CASE REPORT

A paediatric case of bilateral mandibular condyle fracture presenting with bloody otorrhoea following trauma

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SUMMARY

A 7-year-old boy presented to the emergency department with bilateral bloody otorrhoea after falling from his scooter. Skull base fracture was suspected. CT showed no evidence of skull base fracture but bilateral mandibular condyle and external acoustic canals fractures. We report this case to illustrate a rare possibility of bilateral external acoustic canal fracture associated with condylar fracture in trauma patients presented with bloody otorrhoea.

BACKGROUND

Bloody otorrhoea or haemotympanum is a recognised sign for skull base fracture following head trauma. About 4% of all head injuries include skull base fractures,¹ which extend commonly to the superior wall of the external auditory canal (EAC) and results in the classic symptom of bloody otorrhoea. As such, the positive predictive value of bloody otorrhoea for skull base fracture is 70%.² However, the EAC is also closely related to the mandibular condyle anatomically. Therefore, bloody otorrhoea can also result from injury to the mandibular condyle. The occurrence of this combination of injury patterns is, however, rare, and no case has been reported among the paediatric trauma patients.

CASE PRESENTATION

A 7-year-old boy fell from his scooter and was presented to the accidents and emergency for

suspected head injury. He did not wear helmet or any protective device. Bleeding from both ears was noted, and he refused to talk after the event. He was treated as having severe head injury.

On arrival to our unit, the child could barely vocalise and was unable to provide appropriate verbal response. He was rated with a Glasgow Coma Scale (GCS) of 13/15 (E4V3M6). The blood pressure and pulse were 121/89mmHg and 98/min respectively. SaO₂ was 100% in room air. He was afebrile. Both ear canals were filled with blood on examination. Further otoscopic examination was obscured by the blood in the ear canal. Pupils were equal at 3 mm diameter and were responsive to light. There was no scalp wound or swelling found. Localised tenderness was noted around the tragus regions. A 1 cm chin laceration was noted. Cervical spine, chest, abdomen and pelvic examination were unremarkable. Limb power was full and no focal neurological abnormality found.

INVESTIGATIONS

Neurosurgeon was consulted for suspected skull base fracture. Urgent plain CT brain and cervical spine was done. The imaging showed fractures of bilateral mandibular condyles with a displaced medial fragment on the left side (figure 1). Soft tissue swelling was noted at both mandibular fossae, with gas density was noted within left mandibular fossa. Fracture lines were evident at the floors of both EACs (figures 2 and 3). There was also fluid density in the left EAC and middle ear. No obvious skull base fracture was identified. The C spine was normally aligned without fracture line seen.

DIFFERENTIAL DIAGNOSIS

1. Skull base fracture.
2. Injury to external acoustic meatus from mandibular condyle.

OUTCOME AND FOLLOW-UP

The patient was admitted and consultation to ENT surgeon and oral maxillofacial surgeon (OMS) was made. Bilateral EAC laceration was found on further assessment. Hearing assessment was normal. OMS assessment showed satisfactory occlusion of the mouth and thus the condyle fractures could be managed non-operatively. The child tolerated soft diet and early mobilisation of jaw was

Figure 1 Bilateral mandibular condyle fractures. There is displaced medial fragment on the left side.

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Figure 2 Arrows pointing to suspected fracture lines over the floors bilateral external acoustic meatus.

encouraged to reduce fibrotic changes of the temporomandibular joints (TMJs). He was discharged 2 days later.

DISCUSSION

This is the first reported paediatric case of bloody otorrhoea caused by bilateral condyle and EAC fractures. An adult case involving a female who fell from 20 feet high and sustained comminuted EAC fracture has been reported.³ That adult case sustained a much greater impact force and more extensive injury of the jaw bones and comminuted fracture of the EAC; whereas in our present case, the child sustained much smaller impact and more isolated injuries to the condyle bones and EAC. However, both cases illustrated the intimate anatomical relationship between the EAC and the mandibular condyle, and thus the similarity of the injury patterns happening different age groups.

On the other hand, maxillofacial fractures among the paediatric population were less prevalent than among the adult group. Due to the light weight and small size of children, the impact of craniofacial trauma is minimised by the smaller inertia. In addition, due to the proportionally greater cranial volume to facial volume in children (8:1 at birth, 4:1 at 5 years vs 2:1 in adults),

the impact force is more easily absorbed by the forehead and the skull rather than the face. What's more, the paediatric facial bones have higher elasticity, less pneumatization (by sinuses), thicker surrounding adipose tissue and more stabilisation of the mandible and maxilla by the unerupted teeth; all these characteristics rendering the facial bones are more resistant to fractures.

