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Evaluation of unilateral condyle head fracture on panoramic and CBCT imaging: a case report

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ABSTRACT

Objectives: This case report aimed to describe the radiographic characteristics of the fracture of the condyle's head and its impact on surrounding tissues in a young adult patient using panoramic and CBCT radiographs.

Case Report: A 19-year-old female patient presented to the Dental Radiology Unit of Dental Hospital Universitas Padjadjaran with a panoramic and periapical referral letter, diagnosed clinically with a dental fracture of the upper left central incisor, and planning to have orthodontic treatment. The patient had a history of a motorcycle accident in early January 2024 and was hit on the left side of her face. Extraoral examination revealed an asymmetrical facial appearance with mandible deviation, mouth opening limitation, and crepitation on palpation

test. Intraoral examination showed a traumatic ulcer in the upper left lip region (tooth 22) and a dental fracture on tooth 21. Oral hygiene was in good condition. The first panoramic radiograph (January 19th, 2024) showed a fracture on the right condyle's head. It referred to taking the CBCT examination (May 28th, 2024) to know the exact position and the destruction of the condyle's head. The CBCT examination showed a radiolucent line crossing horizontally on the left condyle's head; the joint space was larger than on the other side.

Conclusion: Based on the CBCT results in terms of location and radiographic feature, this radiolucent line led to a suspect radiodiagnosis of unilateral fracture on the left condyle's head that causes pain and limited mouth opening.

Keywords: CBCT, condyle's head, fracture, panoramic, temporomandibular joint

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INTRODUCTION

Bandung, the capital of West Java Province, is the most populous city in Indonesia (45 million people).¹ This increase in population is proportional to the rise in the number of motorized vehicles. Still, it is not followed by improved driving safety, which is a significant problem in West Java, especially in Bandung.² According to data from the Ministry of Transportation, in 2022, there were 137,851 motor vehicle accidents and victims, based on the accident level. Traffic accidents in Indonesia are dominated by wheeled vehicles.¹ According to research by Syahril Samad et al,³ in 2021, out of 100 patients, 16 cases of fracture of the upper third of the maxillofacial, 73 cases of fracture of the middle third, and 53 cases of fracture in the lower third of the face were found. It was concluded that fractures of the maxillofacial middle third due to motor vehicle accidents were the most common incidence of trauma. In the study of A. Naveen Shankar et al,⁴ found that the most common fracture was a mandible fracture in 316 out of 830

traffic accidents. And in the study of Jasper Vanpoecke et al.⁵ found about 18-66% of cases of facial fractures, with the most common location in the condyle, which is about 25-40% of cases of mandibular fractures. In a case review by Fridrich et al.⁶ Condyle fractures were the second most common cause after mandibular angle fractures.

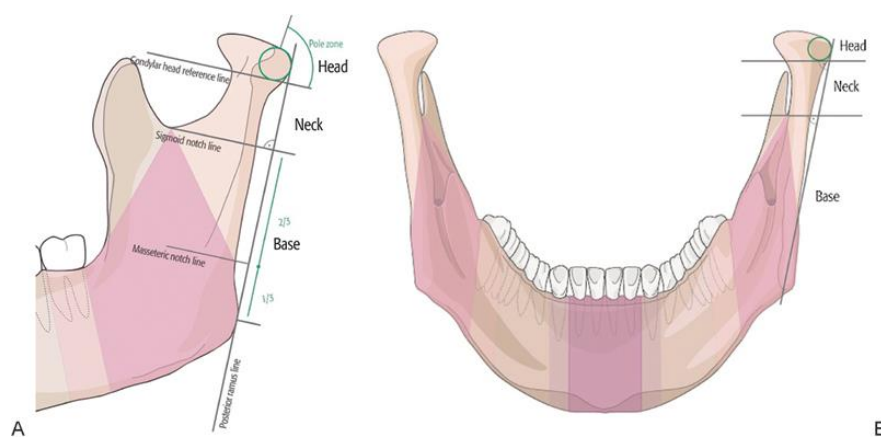
Complications of temporomandibular joint (TMJ) trauma are extensive and not always immediately apparent. Such complications may include impaired occlusal function, mandibular deviation, as well as internal TMJ disorders, facial asymmetry, nerve disorders, intra- and extra-articular ankylosis, and jaw opening limitation. The temporomandibular joint (TMJ) is a joint or attachment that connects the skull and mandible.^{3,8} The TMJ is also the most complex joint, essential in opening and closing the jaw during mastication and speech. Excessive pressure or trauma to the TMJ can damage the joint structure, commonly referred to as temporomandibular disorder (TMD).^{9,10}

