

Computed tomography of the TMJ in diagnosis of ankylosis: two case reports

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ABSTRACT

Ankylosis of the temporomandibular joint is characterized by restriction or limitation of mandibular movement. It presents as a classic symptom a limited range of motion on opening. Radiographically, ankylosis presents features that facilitate the diagnosis. However, its visualization is not clear in most of the cases involving conventional radiographic techniques. With the evolution of radiographic techniques, computed tomography (CT) became an important examination in the diagnosis of the ankylosis of temporomandibular joint. Due to the increasing use of the CT and its importance in the diagnosis of this disease, the aim of this paper is to present and describe tomographic images of ankylosis of this joint by presenting two clinical cases, using several slices as axial, coronal, and three-dimensional reformatted images.

Key words: *Ankylosis, temporomandibular joint, computed tomography.*

RESUMEN

La anquilosis de la articulación temporomandibular es definida como la abolición o limitación de los movimientos de dicha articulación. Radiográficamente la anquilosis demuestra aspectos bien característicos que facilitan el diagnóstico, sin embargo, su análisis en las técnicas radiográficas convencionales, en la mayoría de las veces, no se presenta de forma clara. Con la evolución de las técnicas radiográficas, la tomografía computarizada pasó a ser un examen de gran importancia en el diagnóstico de las anquilosis temporomandibulares. En vista de ello, el presente trabajo se propone mostrar y describir imágenes tomográficas de la anquilosis de esta articulación, presentando dos casos clínicos, utilizando diversos planos, como el axial y el coronal, además del uso de la reconstrucción sagital y en 3D, con la finalidad de orientar una correcta indicación e interpretación de este examen, el cual representa una valiosa herramienta para los profesionales de la Odontología.

Palabras clave: *Anquilosis, articulación temporomandibular, tomografía computarizada por rayos X.*

INTRODUCTION

Ankylosis is characterized by the impossibility of movement in a body articulation (1). The presence of this problem in a temporomandibular joint (TMJ) is presented as a limitation of mandibular movements. TMJ ankylosis could be classified according to type of tissue involved, bony, fibrous or fibro-osseous, or according to location, intra or extracapsular.

Trauma is identified as the leading cause of TMJ ankylosis (57-63%). If the cause is trauma, it is hypothesized that the extravasation of blood into the joint, along with the disruption of fibrocartilage integrity, permits the ingrowth of fibrous connective tissue into the joint, which subsequently results in ossification, leading to the fusion of the mandibular condyle to the articular surface of the temporal bone. (1-7). Other causes of TMJ ankylosis include post-operative problems, condylar fracture, infections, and rheumatoid arthritis.

CASE REPORTS

Patients presented in this paper were referred to the Diagnosis Service of Irmandade da Santa Casa de Misericordia de Sao Paulo Hospital. CT was performed obtaining the axial slices. After that, coronal and 3D reformatted images were obtained.

- Case 1

A 28-year-old man was referred to the hospital service for investigation of the TMJ ankylosis. He was otherwise healthy. There was history of trauma to the facial skeleton from a car accident. The patient related a history of progressive restriction of opening movement. Maximum opening was about 20 mm, maximum left lateral movement 3.5 mm and right lateral movement 5 mm.

Figure 1A shows an axial slice of CT, revealing a fusion of the left mandibular condyle to the base of the skull, which is represented by a radiopaque image. On the right TMJ, there is a condyle rearrangement that can be visualized in the coronal slice (Figure 1B). The coronal slice also shows an effect on the mandibular fossa, remodeling in a flat shape to accommodate the abnormal condyle.

Sagittal reformatted images were performed (Figures 1C and 1D). In the open-mouth position, sagittal reformatted images were obtained which show a bilateral absence of condylar movement. A bone ankylosis on the left side was indicated. It was possible to observe a joint space on the right side, a fibrous ankylosis was suggested.

- Case 2

A 23-year-old woman reported an inability to open her mouth wide. She revealed a history of chin trauma during early childhood. There was a history of pain and swelling subsequent to the trauma. Her mouth opening started reducing gradually. She had no protrusion or lateral mandibular movement. Her face presented signs of mandibular retrognathism.

An axial slice (Figure 2A) shows a bilateral radiopaque image at the temporal bone region. It is presented as the same osseous block, which characterizes a condylar ankylosis. Analyzing a coronal slice (Figure 2B), it is possible to note a reduced joint space in the medial region of the right TMJ; meanwhile, in the lateral region there is no space at all. The same situation of total absence of joint space is noted in the left TMJ.

