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**Original study**

# Is scalene lymph node biopsy still effective?

# Skalen lenf nodu biyopsisi hala etkin mi?

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**ABSTRACT**

Excision of scalene lymph nodes via surgical biopsy technique is a valuable method for the diagnosis and treatment plan of thoracic and extrathoracic malignancies and some granulomatous diseases.

In this study, we aimed to investigate the efficacy and safety of scalene lymph node biopsy as a diagnostic tool. Surgical biopsy was performed on 15 patients with palpable scalene lymph nodes, and their data were retrospectively analyzed.

Materials obtained via scalene lymph node biopsy were sufficient for 93.3% of the diagnoses. Of the diagnoses, 33.3% were non-small cell lung carcinoma metastasis, 26.7% were small cell lung carcinoma metastasis, 26.7% were lymphoma, and 13.3% were non-cancer pathologies. No complications were observed during or after scalene lymph node biopsy procedure in any of the patients.

Scalene lymph node biopsy is a reliable, inexpensive, and effective diagnostic method.

**Keywords**: Scalene lymph node; lung cancer; lymph node biopsy.

**ÖZET**

Skalen lenf nodlarının cerrahi biyopsi tekniği ile eksize edilmesi torasik ve estratorasik malignitelerin ve bazı granülamatöz hastalıkların tanı ve tedavi planı için değerli bir yöntemdir.

Bu çalışmada skalen lenf nodu biyopsisinin bir tanı aracı olarak etkinliğini ve güvenilirliğini araştırmayı amaçladık. Palpabl skalen lenf nodu bulunan 15 hastaya cerrahi biopsi yapıldı ve hastaların verileri retrospektif olarak incelendi.

Skalen lenf nodu biyopsisi ile alınan materyaller %93,3 oranında tanı konması için yeterli olmuştur. Tanıların %33,3'ü küçük hücreli dışı akciğer karsinom metastazı; %26,7'si küçük hücreli akciğer karsinomu metastazı; %26,7'si lenfoma ve %13,3'ü kanser dışı patolojiydi. Hastaların hiçbirinde skalen lenf nodu biyopsi işlemi sırasında ve sonrasında herhangi bir komplikasyon izlenmemiştir.

Skalen lenf nodu biopsisi tanı koymak için güvenilir, ucuz ve etkin bir yöntemdir.

**Anahtar kelimeler**: Skalen lenf nodu; akciğer kanseri; lenf nodu biyopsisi.

## INTRODUCTION

Despite its vital structures and complex anatomy, the supraclavicular area is a region that thoracic surgeons are familiar with and dominant due to their experience with scalene lymph node biopsy(1). Scalene lymph nodes are located in the fat pad under the omohyoid muscle in front of the lower end of the anterior scalene muscle, and range from 5 to 20. lymphatics of the lung and mediastinum drain to the inferior deep cervical lymph nodes via the paratracheal lymph nodes. These nodes are usually not palpable. Although they are often of normal size, microscopic invasion can be detected(2). Because of their connection with pulmonary lymphatic drainage, they are easily affected by intrathoracic pathological events. Likewise, bronchial cancers and systemic events outside the chest may cause involvement of the scalene lymph nodes. Especially bronchial cancers metastasize to the scalene lymph node, which is the medial group of deep cervical lymph nodes outside the chest(2). Therefore, surgical biopsy of supraclavicular lymph nodes is a valuable tool for determining the treatment plan and cell typing (3). Here in, we aimed to investigate the efficacy and safety of scalene lymph node biopsy as a diagnostic tool.

## MATERIAL and METHOD

After local ethics committee approval dated 29.12.2022 and decision number 25/370 was obtained from the ethics committee of Süleyman Demirel University, the data obtained from the electronic files and surgical records of 15 patients who were admitted to the Thoracic Surgery Clinic of Süleyman Demirel University Research and Application Hospital with the diagnosis of palpable sclaen lymph node were retrospectively analyzed (Figure 1). The 15 cases were evaluated in terms of demographic characteristics, histopathologic results, imaging data, length of hospitalization, and complications. The lymph node was excised under local anesthesia with a 5 cm incision approximately one finger above the clavicle in a supine position with the patient's head facing the biopsy side (4). None of the patients developed major or minor complications related to the biopsy procedure. Sixty percent of the patients who underwent biopsy were discharged on the same day, 13.3% were discharged 1 day after the procedure, and 26.7% were hospitalized due to previous accompanying pathologies.