With regard to paediatric facial bone fracture, the mandibular bone is the second commonest fracture site after nasal bone.^{4,5} The fracture pattern shifts from condylar fracture being more common among younger age group (<13 years) to mandibular angle fracture being more common in older age group.⁶ Among all mandibular fracture, condyle fracture accounts for about 30% and 37%, respectively for dentulous and edentulous patients.^{7,8} Condyle fracture can be unilateral or bilateral, with left side more common.⁹ Bilateral condyle fracture accounts for only about one-third of all cases. It has been documented that most condyle fractures are caused by indirect blow to the mandible; therefore, it is easily overlooked and is the least diagnosed trauma in the head and neck region.¹⁰ Mandibular condyle fracture is most commonly caused by road traffic accidents.¹¹ A study showed that mandibular condyle fracture has highest incidence between 11 and 30 years old.¹¹ In children, the injury most commonly results from falls from a bicycle, on steps and sports.¹²

In adult, the EAC is about 2–3 cm long, which is divided into the cartilaginous lateral third and the bony medial two-thirds. The TMJ is located anterior to the bony portion. This location allows physicians to palpate the TMJ by placing a finger inside the EAC and palpating anteriorly. This intimate anatomic relationship explains why the EAC and TMJ can be injured simultaneously as in this case. As the growth of EAC is slow, the length of EAC in children is nearly as long as in adult, though its course is less angulated.¹³ The EAC is initially fibrocartilaginous in newborn.¹³ The osseous part starts to form at 12–15 months of age. As such, we postulated that the EACs in children, which run a more straight course, are more vulnerable to be injured by the condyle bone on direct impact onto the chin and produce the injury pattern observed as in this case.

Clinical features suggestive of condyle fracture include pain, swelling and tenderness localised near the TMJ. There may be malocclusion and obvious deviation of mandible on biting. These injuries around TMJ could directly result in decreased verbal response and may easily result in underestimation of conscious state among paediatric patients and affect the diagnostic process. Laceration or contusion of the chin would be the only telling sign under these circumstances.¹² If orthopantomogram is not readily available due to special equipment requirement, CT would be the radiological imaging of choice in the emergency setting and it provides the added benefit of ruling out skull base or intracranial injuries.

As mentioned, basal skull fracture is an important differential diagnosis in this patient. Classically, one can examine the otorrhoea on a bed sheet or filter paper to look for the 'ring sign', which, if positive, may signify cerebrospinal fluid (CSF) otorrhoea. There is no large scale study in the current literature reviewing the usefulness of this bedside examination. One in vitro study has proved that the 'ring sign' is sensitive but not exclusive for CSF, since tap water, saline or saliva can produce similar pattern.¹⁴ Hence this test was not done in this reported case, and CT scan is currently the gold standard in the diagnosis of skull base fracture. Although the bilateral condylar fractures in this patient was managed conservatively, the diagnosis was still important in terms of parental counselling, consideration of the use of splintage and early mobilisation exercise.¹⁵ On the other hand, if skull base fracture was present, CT scan is an

Figure 3 Left external auditory canal fracture in sagittal view. A gas density is also seen in the mandibular fossa.

important risk-stratifying tool, since a positive finding on CT scan is associated with more adverse outcomes than a patient with pure physical findings without CT evidence of fracture.¹⁶

We reported a rare paediatric case of bloody otorrhoea caused by EAC and condyle fractures under fall injury. It highlights the importance of associating mechanism of injury and the resultant injury patterns, that is, direct chin impact resulting in bilateral condyle and EAC fractures. EAC injury secondary to mandibular condyle fracture should be considered as a differential diagnosis for bilateral bloody otorrhoea in addition to skull base fracture. The discrepancy in the different components in assessing GCS may aid the diagnosis. Clinical palpation at physical sites, in this case the TMJ, which could be distant from the external site of injury, and the chin laceration could also provide hint on the exact location of injury. A previous study has shown the use of protective device (including seat belt and helmet) is effective in reducing condylar fracture in road traffic accident, although the specific type and design of protective helmet was not specified.¹¹ We believe helmets with chin strap cushion may reduce the impact force on the mandible and resultant injury, but this may need further evidence-based evaluation in the future.

Learning points

- ▶ In patient with head injury presenting with bloody otorrhoea, mandibular condyle fracture with resultant external auditory canal injury is a differential diagnosis, as these two structures have intimate anatomical relationship.
- ▶ Active examination and appropriate imaging of these anatomical regions are necessary as the patient may not speak well in the presence of a mandibular fracture, especially in paediatric case.
- ▶ Laceration or bruises of the chin is a subtle yet important sign for this condition.

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