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RESEARCH ARTICLE

Comparison of Diagnostic Accuracy in Excisional Lymph Node Sampling Procedures Performed in Minor Surgical Procedure Rooms and Operating Theaters

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ABSTRACT

Objective: Excisional lymph node biopsies are usually conducted in a minor procedure room under local anesthesia, and in some cases, they can also be carried out in an operating room under general anesthesia. Our study aims to compare the diagnostic accuracy, pathological results, and necessity for biopsy repetition of excisional lymph node biopsies performed in both the minor procedure room and the operating room.

Materials and Methods: This study provides a retrospective analysis encompassing 60 patients who underwent excisional lymph node biopsy procedures. Within the ambit of this investigation, a comparative analysis is conducted on the outcomes of lymph node excision procedures, differentiating those carried out in the minor procedure room from those executed in the operating room.

Results: Out of 47 excisional lymph node biopsy samples conducted in the minor procedure room, 45 had a diagnostic feature, while among the 13 excisional lymph node biopsy samples performed in the operating room conditions, 12 had a diagnostic feature. The entirety of samples obtained in the operating room concurred with pathology reports, and 88.9% of the samples taken in the minor procedure room demonstrated congruence between pathology report outcomes and clinical findings. In two cases where a definitive diagnosis could not be established, repeat biopsies were administered; however, alterations in the final biopsy results were observed in only one of these patients.

Conclusion: Considering factors like cost and the achievement of similar outcomes in both methods, we believe that conducting excisional lymph node biopsies in the setting of a minor procedure room is a preferable option.

Keywords: Anesthesia, diagnosis, excisional biopsy, general surgery, lymph node, pathology

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INTRODUCTION

The lymphatic system frequently serves as a common pathway for the metastatic dissemination of tumor cells. The degree of lymph node metastasis assumes paramount significance in gauging disease advancement and devising treatment strategies.[1,2] The evaluation of conditions involving the lymphatic system exhibits variability contingent upon the distinct attributes of the patient and the nature of the disease.[3] Diverse methodologies are employed to procure specimens for histopathological evaluation, encompassing techniques such as fine/core needle biopsy, image-guided biopsy, and excisional biopsy.[4,5] An excisional lymph node biopsy can be performed for the identification of tumor cells or the diagnosis of other conditions in the sampled lymph node.[6] An excisional lymph node biopsy is typically conducted under the administration of local anesthesia within minor procedure rooms. Nevertheless, there are circumstances where this procedure can also be executed under the influence of general or local anesthesia in operating theaters.[7,8] The existing literature offers very limited insights into the comparative accuracy of excisional lymph node biopsies conducted in minor procedure rooms versus those performed in an operating room setting. We hope that our study illuminates the gap in this field.

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MATERIALS and METHODS

Our hospital is a tertiary referral teaching hospital, providing healthcare services to a population of 400,000 in the region. Our hospital receives a diverse range of patients from both our city and the surrounding provinces, including complex cases that necessitate specialized expertise. Approximately 300–400 minor surgical procedures are performed annually in our surgical clinic, with approximately 70–100 of them comprising excisional lymph node biopsies. Patients suspected of malignancy, granulomatous disease, or lymphoproliferative disease by the internal medicine and infectious diseases departments are generally referred to the general surgery outpatient clinic for the excision of palpable lymph nodes or lymph nodes with intense fluorodeoxyglucose uptake on positron emission computed tomography (CT) scans. In our clinic, patients' medical histories and physical examinations are comprehensively evaluated. All patients undergo a comprehensive imaging evaluation, which includes ultrasonography, CT, and magnetic resonance imaging. These imaging studies are carefully reviewed by an experienced radiologist, and each case is thoroughly discussed to determine whether the procedure will take place in the minor procedure room or the operating room. Moreover, if patients are taking blood thinners, they are advised to discontinue usage for the recommended duration prior to the procedure. On the day of the procedure, patients are also requested to provide informed consent.

