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Comparison of 21 G and 22 G EBUS TBNA Needles Diagnostic Value in Mediastinal and Hiler Lymph Nodes

21 ve 22 G EBUS TBNA İğnelerinin Mediastinal ve Hiler LENF nodları Tanısal Değerinin karşılaştırması

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ABSTRACT

Aim: EBUS TBNA is an important diagnostic procedure for the intrathoracic lymph nodes. 21 G, 22 G and 25 G needles are used for sampling. Better samples can be expected to be taken via 21 G needle, as the inner diameter of 21 G needle is larger. However, the results of the studies comparing 21 G and 22 G needles are controversial.
Methods: The study population consists of patients with EBUS TBNA performed via 21 G needles (Group 1; n=40) and the patients for whom 22 G needles used (Group 2; n=40). The data of patients were retrospectively analyzed. ROSE was performed for all samples.
Results: The sensitivity, specificity and diagnostic accuracy of the procedure with 21 G needle was 95%, 85%, 93%, respectively. The diagnostic accuracy of 21 G needle was found to be higher than that of 22 G needle (93% versus 80%). In the procedure performed with 21 G needle, fewer samples were sufficient for the diagnosis than 22 G needle ($r = 0.03$, $p < 0.05$).
Conclusion: The diagnostic accuracy rate of 21 G needle was higher than 22 G needle. According to that result, it is better to prefer 21 G needle. With a 21 G needle, a smaller number of sample was sufficient for diagnosis than a 22 G needle. Diagnostic opportunity with less sample obtained with 21 G needle may provide time advantage to the cytopathologist who performs ROSE. Due to this advantage, in EBUS TBNA with ROSE, 21 G needles can be prioritized.

Key words: Endobronchial ultrasound-guided transbronchial needle aspiration (EBUS-TBNA), Rapid On Site Evaluation (ROSE), 21 Gauge Needle, 22 Gauge Needle

ÖZ

Amaç: EBUS TBNA intratorasik lenf nodları için önemli bir tanısal işlemdir. Örnekleme için 21, 22 ve 25 G iğneler kullanılır. 21 G iğnenin iç çapı daha geniş olduğu için daha iyi örneklerin alınması beklenir. Halbu ki, 21 ve 22 G iğneleri kıyaslayan çalışmaların sonuçları çelişkilidir.
Yöntem: Çalışma grubu, 21 G (Grup 1; n=40) ve 22 G (Grup 2; n=40) iğne kullanılarak EBUS TBNA yapılmış hastalardan oluşmuştur. Hasta verileri retrospektif olarak analiz edilmiştir. Tüm örneklemlerde ROSE uygulanmıştır.
Bulgular: 21 G iğnenin sensitivite, spesifite ve tanısal doğruluğu sırasıyla %95, % 85 %93 idi. 21 G iğnenin tanısal doğruluğu 22 G iğneye göre daha yüksek idi (93% karşı %80). 22 G göre 21 G iğne ile yapılan işlemde, tanı için daha az örnek yeterli oldu ($r = 0.03$, $p < 0.05$).
Sonuç: 21 G iğnenin tanısal doğruluk oranı, 22 G iğneden daha yüksekti. Bu sonuca göre, 21 G iğneyi tercih etmek daha iyidir. 21 G iğne ile 22 G iğneye göre, daha az sayıda örnek tanı için yeterlidir. 21 G iğne ile elde edilen daha az örnekle teşhis imkanı, ROSE yapan sitopatoloğa zaman avantajı sağlayabilir. Bu avantajdan dolayı ROSE yapılan EBUS TBNA'da 21 G iğneye öncelik verilebilir.

Anahtar kelimeler: EBUS TBNA, ROSE, 21 Gauge İğne, 22 Gauge İğne

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INTRODUCTION

Endobronchial ultrasound-guided transbronchial needle aspiration (EBUS-TBNA) is an important initial tool for the diagnosis of both benign and malignant pathologies [1]. It has been reported that the rate of diagnosis is higher than the conventional TBNA [2]. The diagnostic rate of the process may vary between 69% and 97% depending on various factors [3- 6]. One of these factors is that the selection of appropriate TBNA needle [7,8].

MATERİAL AND METHODS

In the EBUS TBNA process, it is recommended to use 21-22-25 G needles for cytological evaluation, whereas 19 G needles with a larger inner diameter are preferred for histological evaluation [9,10]. In this study,40 patients for whom 21 G needles were used and 40 patients for whom 22 G needles were used during EBUS TBNA, in respect to age, gender, presence of an endobronchial lesion, mass presence in thorax CT, lymph node diameter assessed by EBUS, lymph node diameter measured in thorax CT, sampled lymph node number, stations and biopsy results, were analyzed retrospectively.

