

## The diagnosis of coronoid impingement using computed tomography

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### ABSTRACT

Coronoid impingement can cause limitation of mouth opening. In many cases, it appears to be related to the coronoid hyperplasia. We present a case of mouth opening limitation caused by coronoid impingement on the posterior surface of the zygomatic bone without coronoid hyperplasia. The bony changes in coronoid and zygoma including surface irregularity and discontinuity of the cortex and sclerotic change of inner medullary space were noted on computed tomography (CT) scans in different level of axial planes. Through another CT scans in open mouth position could demonstrate that those bony changes were caused by the contact of both surfaces against each other. In case coronoid impingement is suspected of the many possible causes, the open mouth CT scans will be needed to reveal the direct impingement of coronoid on zygoma even without coronoid hyperplasia. (*Korean J Oral Maxillofac Radiol* 2005; 35 : 231-4)

**KEY WORDS** : Coronoid Impingement; Trismus; Tomography Scanners, X-ray Computed

Limitation of the mouth opening can have many causes. One of the causes is the anatomical disharmony of coronoid process and zygomatic bone. Many reports on the limitation of the mouth opening have shown that the coronoid impingement was accompanied by the marked coronoid hyperplasia.<sup>1-12</sup> However, the reports on the coronoid impingement with normal size of mandibular coronoid were very rare. We don't put any consideration about the coronoid impingement when the coronoid process has normal size on the panoramic radiograph.

We present a case of the coronoid impingement on the zygomatic bone without marked coronoid hyperplasia, with special emphasis on the diagnostic process with several imaging modalities.

### Case report

A 12-year-old boy complaining mouth opening limitation was referred to our department from other dental hospital with temporomandibular joint (TMJ) MRI in January 2005. On the

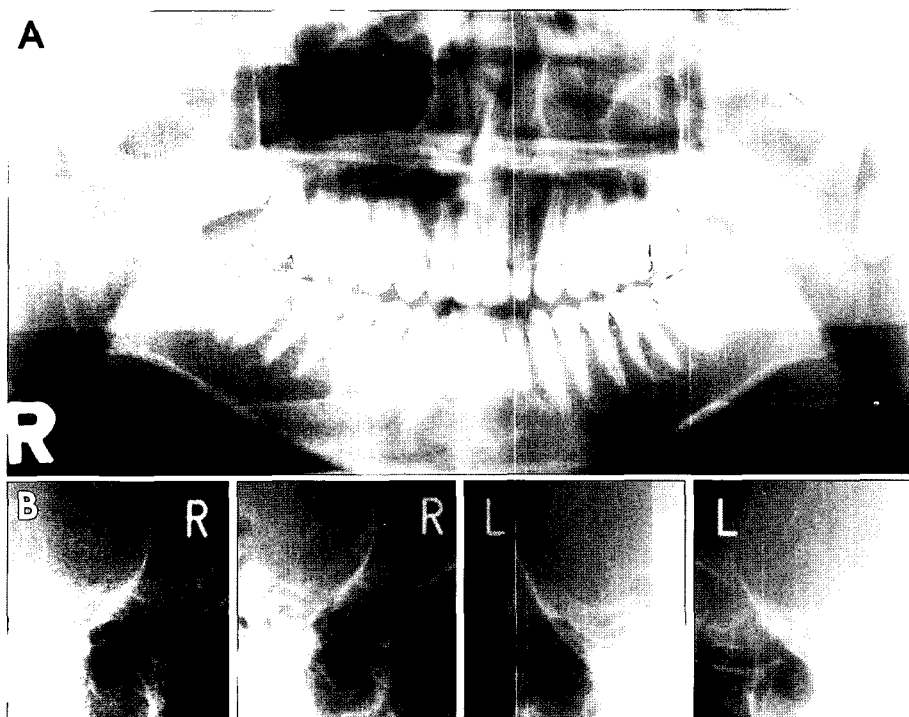
MR images, the relationship between the condyle and the disk was normal and there was no apparent pathologic change in both TMJs. Maximal mouth opening was 25 mm. On the panoramic radiograph (Fig. 1A), there was no pathologic bony changes on the both TMJs. Coronoid hyperplasia was not apparent and it could be considered as within normal range of size. And marked restriction of condylar movement in both TMJs was observed on the transcranial view (Fig. 1B). No history of trauma or familial occurrence of similar symptoms was noted and we couldn't find any apparent causes of the mouth opening limitation. The only clue of abnormality was mild sclerosis of coronoid process. CT scan was performed for further evaluation of the bony structures of the TMJ. On the CT scans (Figs. 2, 3), we could find the proximity of coronoid process to the posterior surface of zygomatic arch and the decrease in width of the retromaxillary fat plane due to the adjacent temporal muscle and coronoid process. Surface irregularity and discontinuity of cortex and sclerotic change of inner medullary space were noted in both coronoid and zygoma. However, the bony changes in coronoid and zygoma were observed in different level of axial planes and it could not be confirmed that those bony changes were caused by the contact of both surfaces against each other.

