Core Needle Biopsy versus Fine Needle Aspiration for Cervical Lymphadenopathy: A Meta-Analysis and Systematic Review

Sacha T. Moufarrej, MA,[1] Kavenpreet Bal, MS,[2] Alexander Rivero, MD,[3] Kevin H. Wang, MD[3]

[1]UC San Diego School of Medicine, [2]Kaiser Permanente Bernard J. Tyson School of Medicine, [3]Kaiser Permanente Oakland Medical Center Department of Otolaryngology-Head and Neck Surgery

Background

- **Adult neck masses, especially cervical lymphadenopathy, are a common patient concern seen within Head and Neck Surgery (HNS) and primary care practices[1]**
- **The differential diagnosis of cervical lymphadenopathy:**
  - Benign cystic growths
  - Infectious etiologies
  - Systemic autoimmune conditions
  - Malignancy (e.g. head and neck cancers, lymphoma, metastatic disease)
- **Lymph node biopsy is crucial in the neck mass diagnostic workup, with fine needle aspiration set as the standard guideline.[2] However, other methods, especially core needle biopsy, may prove to be more useful.[3-6]**

FNA

Pros
- Low cost
- Fast results
- Low morbidity
- Patient acceptability

Cons
- High sample inadequacy rate (0-32%)

CNB

Pros
- Higher diagnostic accuracy seen in other mass types
- Better histological characterization

Cons
- Concern for a slightly higher risk of adverse events (excess bleeding, hematomas, nerve damage)

- **Systematic reviews on biopsy methods confirm CNB as the superior approach for diagnostic accuracy with limited adverse events for salivary gland masses and thyroid masses, but no comparative assessment has been done for cervical lymphadenopathy → variation in institutional and provider practice**

Objectives

Aim 1

Conduct a review and synthesize existing findings on the diagnostic accuracy of FNA versus CNB for cervical lymphadenopathy

Aim 2

Synthesize the prevalence of adverse events with FNA versus CNB

Methods

Literature search on PubMed, Cochrane, and Embase for studies from 1995-2024 assessing the sensitivity, specificity, and safety of FNA versus CNB for adult cervical LAD

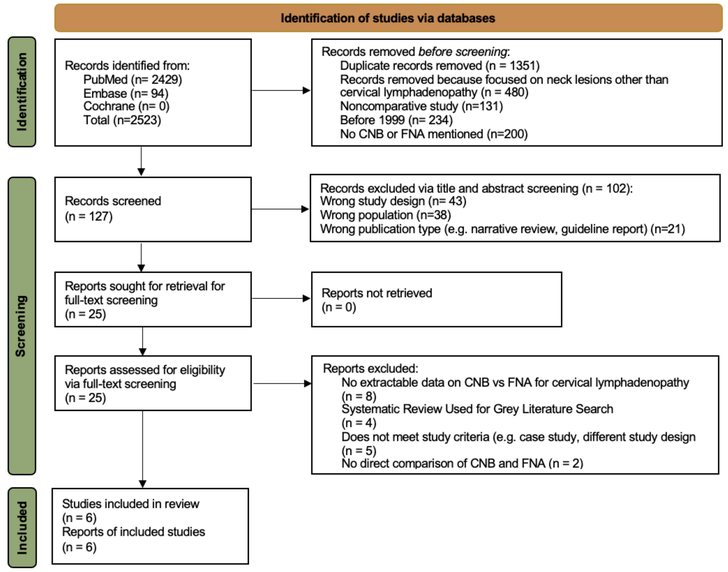
Title and abstract screening, following by full text screening, by 2 independent investigators

Quantitative analysis of extracted and pooled sensitivity and specificity data from our included studies using a random effects model on Stata v18, and summarization of reported adverse effects and their prevalence

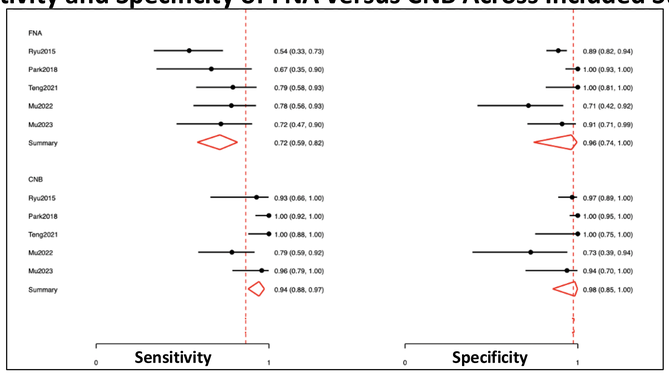
Heterogeneity (I^2) and quality/bias assessment using QUADAS-2

