cranial fossa

Case report

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Dislocation of the mandibular condyle into the middle cranial fossa is a rare event due to anatomical and biomechanical factors. The authors report the case of a 12-year-old girl who presented with this condition after colliding with a classmate. One day after her injury, the patient demonstrated an inability to close her mouth completely, and she had minor tenderness to palpation anterior to the tragus, without neurological deficits. Imaging studies demonstrated a fractured glenoid fossa with intrusion of the mandible into the cranial cavity. Open reduction of the mandibular condyle was performed, and the glenoid fossa was reconstructed with a split-thickness bone graft and titanium screws. Several dural tears noted at the time of surgery were repaired primarily.

Mandibular condyle dislocation into the middle cranial fossa is often misdiagnosed initially because of its low incidence and nonspecific symptoms. Computed tomography scanning is the most sensitive diagnostic study for detecting this injury. Closed reduction after induction of general anesthesia has been recommended in recently suffered injuries without neurological deficits, but this approach may overlook damage to intracranial structures. Surgical repair is recommended if neurological injury is suspected. Treatment options should be tailored to the individual factors of each case. (DOI: 10.3171/PED-07/07/075)

KEY WORDS • fracture • mandible dislocation • mandibular condyle • middle fossa • pediatric neurosurgery • temporal fossa

Case Report

History. This 12-year-old previously healthy girl presented to the emergency department with headaches and an inability to touch her teeth together on the left side of her mouth. On the previous day she had collided with another child at school. She did not lose consciousness and was able to go about her activities for the rest of the day. She was taken by her parents to the emergency department after they noticed that she could not close the left side of her mouth.

Physical Examination. On examination, the patient was awake and alert, and her tongue was midline. She had normal facial sensation. Notably, she had a shift of her dental midline to the right, an open bite of her left posterior occlusion, and minor tenderness to palpation on the right side of her face, just anterior to the tragus, without soft tissue swelling. She could not fully open the right side of her mouth, indicating loss of function of the lateral pterygoid muscle.

Neuroimaging. A head CT scan obtained without contrast (Fig. 1) revealed a hyperdense lesion consistent with bone in the right temporal fossa. There was edema in the brain surrounding the displaced bone. Coronal reconstructions

Abbreviation used in this paper: CT = computed tomography.
(Fig. 2) revealed the head of the mandibular condyle protruding into the right middle cranial fossa.

Operation and Follow-Up Evaluation. The patient was taken to the operating room for a joint neurosurgical and oral maxillofacial surgical procedure to reduce the head of the mandibular condyle and repair the floor of the middle fossa. A right frontotemporal craniotomy was performed. Once the head of the mandibular condyle was exposed in the temporal fossa, the mandible was reduced externally with traction by oral maxillofacial surgery. The occlusion was then stabilized by performing a maxillomandibular fixation. A split-thickness skull graft from the bone flap was placed over the hole in the middle fossa and secured to the skull base with titanium screws. Great care was taken to use the shortest possible screws and to angle them away from the condylar head. This was done to maintain joint integrity to the greatest possible extent. Several dural tears from the initial injury were found, which were primarily repaired. The maxillomandibular fixation was removed to test the patient’s dental occlusion and range of jaw motion. Her jaw was then wired back into the maxillomandibular fixation by the oral maxillofacial surgery team. A postoperative CT scan showed a good repair (Fig. 3). The patient did well postoperatively and was discharged home several days later.

Postoperative Course. At her 1-month follow-up evaluation, the patient was doing well with no report of pain. Her maxillomandibular fixation was removed, and she started physical therapy with a Therabite jaw motion rehabilitation system. At her 1-year follow-up visit, she was eating normally, with a normal jaw opening. On maximum opening of the jaw, there was only a slight deviation of the jaw to the right, indicating some degree of loss of function of the lateral pterygoid muscle.

Discussion

Including this case, there have been 42 reported instances of mandibular condyle intrusion into the middle cranial fossa in the English literature\textsuperscript{1,2,4,6,10-21,24-31,33-43} with another 14 references in the non-English literature.\textsuperscript{3,19,22,23,26,32} With regard to the English literature, the mean age of patients is 22.6 years, with a standard deviation of 15.5 years and an age range between 5 and 64 years. More than half (54.8%) of the patients belong to the pediatric population (defined as \( \leq 18 \) years of age). Females are more than twice as likely to be affected as males, and this female predilection is even more pronounced in the pediatric population, especially in the youngest children (Table 1). Motor vehicle accidents account for the majority of cases (52.4%), with bicycle accidents being the second most common cause (26.2%; Table 2).

Anatomical considerations explain the infrequency of mandibular condyle dislocations into the middle cranial fossa. The relative weakness of the condylar neck leads to the tendency for fractures to occur in the subcondylar region when force is applied to the mandible. Most often, the mandible is displaced posteriorly after fracture of the condylar neck.\textsuperscript{2,6,14} Moreover, in experimental studies performed by da Fonseca,\textsuperscript{9} that investigator found that the normal scroll-shaped condylar head is well anchored in the glenoid fossa by ligamentous attachments and is larger than the fossa, preventing superior dislocation through the central glenoid fossa in most instances. Given these multiple protective fac-
Mandible dislocation into middle cranial fossa

**TABLE 1**

<table>
<thead>
<tr>
<th>Age (yrs)</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–12</td>
<td>3</td>
<td>12</td>
<td>15</td>
</tr>
<tr>
<td>13–18</td>
<td>3</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>19–50</td>
<td>5</td>
<td>11</td>
<td>16</td>
</tr>
<tr>
<td>&gt;51</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>total</td>
<td>13</td>
<td>29</td>
<td>42</td>
</tr>
</tbody>
</table>

Conclusions

We report the case of a 12-year-old girl who suffered a dislocation of the mandibular condyle into the middle cranial fossa following trauma to her face. The patient was treated with a craniotomy for open reduction and repair of the floor of the middle fossa. This case demonstrates the circumstances needed for this rare event to happen. In cases such as this, we recommend that an individualized treatment plan be developed and that surgical exploration and repair be undertaken if neurological injury is suspected.

**References**

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