So, another CT in the open mouth position was taken to

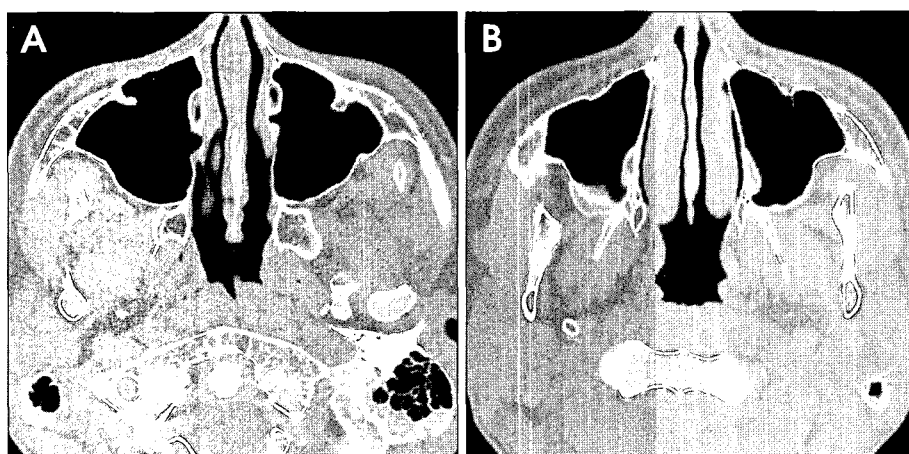
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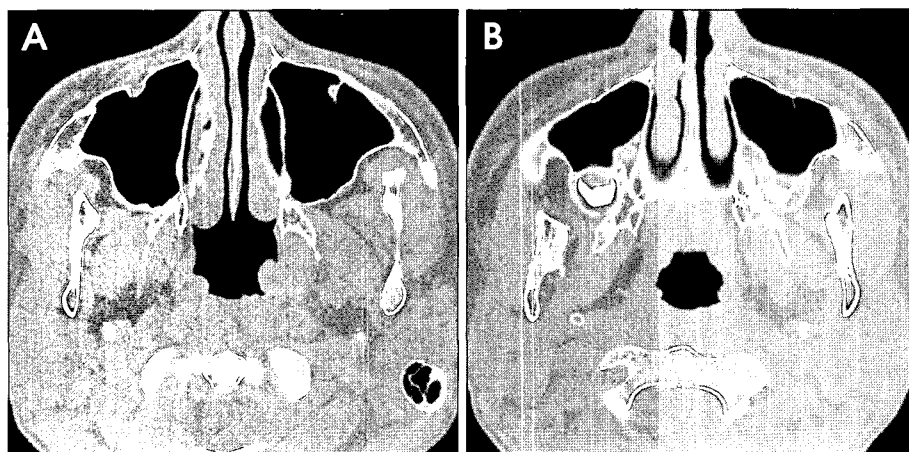
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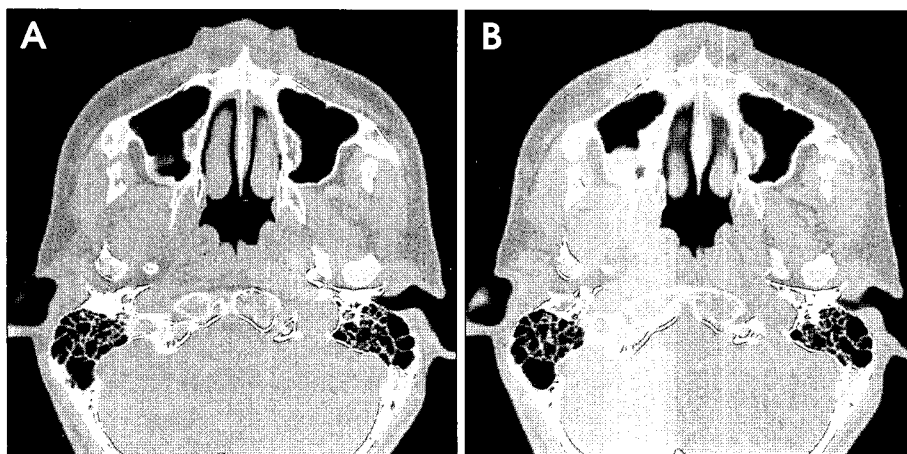
**Fig. 1.** A. Panoramic radiograph did not show any pathologic bony change on both temporomandibular joints. Slight sclerotic bone change was suspicious on the both coronoid process. B. Transcranial view showed marked restriction of condylar movement in both temporomandibular joints.



