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Direct Sagittal Computed Tomography of the Temporomandibular Joint

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Temporomandibular joint dysfunction is a common clinical problem that has been reported to affect 4%–28% of adults [1, 2]. The characteristic signs and symptoms are joint pain, tenderness, joint noises, and limitation of opening [3, 4]. Temporomandibular joint arthrography has shown that many of these patients have intraarticular abnormalities involving the meniscus [1, 5–8] (Katzenberg RW, Keith DA, Guralnick WC, Manzione JV, Ten Eick WR, unpublished data). An anteriorly displaced meniscus is believed to be the cause of the signs and symptoms in many [5–7]. Disadvantages of arthrography are that it is invasive and at times painful. A noninvasive test that could demonstrate the meniscus as well as bony abnormalities of the joint would be an important advance. In an attempt to develop such a noninvasive test, we have performed direct sagittal computed tomography (CT) on cadaver temporomandibular joints and have correlated the images with anatomic sections (Manzione JV, Seltzer SE, Katzberg RW, Hammerschlag SB, unpublished data). We are currently applying this technique clinically and report one representative example in which direct sagittal computed tomography of the temporomandibular joint accurately demonstrated an anteriorly displaced meniscus.

Technique

A Siemens Somatom 2 scanner was used. Direct sagittal scanning was performed with the patient lying supine on a stretcher placed lateral to the gantry and perpendicular to the scanner trolley. The patient's head was then positioned facing up in the gantry in a lateral orientation (fig. 1). The temporomandibular joint was scanned from lateral to medial using contiguous 2-mm-thick sections. Scans were obtained with the mouth opened and closed.

Case Report

A 32-year-old woman had a 3 year history of pain in the region of the right temporomandibular joint. She experienced joint noises

(clicking) with maximal jaw opening and episodes of limitation of opening. Her dentist suspected an intraarticular abnormality, and she was referred for evaluation.

A direct sagittal CT examination of the right temporomandibular joint was performed. A sagittal section with the condyle closed demonstrated a well defined density anterior to the condylar head that represented the meniscus of the joint (fig. 2A). A scan with the joint opened again demonstrated the meniscus anterior to the condyle (fig. 2C).

After CT examination, multidirectional tomography and arthrotomography were performed, revealing a filling defect anterior to the condyle (fig. 2B). This defect represented the meniscus outlined by contrast material in the upper and lower joint spaces. On the opened view (fig. 2D), this filling defect was again seen. The arthrographic findings are characteristic of an anteriorly displaced meniscus [5–7]. The CT findings correlated well with the arthrogram in regard to the position, configuration, and relative size of the meniscus.

A CT image photographed at settings to optimize bone detail demonstrated the flattening of the condylar head and hypertrophic bone formation (fig. 2E) that can also be seen on the conventional tomogram (fig. 2F).

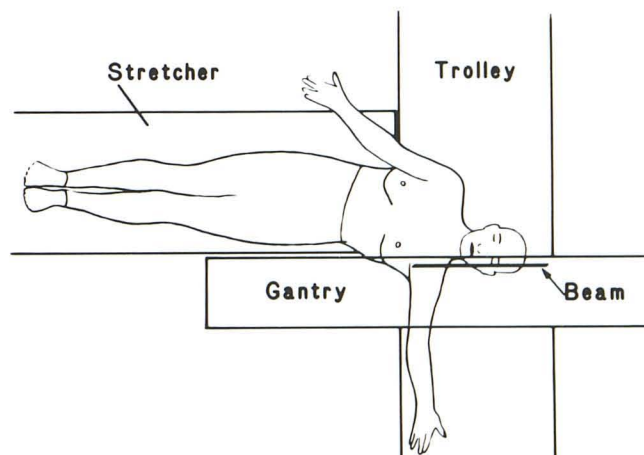


Fig. 1.—Patient positioning in gantry to permit direct sagittal scanning of temporomandibular joint.