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Figure 1. Mandibular Anatomy⁷

Amount of displacement		Direction of displacement
0 = No displacement - The head remains within the limits of the fossa		
1 = Displacement - Part of the head is outside the fossa limits		
2 = Dislocation - Displacement of the entire head out of the fossa limits		
Anterior/posterior displacement		none A = anterior P = posterior
Lateral/medial displacement		none M = medial L = lateral

Figure 2. Head of condyle fracture dislocation classification

The results of Jasper Vanpoecke et al,⁵ stated that the location with the highest incidence occurred in the subcondyle. Condyle fractures according to MacLennan's classification can be divided into four types, (I) non-displaced, (II) deviation in the fracture line (no loss of complete contact between fragments), (III) displacement (the

condyle fragment is not in contact with the distal fragment but the condyle remains in the glenoidalis fossa), (IV) dislocation (the condyle is dislocated from the glenoidalis fossa). Condyle fractures were classified as unilateral or bilateral fractures. Of all condyle fracture cases, the most common complaint was limitation of mouth opening, which

was <40mm calculated from the interincisal. The second most frequent complaint was malocclusion. From the results of a further examination of the

TMJ, complaints of clicking were most often found and were followed by pain or pain when opening and closing the mouth.⁵

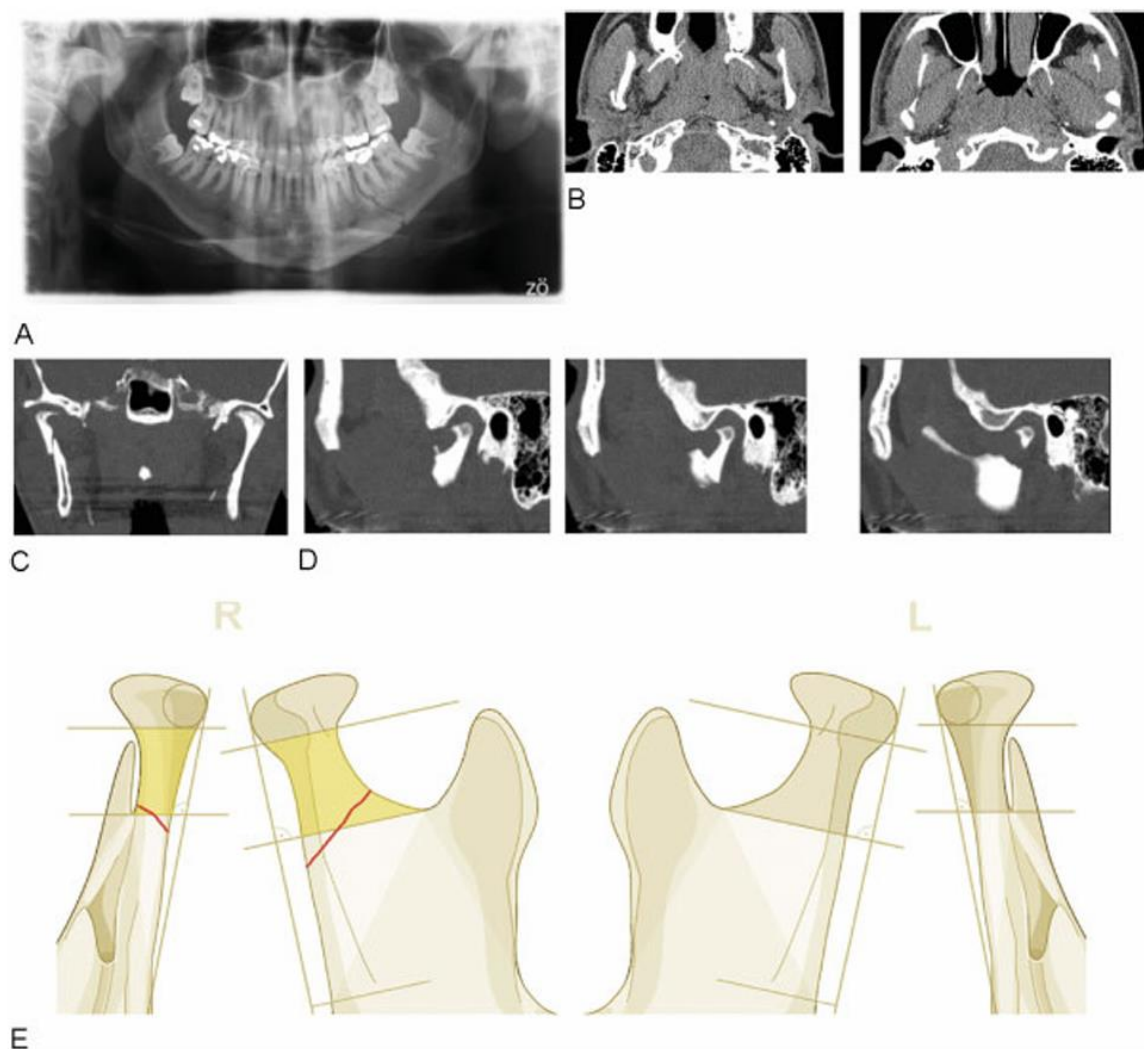


Figure 3. Radiograph Imaging of Fracture on the Head of the Condyle⁷

Significant advances in traumatology of the condyle processes are also mainly due to advances in X-ray imaging, with CT improvements and availability in the emergency room allowing further and better examinations. Currently, orthopantomogram/panoramic combined with CBCT (coronal, axial, and sagittal views) is considered the "gold standard" in the diagnosis of condyle fractures and allows for more difficult diagnoses to be made, especially regarding head condyle fractures that could not be diagnosed before CT imaging.¹¹ 3D reconstruction facilitates proper classification, especially for the upper neck and head region. X-ray imaging, combined with appropriate anatomical knowledge gained with the increasing indications for open surgery has also significantly influenced the current classification of condyle fractures.¹²