**Fig. 2.** Surface irregularity and sclerotic change on the anterior cortex of the right coronoid process (A) and posterior cortex of the right zygomatic process (B) were respectively noted on different levels of axial images of closed-mouth CT scans.



**Fig. 3.** Surface irregularity and sclerotic change on the anterior cortex of the left coronoid process (A) and posterior cortex of the left zygomatic process (B) were respectively noted on different levels of axial images of closed-mouth CT scans.



**Fig. 4.** Another CT scan in the open-mouth position demonstrated the coronoid impingement by showing the close approximation of each bony surface, described above in Fig. 2 and Fig. 3, in right side (A) and left side (B), respectively.

ascertain the relationship of zygomatic and coronoid bone. CT in the open mouth position revealed that the surfaces with pathologic bony changes in coronoid and zygoma were closely approximated to each other (Fig. 4). This finding suggested that the limitation of mouth opening was caused by the coronoid impingement without marked elongation of the coronoid process.

Because the patient was so young and there wasn't severe functional disturbance, surgery was postponed until completion of growth though limitation of mouth opening was detected.

### Discussion

Diagnoses of abnormalities of the coronoid process are difficult because such conditions are relatively rare. Many times it has been overlooked in formulating a clinical diagnosis, to the detriment of the patient.<sup>1-4</sup> When examining such patients, the adoption of a systemic review of all the possible causes of severely limited mouth opening will help to avoid misdiagnosis.

Accurate imaging is important for the correct diagnosis of the coronoid impingement. The panoramic radiograph for the case of coronoid hyperplasia, is useful as an initial imaging tool, showing the relationship of the coronoid process to the zygoma as well as visualizing the TMJ. However, the contact point between zygomatic arch and coronoid process is on its far inner surface. Consequently, this area cannot be detected directly on panoramic radiography.<sup>5</sup> On the other hand, CT scan provides detailed imaging of coronoid hyperplasia in both the axial and coronal planes. It also reveals the precise site of impingement between the coronoid process and zygomatic arch.<sup>6</sup> If there's a situation that is highly suspected like a

coronoid hyperplasia, both clinically and radiographically, the diagnosis can be confirmed by performing CT scan.

At first this case was suspicious of TMJ disorder and TMJ MR was taken. MR images had failed to show any abnormality associated with the TMJ while on CT scans in closed mouth position, the each bony change of coronoid and posterior surface of zygomatic bone was demonstrated. Through another CT scans in open mouth position, we could identify the impingement of coronoid process on zygomatic bone. In the present case, however, the elongation of coronoid process over zygomatic arch was not observed. And, in spite of the impingement and resultant bony changes, direct contact of the bony surfaces of coronoid and zygoma was not observed. But instead, there was an intervention of temporal muscle between them. While in other cases CT showed the direct bony contacts between the coronoid process and zygomatic arch or malar bone,<sup>1,5,7,8</sup> in the present case the significant bony changes were caused without direct contact between them. We couldn't figure out the cause of such bony changes in spite of the muscle intervention. Additional studies and reports will be needed.

Optimal timing of surgery is difficult to determine. If the procedure is performed at an early age, definite improvement in trismus will be obtained. However, dysgnathia and postoperative recurrence are possible.<sup>13,14</sup> The surgery in the present case was postponed until the cessation of growth since the patient was in adolescent age. Van Hoof and Besling described a patient who underwent surgery at 3 years of age.<sup>9</sup> They concluded that when reasonable function existed and when dental treatment could be administered, postponement of surgical intervention until the end of puberty appeared advisable. Rivas also recommended delayed treatment until the cessation of growth to avoid the possibility of additional

future surgery to correct recurrent deformity or restriction of movement.<sup>10</sup>

In conclusion, when coronoid impingement is suspected of the many possible causes of mouth opening limitation, the open mouth CT scans will be helpful to reveal the direct impingement of coronoid on zygoma.

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