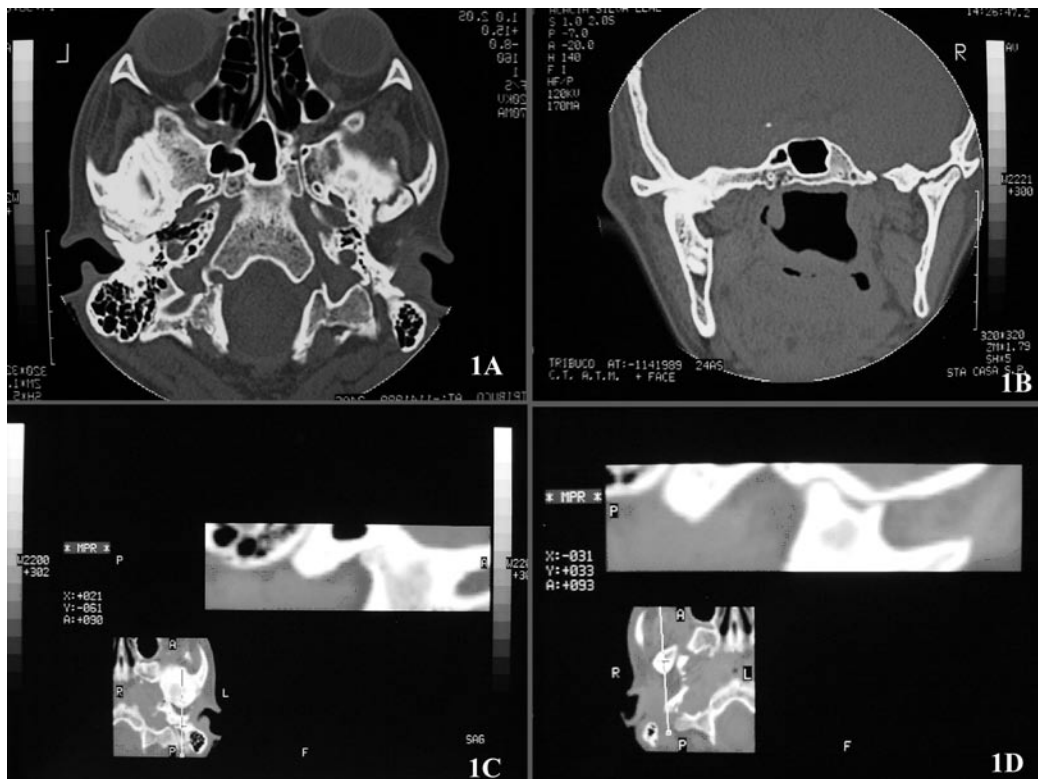


Fig. 1. Case 1. A: Axial Slice; B: Coronal Slice; C: Sagittal reformatted image, left

The fusion of the mandibular condyle to the respective temporal bone is clearly noted in the 3D images (Figures 3A and 3B). These images provide better quality images for evaluation by the radiologist.

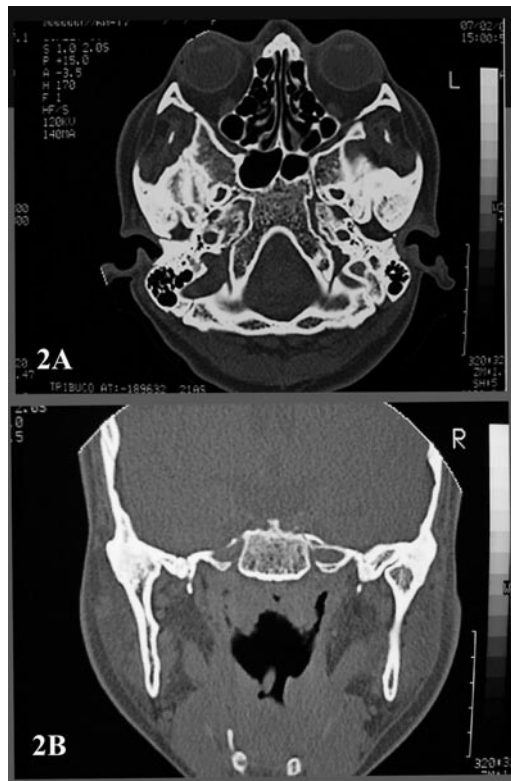


Fig. 2. Case 2. A: Axial Slice; B: Coronal Slice.