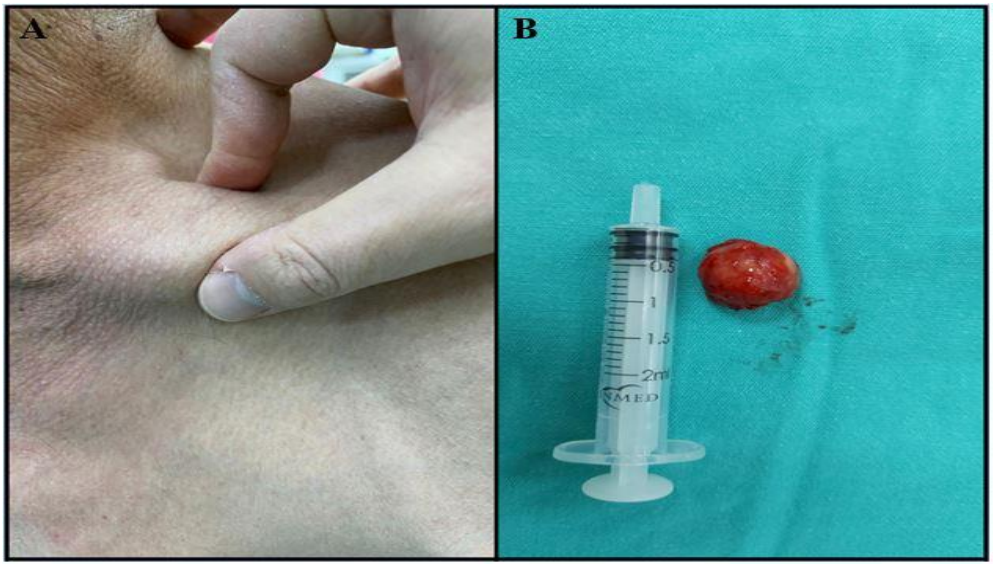


**Figure 1: A)** Image of palpable scalene lymph node **B)** Scalene lymph node after excision.

## RESULTS

Within the scope of the study, 15 patient files were analyzed. 66.7% of the patients were male, and the age range was 30-89 years, with a mean age of 64 years. None of the patients included in the analysis underwent fine needle aspiration biopsy.

53.3% of patients had a PET-CT result before scalene lymph node biopsy. The minimum SUV-Max value of PET-CT was 3.60, the maximum was 13.10, and the mean was 8.69. Scalene lymph node biopsy was sufficient for diagnosis in 93.3% of the cases. Of the diagnoses, 60.0% were lung carcinoma metastases, 26.7% were lymphoma, and 13.3% were non-cancerous pathologies compatible with reactive lymphadenitis. Of the lung carcinoma metastases, 55% were non-small cell lung carcinoma metastases, 45% were small cell lung carcinoma metastases, and all non-small cell lung cancers were adenocarcinoma metastases.

Major complications, such as pneumothorax, phrenic nerve injury, air embolism, and arteriovenous fistula, and minor complications, such as wound infection and local bleeding, were not observed

in any of the patients. Although 60.0% of the patients who underwent scalene lymph node biopsy were discharged on the same day without hospitalization, 13.3% were observed in the hospital for one day and then discharged the next day. Furthermore, 26.7% of the patients were admitted to the hospital during their hospitalization due to additional pathologies that existed before the procedure, and it was observed that the biopsy procedure did not prolong the hospitalization period of the patients (Table 1). According to the results of this study, the sensitivity and diagnostic specificity of scalene lymph node biopsy were 93.3% and 100%, respectively.

**Table 1:** Distribution of patients who underwent scalene lymph node biopsy according to gender, histopathologic diagnosis, and length of hospitalization.

| **Gender** | **n (15)** | **%** |
|---|---|---|
| Male | 10 | 66,7 |
| Female | 5 | 33,3 |
| **Histopathologic Diagnosis** | | |
| Lung Carcinoma Metastasis | 9 | 60,0 |
| • Non-Small Cell Lung Carcinoma Metastasis | 5 | 33,3 |
| • Small Cell Lung Carcinoma Metastasis | 4 | 26,7 |
| Lymphoma | 4 | 26,7 |
| Non-cancer (Reactive Lymphadenitis) | 2 | 13,3 |
| **Duration of hospitalization** | | |
| Discharged on the same day | 9 | 60 |
| 1-day hospitalization | 2 | 13,3 |
| Hospitalization due to additional pathologies existing before the procedure | 4 | 26,7 |

## DISCUSSION

A good diagnostic and staging method should be as inexpensive as possible, simple to apply, have few complications, have a high diagnostic rate, and have a low morbidity rate for the patient (3). The history of scalene lymph node biopsy (SLNB) dates back to 1949 when Daniels proposed it for the diagnosis of intrathoracic diseases (5). SLNB is usually performed for preoperative staging in bronchial cancers or the diagnosis of intrathoracic pathologies, such as mediastinal tumors and other lesions, sarcoidosis, diffuse pulmonary diseases, fungal diseases of the lung, and tuberculosis (3,5). Today, SLNB has become less preferred due to the use of newer methods, such as fine needle aspiration biopsy, for diagnosis and staging. However, in the study by Dong et al., although 90% of the patients were diagnosed with lung cancer in fine needle aspiration biopsy, cell types could not be determined, and the remaining 10% were diagnosed with lymphadenitis. However, as a result of further investigations after needle biopsy, lung adenocarcinoma was diagnosed (3). This approach is disadvantageous in terms of diagnosis time and additional intervention. In our clinical practice, when we think of lung cancer or lymphoproliferative disease, we check the scalene lymph node on examination. If we detect a palpable lymph node, we prefer SLNB to avoid delay in diagnosis.

