16. Chambers AJ, Lord RS: Incidence of acquired immune defi-
ciency syndrome (AIDS)-related disorders at laparatomy in pa-
outcome in patients with human immunodeficiency virus in-
fection and acquired immunodeficiency syndrome. Am J Surg
180:228, 2000
infection among burn patients in a burns unit in Malawi and its
19. Patton LL, Shugars DA, Bonito AJ: A systematic review of com-
plication risks for HIV-positive patients undergoing invasive
20. Diz Dios P, Fernandez Feijoo J, Vazquez Garcia E: Tooth ex-

Traumatic Dislocation of the Mandibular
Condyle into the Middle Cranial Fossa
Treated With Immediate Reconstruction:
A Case Report

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While fractures of the mandible condylar process are
common, accounting for 29% to 40% of mandibular
trauma,1 dislocation of the mandibular condyle through
the glenoid fossa and into the middle cranial fossa is rare.
Less than 45 known cases have been reported in the
literature.2 This report documents another occurrence
of this rare event with its treatment and immediate
reconstruction of the glenoid fossa with a cranial bone
graft.

Report of a Case

A 7-year-old boy reported to an outside hospital following
a 4-wheel all-terrain vehicle collision where he was thrown
from the vehicle and struck his chin on the ground. He was
transferred to the Children’s Medical Center of Dallas Emer-
gency Room for treatment. He was neurologically intact and
his chief complaints were right-sided jaw pain, limited
mouth opening, and malocclusion with an anterior open
bite.

Physical exam revealed chin deviation to the right (Fig
1A), limited mouth opening (Fig 1B), malocclusion, right
preauricular tenderness to palpation, and a luxated maxil-
lar right central incisor. There were no signs of hemot-
typani or cerebrospinal fluid otorrhea.

Plain radiographs (Fig 2) and computed tomography
scans (Fig 3) revealed a superiorly displaced right mandib-
ular condyle in the middle cranial fossa. Immediate consul-
tation with the Neurosurgical and Oral and Maxillofacial
surgery teams was initiated and the patient taken to the
operating room for treatment.

Following induction of general anesthesia and nasotracheal
intubation, an incision extending from the right
temporal line along the anterior aspect of the ear down to
the earlobe was completed and the temporomandibular
joint accessed in the standard fashion (Fig 4A). Once
access to the temporomandibular joint was completed, it
was noted that the mandibular condyle was dislocated
through the fractured glenoid fossa into the cranial base
(Fig 4B). The neurosurgical team then performed a cra-
niotomy in the right temporal fossa region and the bony
window was removed (Fig 4C). With retraction of the
brain in the right temporal region, the right mandibular
condyle was visualized (Fig 4D). With inferiorly directed
force applied to the posterior mandible and inferior pres-
sure placed on the condyle with a periosteal elevator, the
mandible was able to be reduced and placed back into
the remnants of the glenoid fossa (Fig 4E). Following
reduction of the mandibular condyle, a dural tear with
exposed brain matter was successfully repaired by the
neurosurgical team. Inspection of the right mandibular
condyle showed that it was intact without any evidence
of fracture. The right temporomandibular joint disk was
found to be grossly medially displaced. The articular disk

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was successfully repositioned and sutured into place with Nurolon suture (Johnson & Johnson, New Brunswick, NJ) (Fig 4F). A portion of the bony window that had been removed during the craniotomy was used to reconstruct the glenoid fossa from above the fracture site and sutured into place (Fig 4G). A sheet of Gelfilm (Pharmacia & Upjohn, Kalamazoo, MI), an absorbable gelatin film approximately 0.075 mm in thickness, was then placed above the temporomandibular disk to provide an additional barrier against adhesions between the articular surface and the dura. Lactosorb (Biomet, Inc, Warsaw, IN) plates and screws were then used to reconstruct the craniotomy site (Fig 4H). The maxillary right central incisor was repositioned and the patient placed into maxillomandibular fixation (MMF) with Erich arch bars. Postoperative panoramic and lateral cephalometric radiographs showed that the mandibular condyle had been restored to its proper position within the glenoid fossa and symmetrical inferior borders of the mandible (Fig 5). The patient did well postoperatively and was released from MMF at 3 weeks postoperatively. At 7 weeks, his facial symmetry was restored (Fig 6A), he had good mandibular mobility although he deviated to the right on wide opening (Fig 6B), and a normal occlusal relationship. His arch bars were then removed. The patient has continued to do well and is now 6 months postsurgery.

