EXAMINATION OF FACIAL SUPRAMANDIBULAR LYMPH NODES IN DENTAL PATIENTS BY ULTRASONOGRAPHY

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ABSTRACT

Objective: *There are many accessory facial lymph nodes in the head, the supramandibular nodes are among them. The purpose of this study is to identify the frequency of accessory facial supramandibular lymph nodes (FSLN) in a dental patient group using ultrasonography (USG).*

Material and Method: *The supramandibular region in front of the masseter muscle was scanned by USG on the transversal and longitudinal planes in 100 dental patients. The FSLN found were recorded, and their long axis and short axis diameters were measured. The hila and vascularization of the nodes were also examined by Doppler USG.*

Results: *FSLN were detected in 17 patients (17%). The mean size of the detected FSLN was 9.7±4.64 mm in longitudinal diameter and 4.54±2.22 mm in latitudinal diameter. The echogenic hila and hilar vascularization of the nodes were identified in 15 of the patients in whom lymph nodes were detected; in the other two patients, the lymph nodes were smaller than 5 mm and the echogenic hila and hilar vascularization could not be detected. There was no statistically significant difference in the presence of FSLN between genders (p>0.05).*

Conclusion: *The frequency of FSLN was found to be 17% among dental patients in the present study, as diagnosed by USG. Dentists should be aware of these structures and thoroughly define swelling of the perimandibular area.*

Keywords: *Facial, lymph node, ultrasonography.* **Nobel Med 2019; 15(2): 35-39**

DENTAL HASTALARDA FASİYAL SUPRAMANDİBULAR LENF NODLARININ ULTRASONOGRAFİ İLE İNCELENMESİ

ÖZET

Amaç: Kafada aralarında supramandibular nodların da bulunduğu birçok aksesuar fasial lenf nodu bulunmaktadır. Bu çalışmanın amacı bir dental hasta grubunda ultrasonografi (USG) kullanarak aksesuar fasiyal supramandibular lenf nodlarının (FSLN) sıklığını saptamaktır.

Materyal ve Metot: 100 dental hastada masseter kas önünde bulunan supramandibular alan USG ile transversal ve longitidunal yönlerde incelendi. Tespit edilen FSLN'ler ve onların uzun ve kısa aks çapları kaydedildi. Ayrıca nodüllerin hilusları ve kanlanmaları da Doppler USG ile incelendi.

Bulgular: 17 hastada (%17) FSLN tespit edildi. Tespit edilen FSLN'lerin çapları yatay yönde 9,7±4,64 mm, dikey yönde 4,54±2,22 mm idi. 15 hastada ekojenik hilus ve hilar kanlanma tespit edildi, 2 hastada nodların çapı 5 mm'den küçüktü ve hilar kanlanma tespit edilemedi. Cinsiyetler arasında FSLN bulunma sıklığı açısından herhangi bir farklılık bulunmadı (p>0,05).

Sonuç: Dental hastalar arasında USG ile tespit edilen FSLN sıklığı %17'dir. Diş hekimleri perimandibular alanda oluşan şişlikleri incelerken bu yapıların varlığını da aklından çıkarmamalıdır.

Anahtar kelimeler: Fasiyal, lenf nodu, ultrasonografi.
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INTRODUCTION

Lymph nodes, oval-shaped organs of the body's immune system, are major sites at which immune cells fight against infection agents and malign neoplastic cells. Each lymph node consists of a medulla and a cortex surrounded by a fibrous capsule. There is a hilum in the center of the medulla where the blood vessels pass. Lymph nodes reach their largest size around the age of 8-12 years and get smaller after adolescence.

"Lymphadenopathy" refers to swollen lymph nodes. In such cases, the lymph nodes, which are not palpable normally, become detectable by palpation. This, of course, only applies to superficial nodes. Deep lymph nodes can be detected only by imaging techniques. Lymphadenopathy is a sign of various infections or of neoplastic diseases such as metastases or primary cancers affecting lymph nodes.

There are approximately 800 lymph nodes in the human body, and 300 of them are located above the neck.[1] The lymph nodes of the head and neck can be studied separately. The cervical lymph nodes have been classified according to their locations in the neck. The lymph nodes of the head are classified as occipital, posterior and anterior auricular, parotid, sublingual, retropharyngeal, and facial nodes.

Three groups comprise the facial lymph nodes: infraorbital, buccinator, and supramandibular. The supramandibular lymph nodes are located on the outer surface of the mandible, in front of the masseter muscle and in contact with the external maxillary artery and anterior facial vein. The facial lymph nodes provide drainage of the eyelids, the conjunctiva, the skin, and the mucous membranes of the nose and cheek to the submandibular nodes.[2,3] They also play an important role in the spread and diagnosis of facial malignancies. The incidence of the presence of facial lymph nodes is reported as 20–30% in all individuals.[4]

High-resolution ultrasonography (USG) has been commonly used to evaluate lymph nodes and lymphadenopathy.[1,5] The shapes, boundaries, echogenicity, hila, blood supply, necrosis, and calcification of lymph nodes may be assessed by USG. The purpose of the present study was to identify by USG the frequency of facial supramandibular lymph nodes (FSLN) in a dental patient group. To our knowledge, this is the first study in the literature on the frequency of accessory facial lymph nodes in dental patients.