CASE REPORT

The 19-year-old female patient came on January 19, 2024, with a referral letter from the

dentist for two-dimensional photos, which included a periapical photo of tooth 21 and a panoramic at the radiology installation of the Padjadjaran University Dental and Oral Hospital. The patient was referred with a suspected diagnosis of crown fracture of tooth 21. After taking a panoramic photograph, a fracture was found on the condyle on the left side of the patient. The patient's history showed that a week ago, the patient had a motorcycle accident, and his left jaw hit the sidewalk hard. Clinical examination (Figure 4) showed that the patient complained of pain when opening and closing the mouth, and the operator found a deviation of mandibular movement to the left and facial asymmetry. Intraoral examination revealed a traumatic ulcer on the upper lip area (tooth 22) and a fracture on tooth 21 (Figure 5).

At the first visit, the patient took an orthopantomogram/panoramic examination (Figure 6), which showed the results of a fracture in the head of the left condyle. The results of the panoramic examination showed that the fracture of

the crown of tooth 21 reached the depth of the pulp. The image of the condyle head showed a partial non-fragmented fracture line with horizontal medial displacement, and there was a medial displacement of the condyle head. On the second visit (May 28, 2024), the patient took CBCT photos for further examination, with the results of the CBCT examination showing coronal, sagittal, and axial views of the sinistra condyle (Figure 7). The coronal view of the sinistra condyle showed a fracture of the condyle neck (Figure 8). The anteroposteriorly transverse condyle fracture fragment was ± 11.8 mm in length. The fracture fragments were irregular with a size of ± 18.4 mm (mediolateral) x ± 13.4 mm (superoinferior). The sagittal view of the sinistra condyle shows a fracture of the condyle neck where the fracture fragments are on the medial side of the condyle neck (Figure 9). The position of the condyle is posterior to the glenoid fossa and located in the eminence fossa. The distance from the condyle head to the fossa eminence is ± 3.6 mm. The sagittal view of the sinistra condyle shows a fracture line of

± 7.4 mm in length. The fracture fragments measured ± 7.5 mm (anteroposterior) x ± 6.7 mm (superoinferior) (Figure 9).