Discussion

Dislocation of the mandibular condyle into the middle cranial fossa is a rare event, which is evident from
the small number of reported cases, for several reasons. Experimental studies completed by Fonseca have shown that the condylar head is much larger than the glenoid fossa, making central luxation difficult. However, this type of injury is much more common in children because younger individuals can have underdeveloped medial and lateral poles of the mandibular condyle, and a rounded condyle may be more easily superiorly displaced through the relatively weak middle of the glenoid fossa. Even in this situation, special circumstances must occur for this type of injury to take place. Seymour and Irby and Musgrove have suggested that the combination of an open-mouth position on impact with a posterior-superiorly directed blow to the chin may produce such an injury.

The clinical examination in this case consisted of preauricular tenderness, mandibular deviation to the side of the injury, malocclusion with anterior open bite, and restricted mouth opening that were consistent with numerous previously reported cases. While no neurological deficits were noted in this case, previous cases have reported hearing loss, cerebral spinal fluid otorrhea, and facial nerve injury, as well as hemorrhaging from the external auditory canal.

Radiographic imaging in these cases is imperative to determine the exact nature of the injury because mandibular condyle dislocation into the middle cranial fossa may clinically mimic a subcondylar fracture. Plain radiographic imaging has been reported as being difficult to interpret condylar position. Therefore, computed tomography imaging is the most beneficial tool available to accurately diagnose these injuries. As evidenced in this case, computed tomography imaging (Fig 3) clearly reveals the position of the mandibular condyle displaced into the middle cranial fossa, while plain radiographs may be ambiguous (Fig 2).

Several treatment modalities have been proposed for treatment of this type of injury, ranging from closed reduction with intermaxillary fixation to craniotomy with open reduction and glenoid fossa reconstruction with autogenous and alloplastic materials. A protocol for treatment has been presented by Kroestch et al, who advocate closed reduction under general anesthesia with postoperative computed tomography scans to ascertain any possible new intracranial injuries. They only advocate craniotomy with open reduction and reconstruction for patients with neurologic complications or associated facial fractures, long delays in treatment, or failed attempts at closed reduction. In our case, with a large amount of displacement of the mandibular condyle into the middle cranial fossa, intracranial exploration was deemed necessary. This proved appropriate in our case because dural lacerations were discovered and had to be repaired. Traumatic damage to the dura has been associated with meningitis, seizures, cerebrospinal fluid leakage, and hematoma.

Immediate reconstruction with both alloplastic materials, such as titanium mesh, and autogenous sources, such as rib or cranial bone, has been successful in reconstructing the glenoid fossa. The goals of reconstruction have been to prevent recurrent condylar dislocations, to restore posterior facial height, and to restore normal function to the joint. In placing an autogenous cranial bone graft over the glenoid fossa defect, faster healing and support of the fossa likely occurs. A brief period of intermaxillary fixation removes any load bearing on the joint. Gel film, an absorbable gelatin film approximately 0.075 mm thick, is applied to the dural incision to prevent cerebrospinal fluid leakage. The bone graft is then contoured until it is flush with the glenoid fossa. This bone graft is covered with a piece of autogenous cranial bone that has been shaped to fit around the borders of the bone graft and the cranial bone stock. A piece of titanium mesh, contoured to fit the fossa, is then placed over the bone graft and cranial bone. The bone graft is then stabilized with autogenous bone pegs (Fig 4). Finally, the dural incision is repaired with absorbable suture. Although the authors recommend craniotomy for all cases of condylar dislocation into the middle cranial fossa, they have not done a prospective study to determine which cases truly warrant craniotomy. However, in cases where the condylar head is displaced into the middle cranial fossa, dural lacerations have been noted and will not heal without craniotomy. The dura is repaired with 2-0 or 3-0 absorbable suture. The skin is then closed with a running subcuticular stitch using either catgut or nylon. The patient is placed on a neurosurgical service for postoperative observation. The authors have not noted any cases where the skull has been left open due to complications. Postoperatively, patients are observed closely for any neurologic change.}