Study population: The data of patients with convex probe EBUS (CP-EBUS) for diagnosis or staging between 01 January 2019 and 30 September 2019 at the Antalya Training and Research Hospital Chest Diseases clinic were retrospectively analyzed. 22G needles had been used regularly in our hospital before. But for some period, 22G needles were not supplied. At that time, 21G needles (40 in total) were used instead of 22G needle. Therefore, the study population consists of patients with EBUS TBNA performed via 21G needles (Group 1) and the first forty patients for whom 22G needles used (Group 2), immediately after the 21G needles run out.

EBUS-TBNA procedure: All EBUS-TBNA procedures were performed in the operating theatre under conscious sedation (midazolam + propofol), using a Fujinon EBUS device (7.5mhz EB-530US/Sonart SU-1, Tokyo, Japan). For the sampling, 21G needles (NA-201SX-4021; Olympus) were used in the first 40 patients, and 22G (NA-201SX-4022; Olympus) needles were used in the next 40 patients. Identification of mediastinal lymph nodes was made according to the International Association for the Study of Lung Cancer (IASLC) criteria [11]. In the patients, with suspicion of benign disease, at least two lymph node stations were sampled and at least three sampling was performed for each lymph node. In patients, suspicious for malignancy, all stations were scanned, starting from the N3 lymph node, and at least three sampling was performed for each lymph node. If there were more than one lymph node, N3-N2-N1, respectively, lymph nodes were sampled. In patients reported as benign lymph nodes, the final benign outcome was decided at least 6 months after clinical and radiological findings or surgical pathological confirmation.

Radiological evaluation: Contrast-enhanced thoracic CT and/or Positron Emission Tomography (PET-CT) was performed in all patients. The EBUS-TBNA procedure was applied to the patients with a short axis of ≥10 mm and SUV max ≥ 2,5 in mediastinal-hilar lymph nodes on CT and/or PET CT.

Pathological evaluation: Rapid On Site Evaluation (ROSE) was performed for all samples. Cytological samples were stained with Diff-Quik during the procedure and evaluated by the cytopathologist in the operating room. The remaining materials were placed in 10% formaldehyde for the cell block and sent to the pathology laboratory for histological evaluation. Samples were evaluated and reported by the same pathologist.

Statistical Analysis: Statistical analysis was performed using the SPSS (Statistical Package for Social Science, Chicago, Il, USA) 19.0 Windows packet program. Descriptive data were expressed in mean ± standard deviation, median (min-max), or number and percentage. For the comparison of definitive diagnostic rates of the groups with different needles (21G-22G), the chi-square test was used. ROC (Receiver-Operating Characteristic) analysis was performed and ROC curves were drawn to examine the consistency of the diagnostic efficacy evaluations of the study groups with the actual mortality. AUROC (Area Under the Receiver Operating Characteristic) values were calculated to compare the ROC fields. A p value of <0.05 was considered statistically

significant.

RESULTS

33 (82.5%) of 40 patients for whom 21 G needles used (Group 1) and 28 (70%) of 40 patients for whom 22 G needles used (Group 2), were male. The mean age of the patients in Group 1 was 63,23±10,51 while 62,8±12,25 in Group 2. The groups were similar in respect to age and gender. The groups were similar also in respect to the presence of endobronchial lesion, mass presence in thorax CT, lymph node diameter assessed by EBUS, lymph node diameter measured in thorax CT, sampled lymph node number and stations. The patient characteristic in Group 1 and Group 2, is summarized in table 1.

Table 1. The characteristics of the patients with 21 G and 22 G.

		21 G	22 G	p
Patient number (n)		40 (%50)	40 (%50)	-
Gender (M/F)		33(%82,5)/7 (%17,5)	28(%70)/ 12(%30)	0,16
Age		63,23±10,51	62,8±12,25	0,39
Endobronchial lesion		7 (%17,5)	3(%7,5)	0,08
Mass in CT		24 (%60)	23 (%57,5)	0,86
EBUS Lymph node diameter		20,39±4,39	20,25±4,87	0,82
BT Lymph node diameter		21,57±3,87	21,01±2,82	0,85
Stations	4	23 (%43)	22 (%35)	0,08
	7	20 (%38)	23 (%37)	
	10	4 (%8)	2 (%3)	
	11	6 (%11)	15 (%24)	

In Group 1, 30 (75%) patients were diagnosed as malignant, while in Group 2, 24 (60%) patients were diagnosed as malign. Although the diagnosis of malignancy was higher in group 1, the difference was not statistically significant (p = 0.09). On the other hand, the diagnosis of benign disease was significantly higher in Group 2.

The average number of sampling was 3,52±0,41 in Group 1, while the average number of sampling was 3,94±0,45 in Group 2 (Table 2). In the procedure performed with 21 G needle, fewer samples were sufficient for diagnosis than 22 G needle (r = 0.03, p <0.05).