A total of 60 excisional lymph node biopsy procedures conducted in the first 6 months of 2021 have been included in the study. Excisional lymph node biopsies conducted in our clinic are predominantly performed on superficial and deep axillary lymph nodes, superficial and deep inguinal lymph nodes, and intra-abdominal lymph nodes (para-aortic, mesenteric, left gastric, obturator, aortocaval, and porta hepatis). Lymph node samplings from regions other than these are not included in the study. The study adheres to the principles outlined in the Declaration of Helsinki and was conducted following approval from the ethics committee (Approval No. E-83045809–604.01.01–338756, Approval Date: March 01, 2022). All patient information was gathered from written and electronic patient records (ISHOP 3.4.9.1052 system). Patient characteristics, demographic information, and pathological results were analyzed comparatively, and the presence of statistically significant differences among these parameters was also investigated. Following pathological examination, excisional lymph node characteristics were categorized into four groups: non-specific or normal lymph node samples; dermatopathic, granulomatous, or reactive lymph nodes; lymph nodes with malignant cell metastasis; and lymph nodes without diagnostic or insufficient samples.

Statistical Analysis

In the process of analyzing the acquired data, the software IBM SPSS Statistics 22 (IBM, Armonk, NY, USA) was utilized. Descriptive statistics were presented through diverse measures encompassing mean, standard deviation, median, frequency, ratio, and minimum-maximum values. The normal distribution of quantitative data was scrutinized employing the Shapiro–Wilk test, with due consideration given to skewness and kurtosis values when deemed necessary. The comparison of quantitative variables between the two distinct groups was effectuated using the Mann-Whitney U test. Regarding the comparison of qualitative data, both the Fisher's Exact test and the Fisher Freeman Halton Exact test were enlisted. The determination of statistical significance was established at the $p<0.05$ threshold.

RESULTS

The study included 60 patients, of whom 38.3% (n=23) were female and 61.7% (n=37) were male. The patients' ages ranged from 21 to 80, with an average age of 48.45±15.35 years. Among the patients, 78.3% (n=47) underwent biopsies in the minor procedure room under local anesthesia, while 21.7% (n=13) received excisional lymph node biopsies in the general operating theater under either local or general anesthesia. Notably, the age and gender distribution between the two groups exhibited no statistically significant difference ($p>0.05$). Among all samples collected from excisional lymph node biopsies, it was observed that 95% (n=57) presented a diagnostic feature, whereas three samples yielded non-diagnostic results. Pathological analyses revealed no statistically significant distinction between the minor procedure room and operating theater groups ($p=0.175$). In the comparison of diagnoses between the minor procedure room group and the operating theatre group, the incidences were as follows: non-specific or normal lymph nodes (18 cases in the minor procedure room group versus 2 cases in the operating theatre group), dermatopathic, granulomatous, or reactive lymph nodes (12 cases vs. 7 cases), lymph nodes with malignant cell metastasis (15 cases vs. 3 cases), and lymph nodes without diagnostic or insufficient samples (2 cases vs. 1 case) (Table 1).

In the process of assessing the alignment between pathological findings and clinical manifestations, it was ascertained that all outcomes derived from the operating theater group exhibited concurrence with the patients' clinical presentations. In con-

Table 1. Comparison of groups based on demographic findings and pathology results

	Overall (n=60)		Biopsy clinic (n=47)		Operating room (n=13)		p
	n	%	n	%	n	%	
Age (years)							
Min-max (median)	21–80 (48)		21–80 (49)		21–76 (45)		0.355[a]
Mean±SD	48.45±15.35		49.45±14.61		44.85±17.97		
Sex							
Female	23	38.3	30	63.8	6	46.2	0.535[b]
Male	37	61.7	17	36.2	7	53.8	
Sample assessment							
Non-diagnostic			2	4.3	1	7.7	0.526[b]
Diagnostic			45	95.7	12	92.3	
Pathology result							
Non-specific or normal lymph node			18	38.3	2	15.4	0.175[c]
Dermatopathic or granulomatous lymphadenopathy or reactive lymph node			12	25.5	7	53.8	
Malignant cell infiltration or lymph node conclusive for malignancy			15	31.9	3	23.1	
Non-diagnostic, insufficient sample or excessive adipose tissue sampling			2	4.3	1	7.7	