**FIGURE 3.** Coronal (A) and sagittal (B) computed tomography showing displacement of the mandibular condyle into the middle cranial fossa.

FIGURE 4. Photographs demonstrating surgical procedure. A, Outline of extended preauricular incision. B, Exposure of the temporomandibular and lateral skull showing that the condylar process is impacted within the middle cranial fossa. C, Small craniotomy made through temporal bone. D, Retraction of the dura showing the condyle. E, Dural tear being demonstrated. F, Condylar process has been replaced to its normal position in the mandibular fossa and the articular disc has been sutured to the posterior aspect of the condyle. G, Roof of the articular fossa (floor of the middle cranial fossa) reconstructed with calvarial bone. H, Craniotomy opening reconstructed with combination of calvarial bone and resorbable mesh.

mm in thickness, was placed between the cranial bone graft and temporomandibular disc to decrease the likelihood of adhesion development. It is commonly used in neurosurgical procedures to cover dural defects because it does not produce an inflammatory reaction and absorbs at a sufficiently slow rate to permit adequate healing.

In conclusion, superior dislocation of the mandibular condyle into the middle cranial fossa is a rare event that predominately occurs in children because of the anatomic composition of the mandibular condyle and the weakness of the middle glenoid fossa. Appropriate imaging is required to accurately diagnose these injuries as they may mimic subcondylar mandible fractures. Neurosurgical consultation is warranted in the majority of cases, and treatment options can vary from closed reduction to craniotomy and open reduction with reconstruction of the glenoid fossa with either alloplastic or autogenous materials.

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**FIGURE 5.** Postoperative panoramic (A) and lateral cephalometric radiographs (B) showing repositioning of the right mandibular condyle into the mandibular fossa.


**FIGURE 6.** Frontal photograph (A) taken at 7 weeks postsurgery showing good facial symmetry. Mouth opening (B) at 7 weeks shows deviation to the right upon opening.


References

Intraoral Endoscopic Enucleation of a Central Mandibular Condylar Lesion

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Surgeons are challenged daily to minimize invasive procedures for the benefit of their patients. Advancements in technology and equipment over the past 20 years have allowed surgeons from every discipline to diagnose and treat diseases through orifices and small incisions with the aid of the endoscope.1 Otorhinolaryngologists and oral and maxillofacial surgeons are routinely using endoscopy for craniofacial surgery, cosmetic surgery, temporomandibular joint surgery, sinus surgery, nasal surgery, laryngeal surgery, and trauma surgery. Recent applications of endoscopic techniques allow for a greater visualization of the operative field by magnifying the view through the aperture of telescopic lenses and transferring the image to a television monitor. Suarez-Cunqueiro et al2 published a report regarding the use of endoscopic techniques for the treatment of an ectopic mandibular molar.2 Other authors have suggested using endoscopy to access the mandibular ramus and condyle.3-5 This article presents an expanded application of endoscopic surgery for intraoral enucleation and curettage of a central lesion of the mandibular condyle in an asymptomatic 14-year-old female patient. The preoperative evaluation, radiographic studies, and differential diagnoses are reviewed, and the operative procedure is described. The final diagnosis is that of a solitary bone cyst of the left mandibular condyle.

Solitary Bone Cysts

Cysts and tumors within the mandibular condyle are extremely rare. Review of the subject reveals few documented cases of a solitary bone cyst in this anatomic region, and these cysts overall account for about 2% of all cysts occurring within the jaws.6

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