Coronal, sagittal, and axial views of the dextra condyle showed no abnormalities (Figure 10). The size of the dextra condyle from the coronal view was ± 19.6 mm (mediolateral) x ± 15.3 mm (superoinferior), with a distance of ± 3.0 mm to the glenoid fossa. The sagittal view of the dextra condyle showed a size of ± 5.4 mm, with a distance of ± 3.1 mm towards the glenoid fossa. The three-dimensional view showed the condition of the dextra and sinistra condyles (Figure 11). The impression of this case shows a change in the shape of the anatomy of the condylar head. The joint space is widening in the dextra and sinistra condyles. There appears to be a fracture line in the sinistra condyle, which results in a narrowing of the anterior joint space against the glenoid fossa, so that it can be concluded that the radiodiagnosis of the sinistra condyle neck fracture with medial displacement of the condyle head.



Figure 4. Clinical Examination



Figure 5. Intraoral Examination



Figure 6. Orthopantomogram/panoramic Imaging showed a radiolucent line (fracture-like) on the left-side condylar.

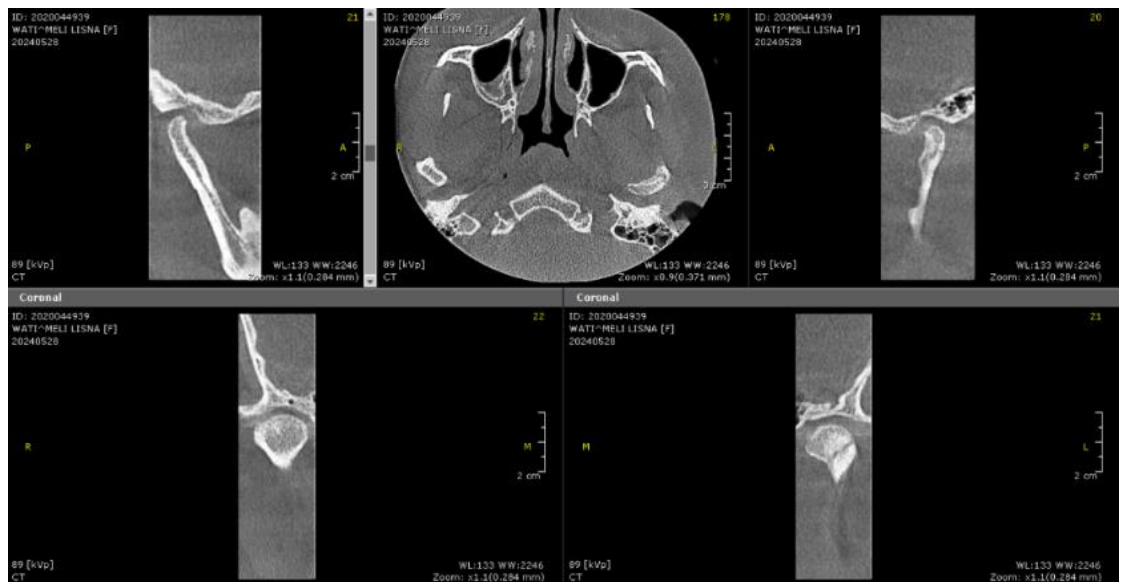


Figure 7. MPR View Dextra and Sinistra Condyle showed a clear image of the fracture area.

