The feasibility of cone beam computed tomographic sialography in the diagnosis of space-occupying lesions: report of 3 cases

Shoaleh Shahidi, DDS, MScD,[a] and Shahram Hamedani, DDS, MSc[b]
School of Dentistry, Shiraz University of Medical Sciences, Shiraz, Iran

Cone beam computed tomography (CBCT) is being widely used in recent years and has modernized the practice of oral and maxillofacial radiology by its inherent advantages, such as short scanning time, high resolution, and low dose of radiation to the patient. Sialography can be considered as the second step of assessment of space-occupying masses after initial diagnosis with ultrasonography. Sialography is combined with plain radiographs in routine practice. It can also be combined with advanced modalities such as computed tomography (CT), magnetic resonance imaging (MRI), and CBCT. In this report, we describe 3 cases to confirm the feasibility and superiority of sialography using CBCT and 3-dimensional (3D) images in space-occupying lesions of major salivary glands when conventional sialography is not diagnostic or MRI and CT are not easily available or affordable. CBCT sialography and its 3D images can be helpful in the diagnosis of space-occupying lesions of major salivary glands. (Oral Surg Oral Med Oral Pathol Oral Radiol 2014;117:e452-e457)

Diagnostic imaging has a crucial role in the assessment and management of symptomatic major salivary gland diseases. Such imaging can help in finding the nature, extent, and (probably) the cause of these diseases and can reveal their possible effects on the adjacent anatomic structures.[1]

Imaging of the major salivary glands is currently performed with one of the following imaging modalities: occlusal intraoral radiographs, conventional sialography, ultrasonography (US), computed tomography (CT) with or without contrast media, magnetic resonance imaging (MRI) with or without enhancements, magnetic resonance sialography, and nuclear salivary scintigraphy. Each technique has its own indication or shortcomings considering the primary assessment made and the availability of these devices.[1,2]

Currently, US is the preferred imaging modality in the initial evaluation of salivary glands in many countries. It is widely available, low-cost, patient-friendly, and safe and is valuable for the assessment of superficial lesions of the parotid and submandibular glands. It has been reported to be 98% accurate in discriminating glandular lesions from extraglandular lesions.[1] However, US is an operator-dependent technique and is limited in outlining deep parotid masses that are obscured by the mandible. Thus, clinicians should seek further imaging modalities to discover large tumor extension or to reach the definitive diagnosis in locally invasive lesions.[1]

Initially performed in 1902, sialography illustrates the ductal structures of the salivary glands by introducing a contrast agent into the orifice of its duct.[3] Traditionally, sialography is performed by using plain radiographs and injection of water-soluble contrast media into the major salivary gland ducts to outline the anatomy of the ducts, find strictures, and detect salivary stones (sialoliths).[1]

Conventional sialography, CT, and MRI can be used to assess space-occupying lesions of salivary glands when US fails.[2,3] The main shortcoming of conventional sialography is in the diagnosis of space-occupying lesions.[3]

Space-occupying masses of the salivary glands can be subdivided into cystic conditions and neoplastic lesions. Salivary gland tumors are uncommon, and cysts are rare. Fewer than 5% of salivary gland masses are related to cysts, and salivary gland tumors represent fewer than 3% of all tumors in the head and neck region.[1-3]

With combinations of imaging modalities, 3-dimensional (3D) images of ductal structure and gland anatomy can be obtained by combining sialography with CT or MRI. The high radiation dose of CT and the sophisticated methods of MRI are their primary well-recognized limitations.[2,3]

Today, the rapid achievement of a 3D image volume using cone beam computed tomography (CBCT) has overcome the limitations of MRI images and spiral (medical) CT scans. CBCT is being widely used in recent years and has modernized the practice of oral and maxillofacial radiology by its inherent advantages, such as short scanning time, high resolution, and low dose of radiation to the patient.[4] The CBCT equipment and procedures are primarily designed for proper imaging of bone and some soft tissue.[5] Very fine images and 3D reconstructions can nevertheless be obtained by CBCT,