[a]: Mann-Whitney U test; [b]: Fisher's exact test; [c]: Fisher Freeman Halton exact test. SD: Standard deviation

trast, among the minor procedure room group, concordance between pathological findings and clinical manifestations was identified in 14 out of 18 cases marked by non-specific or normal lymph nodes, 11 out of 12 cases entailing dermatopathic, granulomatous, or reactive lymphadenopathy, and in the entirety of 15 cases characterized by malignant infiltration. In the case of 5 patients exhibiting discordant pathological findings in relation to their clinical presentations, a deliberation ensued regarding the necessity for re-excisional lymph node biopsy procedures, ultimately leading to the implementation of such procedures for 2 of these patients. These subsequent interventions were executed under the purview of general anesthesia within the operating theater. Notably, upon subjecting these patients to a repeat excisional lymph node biopsy, one individual received a reaffirmation of the diagnosis of a non-specific or normal lymph node, whereas the other was diagnosed with malignant infiltration.

DISCUSSION

Lymph node metastases are a common occurrence in the advancement of various cancer types, often serving as indicators of an unfavorable prognosis.[9] While lymph node biopsy primarily serves to unveil the extent of disease progression and prognosis, its outcomes can also hold significant value in confirming diagnoses and guiding treatment strategies across a spectrum of medical conditions.[3] The present study demonstrated a remarkable alignment between diagnostic biopsy outcomes conducted in the minor procedure room and the corresponding clinical observations, with 88.9% (40 out of 45 diagnostic samples) exhibiting concordance. Furthermore, among the five cases that displayed incongruities with clinical findings, a re-biopsy was deemed essential for just two patients. Notably, only one of these cases exhibited a variance in lymph node status compared to the initial result obtained during the biopsy clinic assessment. The pivotal role of histopathological analysis in appraising lymphatic dissemination underscores the necessity for clinicians to scrutinize the suitability of diverse biopsy techniques. The insufficiency of numerous biopsy methods in attaining desired outcomes for specific differential diagnoses, particularly those involving minimal sample procurement (e.g., fine needle aspiration biopsy) or substantial tissue disruption (e.g., core-needle biopsies), forms the focal point of extensive investigations dedicated

to the evaluation of this subject.[10] Nonetheless, even within scenarios where samples are obtained via excisional lymph node biopsy while preserving the capsule's integrity, the outcomes remain susceptible to the impact of traumatic complications and various other influencing factors. Our conviction lies in the notion that adopting the excisional biopsy technique for lymph node sampling yields results of heightened reliability. Consequently, within our study, every participant (n=60) underwent an excisional lymph node biopsy, culminating in the identification of three samples (5%) that were characterized as non-diagnostic within the scope of histopathological assessments. This proportion demonstrates a parallel with outcomes presented across a substantial portion of the existing literature,[11,12] thereby underscoring the robustness of these findings. It's noteworthy that some studies have reported a markedly lower incidence of non-diagnostic or non-specific results.[13] Nonetheless, the limited occurrence of non-diagnostic samples should not be unexpected, given that excisional lymph node biopsy is frequently employed to provide a confirmatory assessment of initial findings obtained through alternative biopsy methods.[14] While relatively few in number, the existence of non-diagnostic biopsy samples underscores both the significance of the biopsy method and the precise identification of the lymph node designated for excisional biopsy.[15,16]

It is important to acknowledge that a larger patient cohort might have yielded more robust data for accurately determining the frequency of non-diagnostic samples, both from procedures conducted in the minor procedure room and the surgical theater. This is particularly relevant considering the notably low incidence of non-diagnostic outcomes observed in our study. Analyzing the results in relation to the available sample sizes reveals a reduced frequency of non-diagnostic outcomes in the biopsies performed within the minor procedure room category. However, it is imperative to consider that this approach demands higher patient compliance and is typically applied to lymph nodes that are more readily accessible, which should be taken into account when interpreting our findings. Moreover, when viewed from a statistical standpoint, no significant distinction emerged between the minor procedure room group and the operating theater group regarding the frequency of non-diagnostic samples.