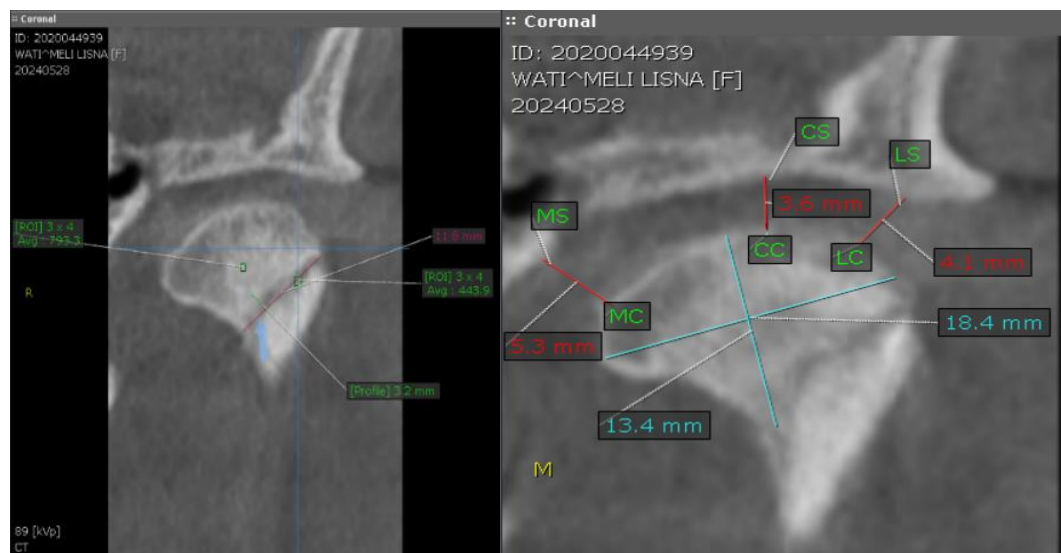


Figure 8. Coronal View Sinistra Condyle showed an anteroposterior transverse condyle fracture