DISCUSSION

According to Graziani (1), patients who present a TMJ ankylosis have limited opening of the mouth, 1 to 2 mm. Meanwhile, Zarb *et al.* (5) asserted that patients with TMJ ankylosis are able to obtain from 5 to 7 mm of interincisal opening, but they do not have any protrusion or lateral mandibular movement. Patient #2 presented these features. When the problem is unilateral, patients can reach from 3 to 4mm of lateral movement toward the affected side. Patient #1 presented a slight lateral movement toward the left side, which was affected by an osseous ankylosis.

Once the movements of the TMJ are restricted, pain is not a characteristic symptom of ankylosis. The classic sign is the limitation of opening movement, as these patients presented. In general, patients related a history of progressive restriction of opening movement up to an unacceptable level of limitation. In some cases, the patient is hampered by a complete lack of mandibular movement.

Early ankylosis of the TMJ in children can be a deterrent to normal mandibular growth, resulting in a mandibular hypoplasia, especially if there is a bilateral problem (8). Patient #2 presented signs of mandibular retrognathism. Due to the delayed growth and development of the affected areas, the effects of the ankylosis will be more evident as the child grows. The lack of jaw development can cause breathing problems as well as a dental malocclusion, which could generate a psychologist problem (9).

Osseous ankylosis presents characteristic radiographic features, which facilitate the diagnosis. In general, it is observed that the condyle is bridged with a temporal bone. These present patients presented these radiographic features. It could be a small piece of bone or even a huge bone mass that could involve the condyle of the mandible, temporal bone and zygomatic process (10). In some cases, it is possible to note a radiolucent area inside the lesion, which represents a remanent interarticular disk.

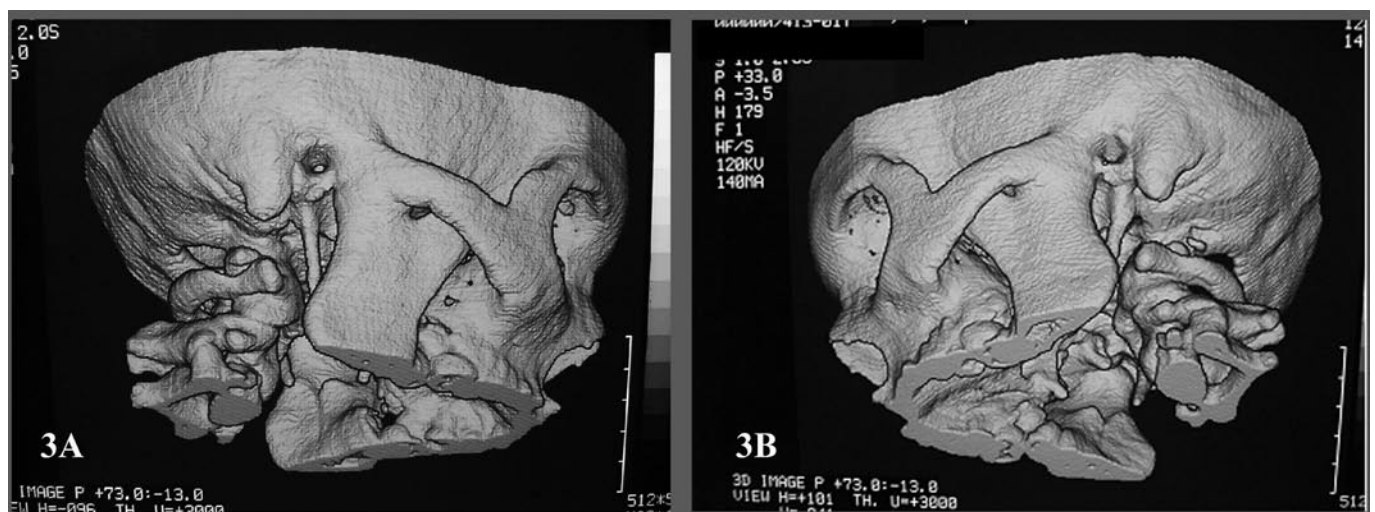


Fig. 3. Case 2. A: Three-dimensional reformatted image, right TMJ; B: Three-dimensional reformatted image, left TMJ.

Diagnosis of a fibrous ankylosis is more difficult; since the soft tissue fibrosis is not visible by a conventional radiographic examination (11). Osseous components of the TMJ in fibrous ankylosis present a normal image, or small areas of erosion, but the joint space is reduced in association with a limited mandibular opening movement. TMJ osseous components may remodel as an attempt to adapt to the new situation (11). In this type of ankylosis, magnetic resonance image (MRI) provides better diagnostic information, once the alterations in the soft tissues are located (2).

