Contrast-enhanced ultrasound for diagnosis of an enlarged cervical lymph node in a patient with oropharyngeal cancer: a case report

Shalva R. Gvetadze, PhD, DDS,[a,b,c] Ping Xiong, PhD, MD,[d] Jiang Li, PhD, DDS,[e] Mingming Lv, PhD, DDS,[a,b] Jun Li, DDS,[a,b] Xin Yang, PhD, DDS,[a,b] Konstantin D. Ilkaev, MD,[f] and Jian Sun, PhD, MD[a,b]

In oral and oropharyngeal cancer, the presence of regional neck metastasis strongly influences treatment planning and survival prognosis. A number of imaging techniques can be utilized in the clinic for diagnosis and staging. A patient with oropharyngeal cancer was staged T2 cN1 after clinical examination, computed tomography, and ^{18}F-fluorodeoxyglucose positron emission tomography with computed tomography. Contrast-enhanced microbubble imaging was applied for diagnosis of a lymph node suspected of harboring a metastasis. The result of the microbubble procedure showed the suspicious node to be tumor negative, and this was later confirmed by frozen section and serial step section of the harvested node. Contrast-enhanced ultrasonography with introduction of intravenous microbubble contrast may be of benefit in staging oropharyngeal cancer in patients with enlarged neck lymph nodes. (Oral Surg Oral Med Oral Pathol Oral Radiol 2017;124:495–499)

It is well recognized that patients with early oral and oropharyngeal squamous cell carcinoma (SCC) tend to benefit from execution of sentinel lymph node (SLN) biopsy for diagnostic and staging purposes. In a situation where there is a choice between wait-and-see follow-up and neck dissection, SLN detection and pathologic examination may spare the patient from morbidities linked to regional lymphadenectomy.[1,2] Several classic (blue dye injections, lymphoscintigraphy and single photon emission computed tomography with lymphoscintigraphy) and new evolving lymphographic techniques (computed tomography [CT] with lymphography, magnetic resonance imaging with lymphography, near-infrared fluorescence imaging, etc.) are used for SLN visualization in different clinical settings.[3] Among these novel means is contrast-enhanced ultrasonography (CEUS), which was introduced for SLN biopsy in the staging of breast cancer.[4]

The work was conducted done in the 9th People's Hospital, Shanghai Jiao Tong University School of Medicine, Department of Oral Maxillofacial – Head Neck Oncology and Department of Ultrasound.

[a]Department of Oral Maxillofacial – Head Neck Oncology, Ninth People's Hospital, Shanghai Jiao Tong University School of Medicine, Shanghai, China.

[b]Shanghai Key Laboratory of Stomatology & Shanghai Research Institute of Stomatology, National Clinical Research Center of Stomatology, Shanghai, China.

[c]Central Research Institute of Dentistry and Maxillofacial Surgery, Moscow, Russia.

[d]Department of Ultrasound, Shanghai Ninth People's Hospital, School of Medicine, Shanghai Jiao Tong University, Shanghai, China.

[e]Department of Oral Pathology, Shanghai Ninth People's Hospital Affiliated to Shanghai Jiao Tong University School of Medicine, Shanghai, China.

[f]Department of Head and Neck Surgery, NN Blokhin Russian Cancer Research Center, Moscow, Russia.

Received for publication Jun 11, 2017; returned for revision Aug 6, 2017; accepted for publication Aug 10, 2017.

2212-4403/$ - see front matter
https://doi.org/10.1016/j.oooo.2017.08.007

The high diagnostic efficiency of the method has been reported since then.[5] Microbubble contrast agents that are used for CEUS can be delivered intravenously or injected into soft tissues peritumorally. Intravenous delivery allows for preoperative differentiation of the status of nodes that are considered suspicious for metastasis.[6] Local (intradermal, subcutaneous, or submucous) peritumoral injections are done for tracing and identification of the SLN.[7] More recently, CEUS has been applied for SLN mapping in patients with T1-2 cN0 tongue SCC.[8] Here, we present a case in which CEUS was successfully utilized for imaging and diagnosis of an enlarged lymph node in a patient with early oropharyngeal SCC.

CASE REPORT

A 52-year-old male patient was referred for a recent experience of odynophagia. There was no history of smoking or alcohol abuse. CT of the head and neck revealed a tumor $1.7 \times 2.1 \times 2.1$ cm in size occupying the right vallecula and almost totally obstructing the right part of the oropharyngeal orifice at the level of the third cervical vertebra (Figure 1A). In the right neck, an enlarged lymph node was spotted at level III at the anterior border of the sternocleidomastoid muscle (Figure 1B). Biopsy specimens obtained with the assistance of pharyngoscopy exhibited poorly differentiated SCC. Positron emission tomography with computed tomography (PET-CT) showed 2 zones of increased heterogeneous FDG uptake: one in the primary site in the oropharynx and another in the right neck at level III. The presence of a metastatic deposit was suspected. The patient then underwent ultrasonography for further neck evaluation. During gray-scale ultrasonography, the enlarged $3.0 \times 1.2 \times 1.9$ cm lymph node that had been seen during CT was visualized on the right side at level III. The hilum was intact, and no signs of cortical thickening were present (Figure 2A). Gray-scale ultrasonography and CEUS were performed using the Esaote MyLab Twice (Esaote SpA,