MATERIAL AND METHOD

This study was carried out in the Oral and Maxillofacial Radiology Department. The study has been conducted in full accordance with the World Medical Association Declaration of Helsinki and it was approved by the Ethical Committee of our faculty (Decision No: 58/2015). We obtained written consent from all participants and the parents of all participants that were under 18 years of age. The

study involved a total of 100 patients (42 male, 58 female), and the group's mean age was 30.16 years (range: 9–73 years; SD: 13.42). The study group was chosen from among patients who were coming for routine dental examinations and had no systemic problems. There was no age limit on this study, as USG has no harmful effect on children.

First, routine clinical examinations of the patients were performed, and the supramandibular area in front of the masseter muscle above the mandibular base was palpated. The dental pathologies of the patients were not considered, as the facial lymph nodes provide drainage of the superficial soft tissues, such as mucous membranes and skin, and are not associated with teeth.

USG was applied using an Aplio-300 device (Toshiba Corporation, Tokyo, Japan) and an 8 MHz linear array transducer. The USG examinations were performed by two oral and maxillofacial radiologists with at least four years of experience with USG. The examinations were carried out with the patients in the rest position; patients were asked not to clench their teeth (Figure 1). During the examinations, the supramandibular region in front of the masseter muscle was scanned on the transversal and coronal planes. The supramandibular nodes found were recorded, and their short and long axis diameters were measured (Figure 2). The hila and vascularization of the nodes were also examined by Doppler USG (Figure 3). Standardized machine settings (Doppler frequency 6 MHz, low wall filter, medium persistence and pulse repetition frequency of 700) were used to maximize Doppler sensitivity.

The statistical analyses were conducted with SPSS® software (SPSS v. 20.0 for Windows, SPSS Inc., Chicago, IL). Descriptive analyses were performed, and the frequencies were calculated. The difference in the presence of FSLN between genders was analyzed using the χ^2 test, with $p<0.05$ being considered statistically significant.

RESULTS

FSLN were found in 17 of 100 patients (17%). The detected FSLN were unilateral in 16 of 17 patients and bilateral in one patient. When the mean size of the detected FSLN was evaluated, it was 9.7±4.64 mm (min: 3, max: 21.7) in longitudinal diameter and 4.54±2.22 mm (min: 2.50, max: 10.20) in latitudinal diameter. The echogenic hila and hilar vascularization of the nodes were identified in 15 patients, while the echogenic hila could not be identified in two patients (Figure 4). A history of swelling was found in 14 patients, and the lymph nodes of these patients were palpable; 3 patients presented no history of swelling and no positive findings in palpation. There were no statistically significant differences in the presence of FSLN between genders ($p>0.05$) (Table).

Table. The frequency of facial supramandibular lymph nodes in genders and total patients.

	Total Patients n(%)	FSLN n(%)	*p*
Male	42(42)	7(17)	>0.05
Female	58(58)	10(17)	
Total	100(100)	17(17)	

FSLN: Facial supramandibular lymph nodes

DISCUSSION

Many factors can cause lymphadenopathy, particularly infections. In cases of infection, the number of lymphocytes in the lymph nodes increases, the lymph nodes swell, and the capsule of the lymph node is stretched. The lymph node is therefore sensitive to palpation in cases of acute infection. Other important causes of lymphadenopathy are neoplastic diseases such as lymphoma or leukemia, which are primary for lymph nodes, and metastases of other malignancies. Neoplastic lymphadenopathies are not painful on palpation. Because this area is the drain region of the head and neck and contains a plurality of nodes, the evaluation of lymphadenopathy in this region is very important.

Figure 1. Examination of supramandibular nodes by ultrasonography.

Figure 2. B-mode ultrasound appearance and size measurements of a facial supramandibular lymph node. Thin arrows point the mandibula, thick arrows point the masseter muscle and arrowheads point the supramandibular lymph node.

Figure 3. Color Doppler ultrasound and hilar vascularity of a facial supramandibular lymph node. Thin arrows point the mandibula, thick arrows point the masseter muscle and arrowheads point the supramandibular lymph node.

Figure 4. B-mode ultrasound of a facial supramandibular lymph node smaller than 5 mm in size and echogenic hilus cannot be identified. Arrow points the facial supramandiblar lymph node and arrowheads point the mandibular bone.