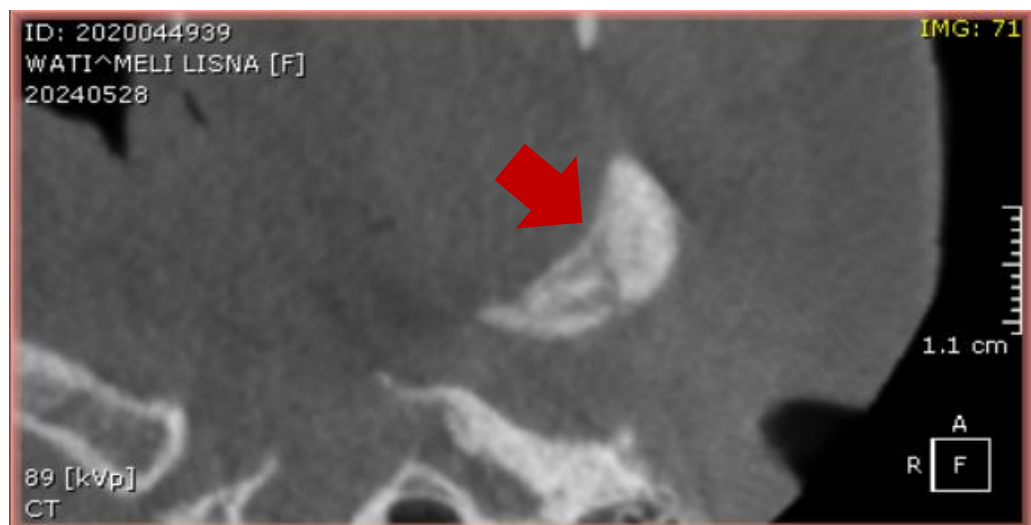


Figure 9. Axial View Sinistra Condyle

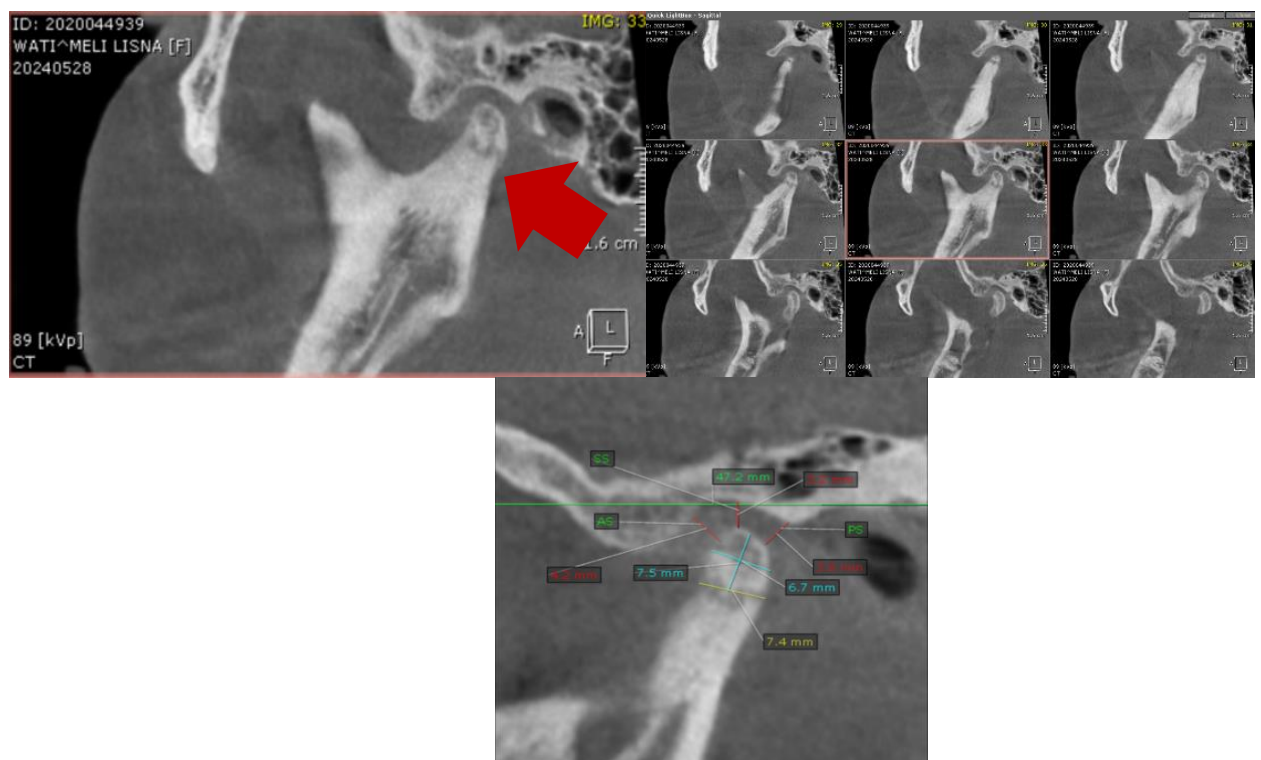


Figure 10. Sagittal View Sinistra Condyle

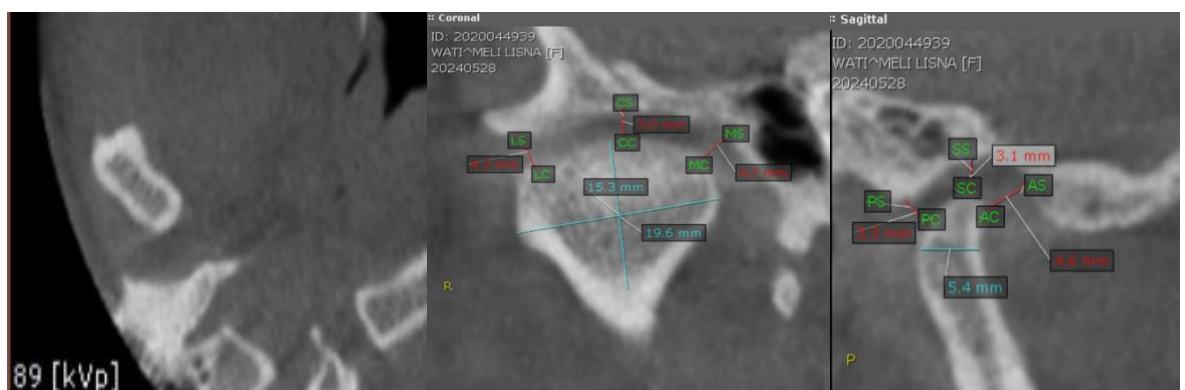


Figure 11. Axial, Coronal, and Sagittal View Dextra Condylus

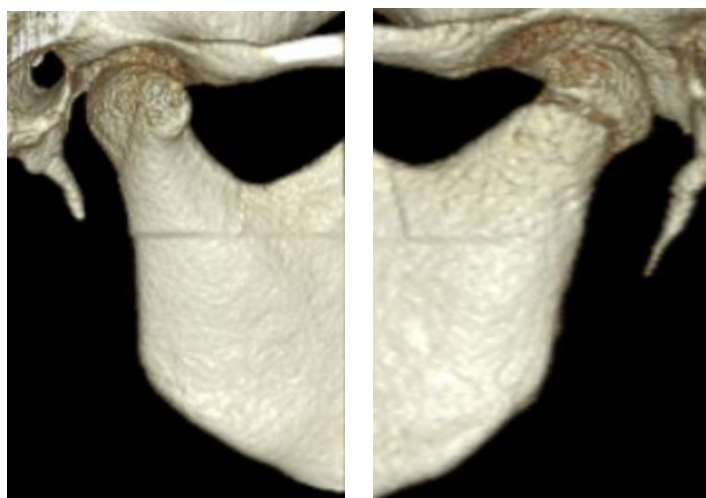


Figure 12. 3D View Dextra dan Sinistra Condyle

DISCUSSION

This patient experienced pain during the process of opening and closing the mouth, which showed symptoms of a post-traumatic temporomandibular joint disorder that caused a condyle neck fracture. The parts of the lower jaw or mandible that most often experience fractures are the condyle-subcondyle, parasymphysis-symphysis, ramus, mandibular angulus, and others. It was concluded from other studies and this case that condyle fractures on at least one side can result from direct force on the mandible, where the impact force is not fully received at the impact site.⁵

Fractures of the condylar head can cause various complaints. The most common complaints are limited jaw opening, pain when opening and closing the jaw, malocclusion, facial asymmetry, and nerve disorders. These complaints can lead to signs and symptoms of temporomandibular joint disorders. Temporomandibular joint disorders require further examination to determine the appropriate treatment for condyle head fractures and aim to restore stomatognathic function.^{5,8}

Condyle head fractures require a complete history of the trauma experienced so that the operator can understand the direction of the pressure or impact that caused the fracture. The history is complemented by a supporting examination in the form of a radiology examination to establish the correct diagnosis. Radiologic imaging that can be used to view and assess parts of the condyle head fracture