Distension Technique to Improve Computed Tomographic Evaluation of Oral Cavity Lesions

G. M. Fatterpekar, MD; B. N. Delman, MD; M. M. Shroff, MD; T. P. Naidich, MD; M. S. Sacher, MD; P. M. Som, MD

Background: The apposing mucosa of the oral cavity makes the computed tomographic identification of a clinically obvious mass difficult. Contrast distension techniques have been used in radiology to evaluate for presence of a “hidden” mass.

Objective: To illustrate the utility of distending the oral cavity with air, water, or contrast to display otherwise obscure oral cavity lesions.

Patients and Methods: In 3 normal subjects and 5 patients with biopsy-proved oral cavity lesions, serial contiguous 3-mm axial and coronal computed tomographic scans were obtained before and after distension of the oral cavity using intraoral air or water. Air distension was achieved by having the subjects perform a modified Valsalva maneuver during the scan acquisitions. Fluid distension was obtained using approximately 40 mL of water.

Results: In each case, the contrast successfully distended the oral cavity, separating the mucosal surfaces. Gingivobuccal lesions that were obscured by apposition of the lips and cheeks to the gums and teeth, or by apposition of the tongue to the inner margins of the gums and teeth, were clearly demonstrated. Lesions involving or extending into the retromolar trigone were also well demonstrated using this distension technique.

Conclusions: Computed tomographic display of the anatomy and pathology of the oral cavity can be improved simply by distending the oral cavity using air or water as a contrast medium. This technique successfully shows lesions that are obscured by the apposing surfaces of the vestibule and the oral cavity proper, improving computed tomographic diagnosis.


Evaluation of small oral cavity lesions has always been a challenge to head and neck radiologists. Furthermore, determining the exact extent of a mass in the oral cavity can prove to be difficult owing to the apposition of adjacent mucosal surfaces. Use of phonation and other such maneuvers that distend a normally collapsed lumen has helped in the evaluation of other aerodigestive tract lesions.1,2 The present study evaluates the usefulness of distension of the oral cavity with air, water, or contrast media to display otherwise obscure oral cavity lesions.

METHODS

In 3 normal subjects used for control studies and 5 patients with biopsy-proved oral cavity lesions, serial contiguous 3-mm axial and coronal computed tomographic (CT) scans were obtained (HiSpeed CT/i Scanner; General Electric Medical Systems, Milwaukee, Wis) using a 120-kV, 270-mA technique before and after distension of the oral cavity with intraoral air, water, or dilute oral contrast agent (MD-Gastroview; Mallinckrodt Inc, St Louis, Mo). Pseudomasses were simulated in the control patients by the intentional placement of soft tissue-density pledgets along mucosal surfaces. Air distension was achieved by having the subject perform a modified Valsalva maneuver during image acquisition. Fluid distension was obtained using approximately 40 mL of water or dilute oral contrast agent held within the oral cavity. All study patients and subjects gave written informed consent after being briefed about the procedure. Institutional Review Board approval (No. 02-0197R) was obtained from Mount Sinai Medical Center, New York, NY.

RESULTS

In each case, the contrast successfully distended the oral cavity and separated the apposing mucosal surfaces of the vestibule (Figure 1A) and the oral cavity proper (Figure 1B). In the control cases, pseudomasses that escaped detection in the
collapsed state were well seen with air distension. In 1 control case, a pseudomass of soft tissue density (boiled chicken) was used as a phantom and placed on the buccal mucosa adjacent to the right retromolar trigone. The subtle mass was not visualized on routine CT scans but was easily identified on scans obtained after the oral cavity was distended with air (Figure 2).

Similarly, in control case 2, in which chewing gum was used, a pseudomass along the alveolar mucosa was better seen with air distension than in the collapsed state.

Gingivobuccal lesions obscured on routine CT studies by apposition of the lips and cheeks to the buccal surfaces of the alveolar processes, or by apposition of the tongue to lingual surfaces of the alveolar processes or the hard palate, were clearly demonstrated when the oral cavity was distended with contrast (Figure 3 and Figure 4). The contrast technique not only exposed the lesions but also defined their extent, both along mucosal surfaces (Figure 4) and into adjacent muscle (Figure 5).

**COMMENT**

The oral cavity can be subdivided into 2 spaces: the vestibule and the oral cavity proper. The vestibule is a curvilinear space, bounded externally by the mucosa of the lips and cheeks and internally by the teeth and the mucosa covering the buccal surface of the gums. The oral cavity proper is bounded by the alveolar arches and communicates posteriorly with the oropharynx. Its roof is formed by the hard palate, and its floor by the mucosa

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**Figure 1.** Normal anatomy. Air-distended axial (A and B) and coronal (C) computed tomographic scans illustrate the vestibule (V) and oral cavity proper (OCP). Bu indicates buccinator; BM, buccal mucosa; MB, mandible body; BF, buccal fat pad; T, tongue; MR, mandible ramus; RMT, retromolar trigone; and HP, hard palate.

**Figure 2.** A, Routine axial computed tomographic scan does not reveal any abnormality. B, Air-distended axial computed tomographic scan clearly demonstrates the pseudomass (arrow).
Figure 3. A, Axial computed tomographic scan without contrast fails to demonstrate the site of swelling. B, Axial computed tomographic scan after distension with water demonstrates a reparative granuloma (arrow) involving the mucosa overlying the tooth extraction site.

Figure 4. A, Coronal computed tomographic scan demonstrates a right upper alveolar carcinoma. Apposition of the tongue and hard palate limit delineation of the exact extent of the mass. B, Air-distended computed tomographic scan demonstrates the exact extent of the mass (arrow).

Figure 5. A, Nondistended axial computed tomographic scan shows suspicious mild thickening (arrow) in the right retromolar trigone. Axial computed tomographic images with air (B) and water (C) contrast confirm the presence of the mass with contiguous extension into the buccinator muscle (arrows).
of the floor of the mouth. The anterior two thirds of the tongue, also known as the mobile tongue, is contained within the oral cavity proper.

Mucosal lesions of the oral cavity are best assessed by referring clinicians using direct visual examination and bimanual palpation. The role of the radiologist is to evaluate the deep tissue extent of these lesions and to look for cervical lymphadenopathy. Using a routine CT imaging protocol for scanning the oral cavity in a collapsed state, it can be difficult for the radiologist to identify a mass that was seen by the clinician, especially if the lesion is small. However, by distending the oral cavity with a contrast agent (air, water, or oral contrast medium), the opposing mucosal surfaces are separated and it becomes possible to visualize even small masses. This technique also helps to define the extent of mucosal involvement. This technique is well tolerated, adds minimal time to the CT study, and may yield clinically useful information. It should be noted that during this technique, respiration need not be suspended, and patients are encouraged to breathe gently during the image acquisitions.

If the oral contrast agent is poorly tolerated by patients because of its bitter taste, diluted oral barium may be substituted. Care must be taken to prepare contrast of density that is higher than that of soft tissue but lower than that which would mask subtle or irregular lesions.

CONCLUSIONS

Computed tomographic display of the anatomy and pathologic conditions of the oral cavity can be improved by distending the oral cavity using either air or water as a contrast medium. This simple technique markedly increases the ability to identify lesions that might otherwise be obscured by apposing mucosal surfaces and helps to delineate tumor extent more clearly.

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Corresponding author and reprints: Peter M. Som, MD, Department of Radiology, Mount Sinai Medical Center, One Gustave L. Levy Place, New York, NY 10029 (e-mail: peter.som@msnyuhealth.org).

REFERENCES


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