[a]Biomaterial Research Centre, Department of Oral and Maxillofacial Radiology, School of Dentistry, Shiraz University of Medical Sciences.
[b]Dental Research Development Center, School of Dentistry, Shiraz University of Medical Sciences; private practice.
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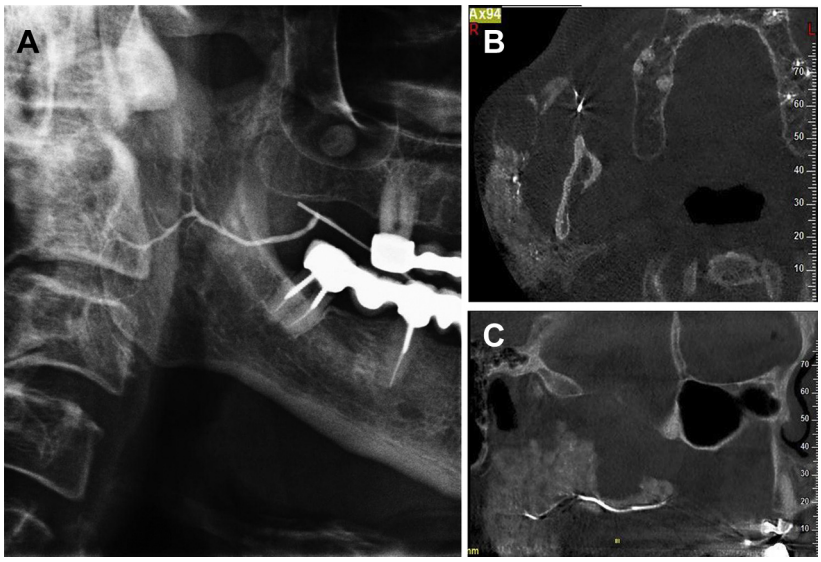

Fig. 1. Case 1. **A**, Conventional sialography from right parotid gland. There is no sign of filling defect, space-occupying lesion, or chronic sialoadenitis. **B**, Cone beam computed tomography sialography of the same gland. An axial section showing the space-occupying lesion in the anterosuperior aspect of the gland. **C**, Coronal section showing the space-occupying lesion in the anterosuperior aspect of the gland.

and it might be used for the differential diagnosis of suspicious radiolucent lesions of the mandible.[6]

Sialography has been found to be the most successful technique to evaluate major salivary gland function and to obtain accurate assessment of the obstructive conditions of the salivary glands.[7-9] This method can also be considered as the second step of assessment of space-occupying masses after initial diagnosis with US. Sialography is combined with conventional radiologic projections in routine practice.

The purpose of this report, which presents 3 clinical cases, is to verify the feasibility and superiority of CBCT sialography and its 3D images in the diagnosis of space-occupying lesions of major salivary glands.

CASE REPORTS

Case 1

A 55-year-old man with a history of 6 to 7 months of painless swelling of the right parotid gland was referred for sialography by his otolaryngologist. The clinical evaluation suggested a space-occupying lesion, and he was referred for conventional sialography. The sialography procedure was carried out by an experienced academic maxillofacial radiologist in a private dentomaxillofacial radiology center using the hand injection technique. The orifice of the primary duct of the salivary gland under examination was dilated with a series of gutta percha cones from No. 25 to No. 45. This was followed by cannulation of the main duct through the orifice using a customized catheter. The catheter was a scalp vein, gauge 19 for parotid glands with blunted needle. Subsequently, 4 to 5 mL of contrast material (Visipaque; iodixanol, 270 mg per 20 mL, Nycomed Amersham, Ireland) was injected slowly into the duct of the gland. We presumed 1 mL for the ductal phase and 3 mL for the parenchymal phase (blushing stage).

A unilateral dental panoramic tomography (DPT) image was then acquired using the Planmeca system (Planmeca Oy, Helsinki, Finland) and a photostimulable phosphor sensor (Konica CR; Minolta, Japan) to confirm the best possible filling up of the ductal structures. All digitally acquired images were viewed under optimal conditions regarding the monitor and the room lights. In the conventional sialogram, no filling defects and no significant space-occupying lesions were detected, although the Stensen duct was deviated to the inferior. There were also no signs indicating chronic sialoadenitis. Conventional sialography showed no abnormality and was not responsive for explicit diagnosis in this case (Figure 1, A). Because the plain-film sialogram was not diagnostic, a sialo-CBCT was planned. The patient was then positioned in the CBCT unit (NewTom VGi; QR Srl, Verona, Italy) with a 1-mL boost of contrast media, and the scanning of the involved salivary gland was performed. The data were examined using the software supplied by the manufacturer. CBCT images were compared with the initial conventional sialography images.

CBCT in axial and cross sections clearly showed a space-occupying lesion in the superomedial aspect of the gland. This finding is compatible with the displacement of the duct inferiorly in conventional and CBCT sialography. There were no signs of filling defects (sialodochitis, sialectasia) or any sign of ductal deterioration and puddling of the injected contrast media. CBCT found a space-occupying lesion, which was concurrent with the patient's condition and the anticipated diagnosis of the referring physician. Although the diagnosis of a space-occupying lesion without ductal disease was confirmed, the patient refused a fine-needle aspiration (FNA) examination (Figure 1, B).