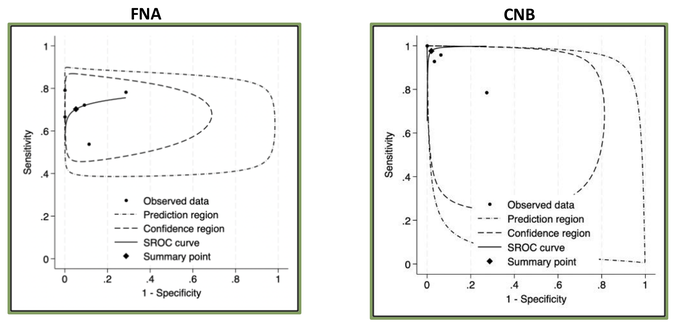
Results

Literature Search Results



Sensitivity and Specificity of FNA versus CNB Across Included Studies





Relative Measures of Diagnostic Accuracy of FNA versus CNB

Effect	Group	Relative Ratio (95% CI)	p-value
Relative Sensitivity			
	FNA	1.00	
	CNB	1.32 (1.13, 1.54)	<0.001
Relative Specificity			
	FNA	1.00	
	CNB	1.02 (0.97, 1.07)	0.17

Adverse Effects: FNA versus CNB in One Study

Adverse Effect	FNA, n (%)	CNB, n (%)	X^2 (p-value)
Bleeding	1 (2.5%)	4 (10%)	X^2=1.92 (p=0.17)
Fever	1 (2.5%)	2 (5%)	X^2=0.35 (p=0.56)
Pain	0 (0%)	2 (5%)	X^2=2.05 (p=0.15)
Abscess	0 (0%)	1 (2.5%)	X^2=1.01 (p=0.31)

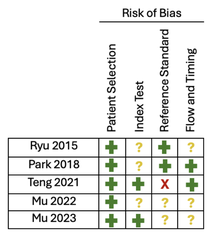
Study Heterogeneity and Quality Assessment

Between-Study Heterogeneity Statistics (I^2)

FNA (n=331):
Sensitivity: 12.31
Specificity: 49.08

CNB (n=318):
Sensitivity: 28.74
Specificity: 17.11

QUADAS-2 Risk of Bias



Conclusions

Pooled sensitivity and specificity for cervical lymphadenopathy methods strongly favor CNB, with CNB being 1.32 times more sensitive than FNA

Adverse effects were minimal and nonsignificant across both groups, contrary to concerns of increased morbidity with CNB

More studies, especially randomized controlled trials, are needed to further validate these findings. However, our findings suggest that increased utilization of CNB should be considered to minimize inconclusive needle biopsies and delayed diagnosis

References

1. Haynes J, Arnold KR, Aguirre-Oskins C, Chandra S. Evaluation of neck masses in adults. Am Fam Physician. 2015;91(10):698-706.
2. Davis RJ, Rettig E, Aygun N, et al. From presumed benign neck masses to delayed recognition of human papillomavirus–positive oropharyngeal cancer. The Laryngoscope. 2020;130(2):392-397. doi:10.1002/lary.27946 Parvez E, Chu M, Kirkwood D, Doumouras A, Levine M, Bogach J. Patient reported symptom burden amongst immigrant and Canadian long-term resident women undergoing breast cancer surgery. Breast Cancer ResTreat. 2023;199(3):553-563. doi:10.1007/s10549-023-06938-8
3. Nasuti JF, Gupta PK, Baloch ZW. Diagnostic value and cost-effectiveness of on-site evaluation of fine-needle aspiration specimens: Review of 5,688 cases. Diagn Cytopathol. 2002;27(1):1-4. doi:10.1002/dc.10065
4. Ganguly A, Burnside G, Nixon P. A systematic review of ultrasound-guided FNA of lesions in the head and neck--focusing on operator, sample inadequacy and presence of on-spot cytology service. Br J Radiol. 2014;87(1044):20130571. doi:10.1259/bjr.20130571
5. Hou Y, Chaudhary S, Shen R, Li Z. Fine-needle aspiration of cervical lymph nodes yields adequate materials for accurate HPV testing in metastatic head and neck squamous cell carcinomas. Diagn Cytopathol. 2016;44(10):792-798. doi:10.1002/dc.23548
6. Pynnonen MA, Gillespie MB, Roman B, et al. Clinical Practice Guideline: Evaluation of the Neck Mass in Adults. Otolaryngol Neck Surg. 2017;157(S2):S1-S30. doi:10.1177/0194599817722550 Chen C, Gu D. Andersen Model. In: Gu D, Dupre ME, eds. *Encyclopedia of Gerontology and Population Aging*. Springer International Publishing; 2020:1-15. doi:10.1007/978-3-319-69892-2_876-1

Acknowledgements

This work was supported by the Kaiser Summer Clinical Otolaryngology Research (SCORE-Oto) Program.

Correspondence: smoufarrej@health.ucsd.edu