includes panoramic/orthopantomogram, mandibular lateral oblique, posteroanterior (PA), Reverse Towne's, and three-dimensional imaging in the form of CBCT or CTScan. Condyle head fractures can be classified as horizontal, vertical, or oblique. The appearance of the fracture can be a radiolucent line between the bone fragments if they are separate, a radiopaque line if they are adjacent to each other, or a step at the lower border of the bone fragments.^{2,5,13}

The condition of the fracture line at the condyle may vary and may be accompanied by dislocation of the condyle at the TMJ. If the bone fragments overlap, there will be a more radiopaque area than

the radiolucent line. CBCT examination is preferred in some cases to support the examination and better illustrate the fracture condition. The difference between panoramic and CBCT is that in panoramic, the operator can only assess in two dimensions, namely, medio-laterally. In contrast, CBCT displays a three-dimensional image, allowing assessment from coronal, axial, and sagittal views, and allowing the operator to detect the fracture location accurately. Assessment on CBCT imaging also includes not only the condyles, but also the articular eminence, glenoid fossa, and coronoid processes.^{14–16}

CONCLUSION

Panoramic/orthopantomograms can detect fractures of the condyles. Still, they must be supported by three-dimensional imaging examinations such as CBCT or CT scans to determine the condition and position of the fracture fragments more accurately.

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FOOTNOTES

All authors have no potential conflict of interest to declare for this article. Informed consent was obtained from the patient to be included in this case report

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