Investigating Optimal Protocol for Image-Guided Tissue Sampling in Cases of Suspected Lymphoid Neoplasm

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Objectives

The purpose of this study was to investigate the variability of tissue sampling and specimen processing for suspected lymphoid neoplasms (LN) between cases at a single institution with the intent of identifying the factors which result in a diagnosis and allow for classification within the World Health Organization (WHO) system.

Introduction

The WHO lymphoid neoplasm classification system reflects a consensus among hematopathologists, clinicians, and geneticists and has implications regarding targeted therapeutic strategies and clinical expectations. With more than 50 different subtypes of lymphoma in the most recent revision of the classification, it is important that the provided tissue samples provide adequate information to distinguish between the subtypes and properly guide patient care.

Tissue sampling in cases of suspected lymphoma varies not only between institutions but often even within individual departments as formalized protocols are uncommon. While excisional biopsy has been the gold standard in lymph node sampling and diagnosis, core-needle biopsy has made great strides in diagnostic utility and accuracy. Prior research has demonstrated that core needle biopsy with or without fine needle aspiration (FNA) was sufficient to provide an actionable diagnosis in lymphoma patients. Often in clinical practice the decision to pursue core needle biopsy and/or FNA depends on clinical suspicion guided by radiological features, with core biopsy more frequently performed in cases of high suspicion. However, a universal protocol specifying size and number of samples has yet to be established.

Methods

- Context and Intervention: No institutional standardized process was in place for image-guided tissue sampling in cases of suspected or possible lymphoid neoplasm with significant variability in tissue sampling, tissue processing, and subsequent results between cases. To identify the significant factors which contributed to obtaining a diagnosis and WHO classification in these cases, the relevant cases from 2018 were identified using the Illuminate InSight search engine and the discoverable variables were collected.
- Study of the Intervention: We compare various features of specimen collection based on the classification outcome (diagnosis of LN with WHO classification, diagnosis of LN without WHO classification, and Indeterminate)
- Measures/Metrics: We provide descriptive statistics, including mean (standard deviation), median (interquartile range), range for continuous variables, and counts/percentages for categorical variables. We test for a significant difference between the three groups using univariate tests. For continuous variables, we use the Kruskal-Wallis test; for categorical variables, we use the Fisher's Exact Test. We consider a p-value of less than 0.05 to be significant.

Results

Table 1 compares the specimen collection characteristics between cases which resulted in LN diagnosis plus WHO classification (LN +WHO), LN diagnosis without WHO classification (LN – WHO), and indeterminate samples from the first 6 months of data collection. There is a significant difference in the type of analysis performed, core minimal length, core gauge, and flow.

Table 1: Specimen collection characteristics by pathology

	LN + WHO (N=35)	LN - WHO (N=20)	Indeterminate (N=18)	Total (N=73)	P value
Type of analysis					<0.001
Core & FNA	21 (60.0%)	2 (10.0%)	2 (11.1%)	25 (34.2%)	
Core only	14 (40.0%)	12 (60.0%)	9 (50.0%)	35 (47.9%)	
FNA only	0 (0.0%)	6 (30.0%)	7 (38.9%)	13 (17.8%)	
Core minimal length (cm)					0.003
Missing	0	6	7	13	
Mean (SD)	2.2 (0.9)	1.8 (0.9)	1.1 (0.8)	1.9 (1.0)	
Median (Q1, Q3)	2.3 (1.3, 2.8)	1.7 (1.4, 2.3)	0.8 (0.7, 1.3)	1.7 (1.2, 2.5)	
Range	1.0 - 4.0	0.3 - 3.3	0.3 - 2.8	0.3 - 4.0	
Core gauge					<0.001
<= 18	25 (86.2%)	5 (45.5%)	0 (0.0%)	30 (69.8%)	
>18	4 (13.8%)	6 (54.5%)	3 (100.0%)	13 (30.2%)	
Missing	6	9	15	30	
Number of smears					0.54
Missing	14	12	9	35	
Mean (SD)	4.3 (2.0)	5.6 (3.1)	4.6 (1.3)	4.7 (2.1)	
Median (Q1, Q3)	4.0 (3.0, 5.0)	5.5 (3.0, 7.0)	4.0 (4.0, 5.0)	4.0 (3.0, 6.0)	
Range	2.0 - 10.0	2.0 - 10.0	3.0 - 7.0	2.0 - 10.0	
Number of blocks					0.46
Missing	0	6	7	13	
Mean (SD)	1.4 (0.5)	1.7 (0.8)	1.6 (0.7)	1.5 (0.6)	
Median (Q1, Q3)	1.0 (1.0, 2.0)	2.0 (1.0, 2.0)	2.0 (1.0, 2.0)	1.0 (1.0, 2.0)	
Range	1.0 - 2.0	1.0 - 4.0	1.0 - 3.0	1.0 - 4.0	
Flow					<0.001
Not QNS	26 (86.7%)	12 (80.0%)	2 (18.2%)	40 (71.4%)	
QNS	4 (13.3%)	3 (20.0%)	9 (81.8%)	16 (28.6%)	
Missing	5	5	7	17	

Discussion

The results suggest that specimen with a diagnosis and WHO classification have a larger core biopsy gauge and length, use both core biopsy and fine-needle aspiration, and provide adequate sampling for flow cytometry. Limitations to the study were mainly secondary to a lack of standardized reporting and limiting the number of external factors retrospectively.

Many studies have demonstrated success with core needle biopsy in diagnostic yield of accurate lymphoma WHO classification. Our study supports these findings and suggests larger core sample provides higher diagnostic yield.

Contrary to findings of Drylewicz et al who demonstrated that core needle biopsy alone without FNA was sufficient for actionable diagnosis, our study demonstrated that using FNA in addition to core biopsy better provided an accurate WHO diagnosis. However, our sample size was much smaller. This may be due to tumor hypercellularity allowing for optimal cell block creation.

References

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