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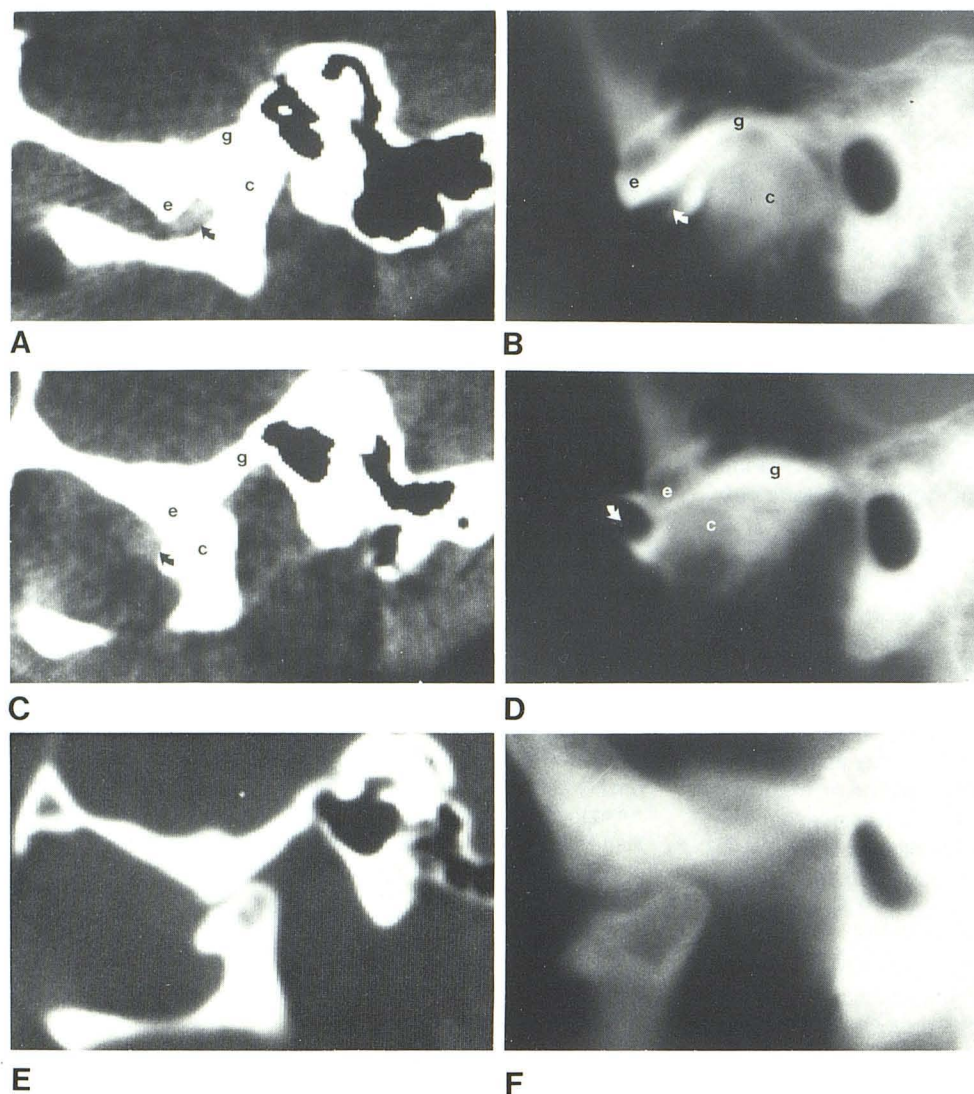


Fig. 2.—A, Sagittal CT of temporomandibular joint with condyle in closed position. Well defined density anterior to condyle represents anteriorly displaced meniscus (arrow). g = glenoid fossa; c = condyle; e = articular eminence. B, Corresponding arthrogram. Anteriorly displaced meniscus (arrow). C, Sagittal CT of temporomandibular joint with condyle in opened position. Well defined density anterior to condyle represents meniscus (arrow). D, Corresponding arthrogram. Displaced meniscus (arrow). E, CT image at bone setting. Flattening of condylar head and hypertrophic bone formation. F, Corresponding tomogram.