The mere presence of lymph nodes within the material acquired through an excisional biopsy might not always suffice for an accurate diagnosis.[17,18] Despite the limited number of patients within the operating room group, it's worth noting that all diagnostic outcomes harmonized with clinical observations, and none of these patients necessitated a follow-up re-biopsy in our study. When it comes to lymph node biopsies, key considerations include pinpointing a diagnostically significant lymph node, obtaining a sample that yields a diagnostic outcome, and concluding the analysis with results that align with clinical suspicions. These factors hold paramount importance in the assessment of the appropriateness of a given approach. Several factors have been linked to the requirement for repeat lymph node biopsies, as well as the accuracy of initial and subsequent biopsies across diverse studies spanning various cancers.[19–22]

In our study, we found that among the initial 45 diagnostic samples, 5 exhibited inconsistencies with clinical findings. Nevertheless, upon subsequent reevaluation by relevant medical centers, a re-biopsy was deemed necessary for just two of these cases. Of particular significance, it's worth noting that only one patient experienced a change in pathology results after undergoing biopsies in the operating room. Despite the absence of statistically significant differences in initial pathology results among different groups ($p>0.05$), the identification of inaccurate outcomes in only one patient during the initial assessment highlights the precision of biopsy outcomes within the minor procedure room. Furthermore, the accuracy of lymph node biopsies using both evaluated methods in our study was congruent with findings reported in studies exploring various pathologies within the existing literature.[23–26]

As previously mentioned, the existing literature unequivocally indicates that conducting sampling under general anesthesia in the operating theater and attaining access to the most prominent lymph nodes do not invariably ensure diagnosis or the acquisition of optimal samples, as illustrated by one of the instances of a non-diagnostic sample from the operating room group in our study. Diverse strategies have been explored to enhance diagnostic accuracy in various biopsy techniques.[27–31]

Nonetheless, enhancing the accuracy of biopsy procedures conducted under general or local anesthesia could be achieved through the identification of prominent lymph nodes via pre-biopsy imaging studies and, if feasible, marking them. Presently, a range of marking techniques exist that facilitate the localization of diagnostic lymph nodes through pre-surgical markings, particularly for nonpalpable lesions encountered in malignancy surgeries. In pursuit of this objective, novel approaches are consistently emerging, underscoring the imperative for heightened precision in the acquisition of lymph node biopsy specimens.[32–35]

Limitations

This study took place in the first half of 2021 during the COVID-19 pandemic, which led to a limited number of patients being able to participate. Additionally, decisions about whether re-biopsies were necessary were made by the referring departments based on clinical and patient-related factors. Different departments might have used different approaches to re-evaluate cases based on pathology results, and this could have influenced the initial analysis outcomes.

CONCLUSION

Except for cases with direct indications, the strategic contemplation of excisional lymph node biopsy arises when fine or core needle biopsies are either unattainable or unsuitable for patients. Drawing insights from the findings of this study, we maintain the perspective that the execution of excisional lymph node biopsies within minor procedure rooms does not compromise diagnostic accuracy when juxtaposed with those performed in the operative theater. This standpoint remains pertinent, particularly when accounting for variables such as cost-effectiveness and potential risks inherent to general anesthesia. The selection of minor procedure rooms for the execution of lymph node biopsies could potentially emerge as a more fitting methodology.

Disclosures

Ethics Committee Approval: The study was approved by the İstanbul University-Cerrahpaşa Clinical Research Ethics Committee (No: E-83045809–604.01.01–338756, Date: 01/03/2022).

Informed Consent: Written informed consent was obtained from all patients.

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