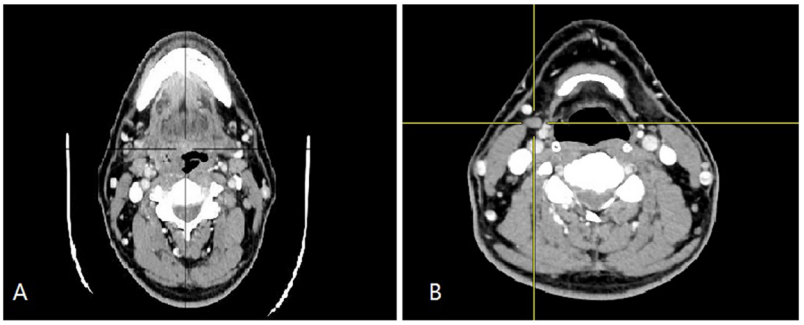

Fig. 1. **A,** Tumor occupying the right vallecula and nearly totally obstructing the right part of the oropharyngeal orifice at the CV III level. **B,** The enlarged lymph node was spotted at level III at the anterior border of the sternocleidomastoid muscle.

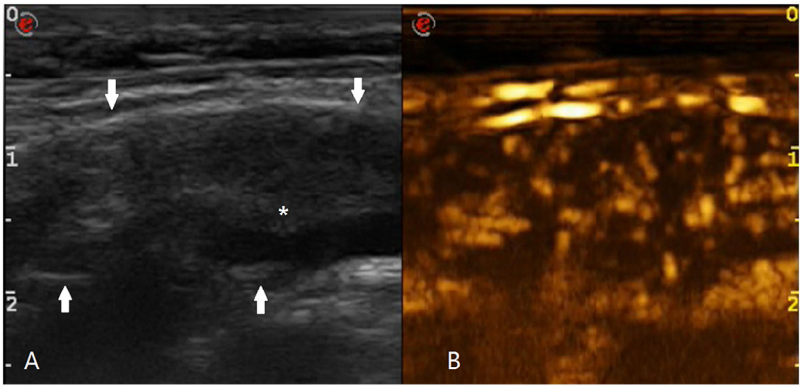

Fig. 2. **A,** A gray-scale ultrasound examination of the suspicious lymph node *(margins outlined with arrows)* showed no signs of malignancy, with the hilum intact *(asterisk)* and no cortical thickening. **B,** In CEUS imaging, the contrast was equally distributed within the node, confirming the benign nature of the enlargement of the node.

Genova, Italy) device. As it was problematic to reach the primary site in the oropharynx for peritumoral contrast injection, intravenous delivery was chosen for CEUS imaging of this particular node to establish its status. The Sonovue contrast agent (Bracco Imaging, Milan, Italy) was used in this case. The dry medium powder was mixed with 5 mL of normal sterile saline. The ampule was thoroughly shaken before every injection to ensure a homogeneous suspension of microbubbles. The prepared contrast was delivered intravenously in a 2.5-mL bolus, immediately followed by 5 mL of saline. Two injections were carried out. Enhancement of the node started 15 seconds after injection, and the contrast washout began after 90 seconds. A uniform filling pattern without perfusion defects was recognized. The contrast material was equally distributed inside the lymph node (Figure 2B). On the basis of this finding, the node was deemed metastasis-free. The patient received surgical treatment: right lateral suprahyoid pharyngotomy for primary tumor excision; modified radical neck dissection with preservation of internal jugular vein and sternocleidomastoid muscle and removal of the accessory nerve on the right side; and selective supraomohyoid neck dissection on the left side of the neck. In the operating room, the examined lymph node was dissected off the surgical specimen and was bisected along the axis (Figures 3A and 3B). One half of the node was submitted for frozen-section examination, and the second half was reserved for routine paraffin serial step sectioning. The frozen-section examination revealed no signs of malignancy, and this finding was later supported by the results of the serial step section, describing a picture characteristic of reactive nodal inflammation (Figure 4). No metastatic nodes were found elsewhere in the bilateral surgical specimens; therefore, the patient was staged as T2 pN0. The postoperative period was uneventful, and 3 months postoperatively, no signs of local or regional recurrence were observed.

DISCUSSION

SCC is the most common malignant tumor of the oral cavity and oropharynx and has a high potency for secondary spread to the regional lymph nodes. The existence of lymph node metastasis is the most important predictive factor that influences survival prognosis and indicates the necessity and extent of neck dissection. The conven-