The diagnostic rate of SLNB for lung cancer was 86.9%, according to Dong et al. (3). In another study, the diagnostic rate for nonpalpable scalene lymph node biopsies was 5% (6). Skinner et al. found a diagnosis rate of 67% for lung cancer and 71% for extrapulmonary cancers for SLNB performed in palpable scalene lymph nodes and, 9% for lung cancer and 20% for extrapulmonary cancers in biopsies performed from nonpalpable scalene lymph nodes. The SLNB diagnosis rate is 66% in palpable scalene lymph nodes (7). There is a consensus that SLNB can be used for diagnosis and staging, especially in palpable lymph nodes (2). The results of this study support the literature, and the diagnosis rate of SLNB in palpable lymph nodes was found to be 100%.

Complications of SLNB include artery, vein, ductus thoracicus, nerve injuries, and pneumothorax(2). Dong et al. reported a complication rate of 12.9% for SLNB in their study (8). The reason why this procedure is not preferred today may be the possibility of these potentially fatal complications. In this study, no complications were observed during or after SLNB. The absence of complications is a supportive finding for the use of this diagnostic method. However, due to the small number of cases, a larger series will be needed.

According to Dong, the diagnostic sensitivity of supraclavicular lymph node excision biopsy is 100%, diagnostic specificity is 97.6%, positive predictive value is 83.3%, negative predictive value is 100%, and accuracy is 97.8% (3). In this study, a diagnosis rate of 93.3% in SLNBs and a diagnostic specificity of 100% confirmed that SLNB is a good

diagnostic method that can be used for staging and diagnosis. Dong et al. stated that SLNB shortens the diagnostic process and has the potential to save time and cost by reducing the need for invasive mediastinal staging and bronchoscopy. SLNB may also help avoid unnecessary surgery or more invasive diagnostic procedures and their complications (3). The fact that it is performed under local anesthesia and that the hospitalization period due to SLNB is between 0 and 1 day supports the fact that SLNB is an inexpensive method that can be easily applied in clinics.

Based on the diagnoses after the biopsy procedure, 55% of the SLNBs performed for lung cancer in this study had non-small cell lung cancer metastases and 45% had small cell lung carcinoma metastases. All non-small cell lung cancer metastases were found to be adenocarcinoma. Similarly, 83.7% of the patients were diagnosed with adenocarcinoma according to a publication by Dong et al. In another study, 65.2% of patients were diagnosed with adenocarcinoma(3,8). The fact that no statistically significant correlation between lung cancer types and scalene lymph node involvement may be due to the fact that this diagnostic method is not specifically for lung cancers, it provides the opportunity to diagnose other pathologies, and the sample was relatively small. We believe that we encountered this result because the most common type of lung cancer is adenocarcinoma.

In this study, no significant relationship was found between sex and pathological diagnosis. In previous studies, no correlation was found between sex and pathological diagnosis. This result may be attributed to the fact that gender is not the only determinant of pathological diagnosis; many factors, such as genetic predisposition, lifestyle, comorbid diseases, smoking, and nutritional status, are effective.

The SUV-max values of the patients included in the study were a minimum of 3.60, a maximum of 13.10, and a mean of 8.69 in PET-CT imaging. In a study conducted in the literature, the SUV-max limit value was accepted as 2.3 and the SUV-max value above this value was accepted as metastasis (9). In this study, scalene lymph nodes with a suv-max value of 2.3 and above were considered positive, and the sensitivity, 75%; specificity, 78%; positive predictive value, 64%; negative predictive value, 86%; and accuracy, 77%, were found on PET-CT for scalene lymph node metastasis. The results of this study also support the literature, and all patients with a suv-max value above 2.3 had metastasis. In our clinical practice, when a scalene lymph node is detected on imaging, we primarily prefer SLNB if it is palpable on examination. In the presence of mediastinal lymph nodes at the same time, SLNB is our first choice, because it is less invasive and does not require general anesthesia. If it is not palpable, interventional radiology methods, such as fine needle aspiration biopsy, may be preferred.

Due to the limited number of cases and retrospective review, we believe that no significant correlation was found between pathological diagnosis and other variables. Future longitudinal studies with larger sample sizes will contribute to the literature.

In conclusion, SLNB is a diagnostic method that can be safely used, especially in palpable lymph nodes, due to its high diagnostic rate, low incidence of complications, ability to be performed under local anesthesia, short hospital stay, and low cost compared with other invasive procedures. This procedure is still important to protect patients' health, increase their chances of recovery, and accelerate the diagnosis and treatment process.

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