Lymph nodes may be evaluated radiologically by computed tomography (CT), magnetic resonance imaging (MRI), and USG. Because of the risk of ionizing radiation, the use of CT is limited and although the resolution of MRI is high enough for soft tissue, it cannot distinguish between malign and benign lymphadenopathies and is not easily accessible.[6] MRI also may not identify intranodal calcification.[7,8] Furthermore, the nature and internal architecture of lymph nodes smaller than 5 mm may not be satisfactorily assessed by CT and MRI.[8]

For these reasons, the importance of ultrasound in the assessment of cervical lymphadenopathy is currently accepted by many authorities.[1,5,8] USG has several advantages compared to other medical imaging techniques. It provides images in real time, and it is portable, inexpensive, radiation free, noninvasive, and unaffected by metal artifacts, such as dental restorations.[9-11] It also allows identification of the vascularization of lesions via its power Doppler and color Doppler facilities, can differentiate cystic from solid lesions, and is helpful in differentiating benign from malignant masses.[10,11] USG also has some limitations, such as patient cooperation and physique, difficulty in imaging structures behind bone and air, and dependence on a skilled operator. The shapes, boundaries, echogenicity, hila, blood supply, necrosis, and calcification of the lymph nodes may be assessed by USG.[1,5,6,8] USG is particularly sensitive compared to clinical examination and palpation.

Various criteria are considered when evaluating lymph nodes by USG. On ultrasound, the hilum of a lymph node appears as an echogenic intranodal linear structure that is continuous with the adjacent perinodal fat.[7] Normal and reactive nodes usually show hilar vascularity on USG. In two patients in the present study, the echogenic hila and hilar vascularity of lymph nodes smaller than 5 mm could not be identified. Some studies have shown that echogenic hila may also be found in malignant nodes.[1,5-8] Therefore, the presence or absence of echogenic hila cannot be used as the sole criterion for the evaluation of cervical lymph nodes. Peripheral or mixed vascularity are common in metastatic nodes.[7,8]

FSLN are mobile structures that lie within the soft tissues of the cheek between the skin and the buccinator muscle at the anterior border of the masseter muscle. They are adjacent to the facial nerve and blood vessels.[12] The presence of facial lymph nodes and their significance has received little attention in the literature. In the present study, the frequency of facial lymph nodes was found to be lower than the literature reports. One reason for this may be that only the supramandibular lymph nodes were included, while another may be USG's occasional inability to visualize superficial lymph nodes because of their small size. Such small superficial nodes only become apparent when they swell. Thus, the majority of the supramandibular lymph nodes identified in this study were symptomatic; 14

patients had a history of swelling. Inflammatory or "reactive" nodes may become apparent on USG while remaining impalpable.[13] Although lymph nodes can sometimes be palpable, they must be examined by USG to confirm that they are lymph nodes.

Masseter muscle investigations by USG are performed on a closed mouth without clenched teeth. The probe is positioned parallel to the occlusal plane, and an image of the masseter muscle is obtained transversally. Supramandibular lymph nodes may also be visualized in this direction. However, if patients are asked to clench their teeth to contract the masseter muscle during the examination, it can be remarkably difficult to localize the nodes. Therefore, patients in this study were asked to remain in the rest position during the examinations.

The lower border of the mandible is known to be the upper limit of level I cervical lymph nodes in cases of head and neck cancer. Accordingly, surgeons do not usually extend their dissections above the base of the mandible, where supramandibular lymph nodes lie because of their close relation to the facial nerve.[14] There are few studies in the literature on facial lymph node involvement in head and neck cancers. Facial lymph nodes are one of the more unusual sites of lymph node metastases. Sheanan et al. found facial lymph node involvement in 7 of 29 oral cavity cancer cases, and all involved nodes were supramandibular nodes.[12]

There is no study in the literature on the frequency of facial lymph nodes in cases other than cancer. The purpose of the present study was to use USG, a noninvasive and harmless technique, to identify FSLN in routine dental cases and attract dentists' attention to this issue. This was felt to be necessary because accessory FSLN have not received as much attention from dentists as neck nodes, such as submandibular nodes. Unfortunately, in many cases, the presence of supramandibular lymph nodes may be ignored, and they may not be considered as possible sites of swelling in this area. Supramandibular lymph nodes can be confused with submandibular lymph nodes, which are known to be on the inside of the mandible. Inaccurate and incomplete diagnosis can result from the fact that conventional radiography cannot visualize these nodes.

CONCLUSSION

There are accessory facial lymph nodes in the head, among which are supramandibular nodes. In the present study, the frequency of supramandibular nodes was 17% as detected by USG, which is a noninvasive and harmless technique. This study was limited by a small sample size; however, it may lead to more comprehensive future studies on this issue.

*The authors declare that there are no conflicts of interest.

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