Discussion

The CT findings in our patient correlate well with the arthrographic and plain tomographic findings and contrast with the normal. On a sagittal CT scan of a normal joint, the meniscus is located between the condylar surface and the articulating surface of the temporal bone (fig. 3A). The small soft-tissue density anterior and posterior to the point of articulation between the condyle and temporal bone represents the anterior and posterior parts (bands) of the meniscus. On a CT scan with the condyle open, the meniscus again is located in a normal position. The small amount of tissue anterior and posterior to the point of articulation indicates that the meniscus has maintained a normal position on the condyle. The corresponding arthrogram (fig. 3D) confirms the normal position of the meniscus. In our patient with an anteriorly displaced meniscus, no soft-tissue density was seen posterior to the point of articulation between the condyle and the temporal bone. In addition, when the me-

niscus is anteriorly displaced (figs. 2A and 2C), the amount of soft-tissue density anterior to the point of articulation is much larger than in normal cases.

The close correlation of CT with arthrographic findings and plain tomographic findings in our patient was also seen in three other patients in whom both methods were performed. These cases illustrate that direct sagittal CT scanning of the temporomandibular joint has the potential for providing a noninvasive evaluation of the meniscus as well as bony abnormalities of the articulating surfaces.

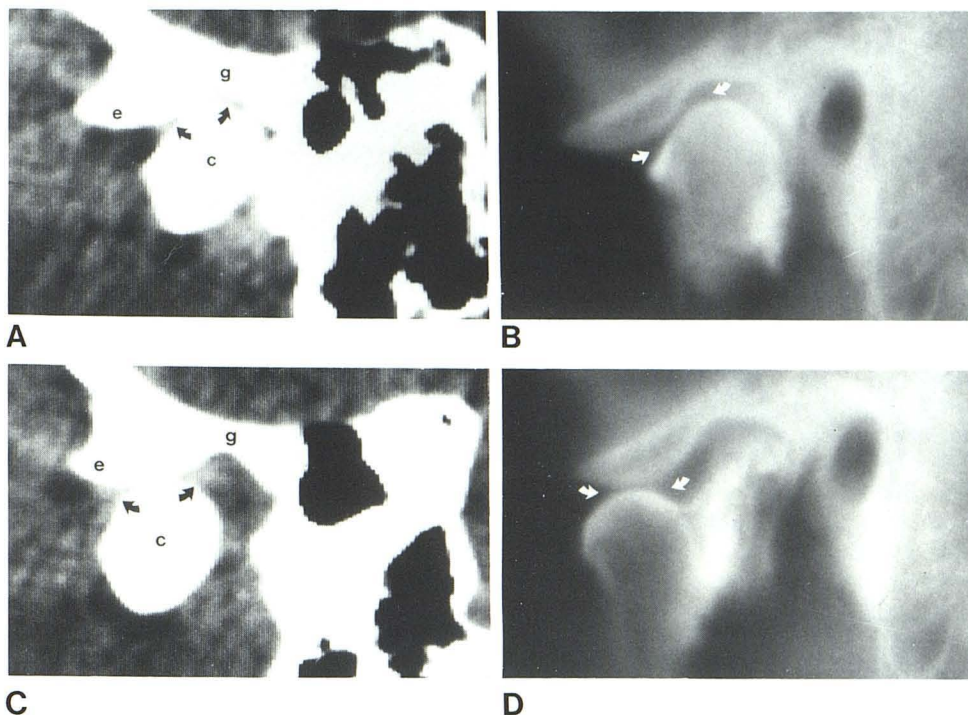
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Fig. 3.—Normal temporomandibular joint. **A**, Sagittal CT scan (mouth closed). Small density anterior and posterior to point of articulation indicates meniscus (arrows) to be in normal position on condylar head. g = glenoid fossa; c = condyle; e = articular eminence. **B**, Corresponding arthrogram. Meniscus in normal position (arrows). **C**, Sagittal CT scan in opened position. Meniscus (arrows). **D**, Corresponding arthrogram. Meniscus (arrows) normal.



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