Osseous alterations can be observed in conventional radiographic images, such as panoramic radiography, lateral mandibular projection, posteroanterior (PA) projection, lateral skull projection, submentovertex projection and transcranial projection. Since 1930, radiographic images have been used as an important diagnostic tool in TMJ diseases. A lot of new techniques and devices have been created in order to provide a better image. The major problems are the overlapping of structures and image distortion.

Conventional film-based tomography is designed to represent more clearly objects lying within a plane of interest. This is accomplished by blurring the images of superficial- and deep-lying structures adjacent to the plane of interest, resulting in no overlapping and better diagnostic information. It is clearly possible to note the lesion edge and extension (5).

Since the introduction of computed tomography (CT), which has superior low-contrast resolution, film-based tomography has been used less frequently. CT provides more information about condyle, mandibular fossa, articular eminence and surrounding tissues. CT was the primary choice for examination in both cases presented in this paper. Switching the image slices, it is possible to evaluate the condyle medial pole and lateral pole as well as the central region (12).

Data from sagittal and coronal slices are the most useful for studying TMJ ankylosis. Three-dimensional reformatted images have also been considered for determining the soft tissues and osseous component images (13). Currently, 3-dimensional computed reconstruction allows elaboration of realistic and spatially accurate images for diagnosis and surgical planning (14,15).

It is important to stress that no case of ankylosis should be treated without a previous radiographic diagnosis. This must include the projection, which provides all-important information about the lesion required to formulate an adequate treatment plan.

REFERENCES

1. Graziani M, ed. *Cirurgia buco-maxilo-facial*. Rio de Janeiro: Guanabara-Koogan; 1986. p. 658,665-6.
2. Kaplan AS, Assael LA, eds. *Temporomandibular disorders*. Philadelphia: Saunders; 1991. p. 235-6.
3. Katzberg RW, Westesson P, eds. *Diagnosis of the temporomandibular joint*. Philadelphia: Saunders; 1993. p. 66,360.
4. White SC, Pharoah MJ, eds. *Oral radiology. Principles and interpretation*. St Louis: Mosby; 2000. p. 523.
5. Zarb GA, ed. *Temporomandibular joint and masticatory muscle disorders*. St Louis: Mosby; 1995. p. 336,342,471,477.

6. Long X, Li X, Cheng Y, Yang X, Qin L, Qiao Y, et al. Preservation of disc for treatment of traumatic temporomandibular joint ankylosis. *J Oral Maxillofac Surg* 2005;63:897-902.
7. Vasconcelos BC, Bessa-Nogueira RV, Cypriano RV. Treatment of temporomandibular joint ankylosis by gap arthroplasty. *Med Oral Patol Oral Cir Bucal* 2006;11:E66-9.
8. Manganello-Souza LC, Mariani PB. Temporomandibular joint ankylosis: report of 14 cases. *Int J Oral Maxillofac Surg* 2003;32:24-9.
9. Mcfadden LR, Rishiraj B. Treatment of temporomandibular joint ankylosis: a case report. *J Can Dent Assoc* 2001;67:659-63.
10. Hong Y, Gu X, Feng X, Wang Y. Modified coronoid process grafts combined with sagittal split osteotomy for treatment of bilateral temporomandibular joint ankylosis. *J Oral Maxillofac Surg* 2002;60:11-8.
11. Sarma UC, Dave PK. Temporomandibular joint ankylosis: an Indian experience. *Oral Surg Oral Med Oral Pathol* 1991;72:660-4.
12. Cohen H, Ross S, Gordon R. Computadorized tomography as a guide in the diagnosis of temporomandibular joint disease. *J Am Dent Assoc* 1985;110:57-60.
13. Kao SY, Chou J, Lo J, Yang J, Chou AP, Joe CJ, et al. Using three-dimensional-computerized tomography as a diagnostic tool for temporomandibular joint ankylosis: a case report. *Zhonghua Yi Xue Za Zhi (Taipei)* 1999;62:244-9.
14. El-Hakim IE, Metwalli SA. Imaging of temporomandibular joint ankylosis. A new radiographic classification. *Dentomaxillofac Radiol* 2002;31:19-23.
15. Rosa EL, Oleskovicz CF, Aragao BN. Rapid prototyping in Maxillofacial Surgery and Traumatology. *Braz Dent J* 2004;15:243-7.

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