While the sensitivity, specificity and diagnostic accuracy of the procedure with 21 G needle were 95%, 85%, 93%, respectively, it was 89%, 80% and 80% in the procedure with 22 G needle (Table 3). Both needles were found to have high diagnostic sensitivity and specificity (Fig.1). The diagnostic accuracy of 21 G needle was found to be higher than that of 22 G needle (93% versus 80%). This value was statistically significant (p = 0.01).

Table 2. 21 G- 22 G Sampling number

	21 gauge (n=53)	22 gauge (n=62)	p
Sampling number	3,52±0,41	3,95±0,45	0,03*

Table 3:.21 G and 22 G needle diagnostic evaluation

ROC	21G (n=40)	22G (n=40)
Sensitivity	95%	89%
Specificity	85%	80%
Diagnostic Accuracy	93% (p=0,01)	80% (p=0,01)

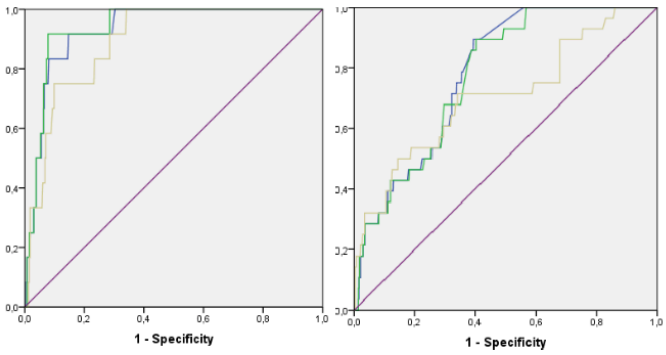

Figure 1: Diagnostic evaluation of 21G and 22G needles.

DISCUSSION

EBUS TBNA is a minimally invasive method, with a proven effectiveness for the diagnosis of mediastinal lymph nodes. 21 G, 22 G and 25 G needles are the needle types, used for cytological sampling in EBUS TBNA. Biopsies can be taken from submucosal, peribronchial, mediastinal and hilar lymph nodes with these cytological needles, which are more capable of curling than histological needles. Initially, EBUS TBNA was performed via 22G needles. Later, the 21G needle with a larger inner diameter began to take part in daily practice.

The inner diameter of the 21 G needle is 20% wider than the 22 G needle. Therefore, better samples can be expected to be taken via 21 G needle. However, the results of the studies comparing 21 G and 22 G needles are controversial. In a study,

that evaluated the EBUS TBNA results in 60 patients, no difference was found between the 21G and 22G needles in terms of diagnostic efficacy [12]. In another study, the diagnostic value of 21 G needle was found to be significantly higher than that of 22 G needle and it was suggested that 21 G needle can be prioritized especially in cases where benign pathologies such as sarcoidosis and tuberculosis are considered [13]. The study with the largest case series comparing 21 G to 22 G needles was performed by Ioony et al. In this study, according to the results of 1235 patients, it was reported that there was no difference between 21G and 22G needles in terms of sample adequacy or diagnostic efficiency [14]. In our study, the diagnostic accuracy rate of 21 G needle was higher than 22 G needle.

ROSE has a positive effect on the duration and accuracy of diagnostic procedures [15,16]. However, ROSE is a laborious and time-consuming procedure for the cytopathologist. We think that ROSE has contributed to the high efficiency of the EBUS TBNA procedure with both needles in our study. However, the data of this study is not suitable for evaluating the effect of ROSE on diagnostic efficiency and commenting on this subject. For this, it is necessary to design a separate study and compare the cases with ROSE and without. However, we can state that lesser sample was sufficient for the diagnosis via 21G needle. The average number of sampling was 3,52±0,41 via 21 G needle, while the average number of sampling was 3,94±0,45 via 22 G needle. In the Lonny et al study, similarly, lesser number of sampling was enough in 21 G group also [14]. Based on this, if you will do ROSE, it may be better to perform TBNA with a 21G needle because it allows diagnosis with less sampling, so it takes less time for your cytopathologist.

Our study has some limitations. One of them is that the study population is small. For a more reliable interpretation of whether the 21G needle provides time advantage for ROSE, new randomized controlled, double-blinded studies with a larger population is required.

In this study, it was observed that both needles were reliable in establishing the correct diagnosis of malignancy. Malignancy was diagnosed effectively with both needles and there was a high level of agreement between the malignancy accuracy rates of both needles. In comparison, the diagnostic accuracy rate of 21 G needle was higher than 22 G needle. With a 21 G needle, a smaller number of samples was sufficient for diagnosis than a 22 G needle. Diagnosis opportunity with less sample obtained with 21 G needle may provide time advantage to the cytopathologist who performs ROSE. Due to this advantage, in EBUS TBNA with ROSE, 21 G needles can be prioritized.

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