



Accuracy of Ultrasound-guided Versus Palpation-guided Fine Needle Aspiration in Patients with Human Papillomavirus-Associated Oropharyngeal Squamous Cell Carcinoma

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BACKGROUND/OBJECTIVES

Fine needle aspiration (FNA) biopsy is the optimal diagnostic test for adults with a persistent neck mass. The use of ultrasound (US) guidance for FNA has become increasingly popular and serves as an alternative to palpation-guided biopsy. The sensitivity of these two methods has not been compared in patients with human papillomavirus (HPV)-associated oropharyngeal squamous cell carcinoma (HPV(+)**OPSCC**), who often present with cystic neck nodes. In this study, we aim to compare the accuracy and sensitivity of US guided and palpation guided FNA biopsies in patients with HPV(+)**OPSCC**.

METHODS

- Retrospective chart review
- Inclusion:
 - Patient underwent palpation-guided or US-guided FNA lymph node biopsy prior to surgery
 - HPV(+)**OPSCC** in the base of the tongue, tonsil, or an unknown primary site.
- True positive (TP) on biopsy = metastatic nodal disease on excisional biopsy or neck dissection.
- True negative (TN) = negative FNA and lack of nodal disease on excisional biopsy or neck dissection.
- Sensitivity = TPs/(TPs+FNs)
- Accuracy = (TPs+TNs)/all biopsies.
- Accuracy and sensitivity were compared among and between techniques with chi-square and Fisher exact tests.
- Associations of features with accuracy of the first ipsilateral FNA biopsy per patient were evaluated using Wilcoxon rank sum, chi-square, and Fisher exact tests.

RESULTS

Table 1. Summary of accuracy for 209 FNA biopsies

Palpation-guided FNA biopsies				
Standard				
	Negative	Positive		Total
FNA	Negative	0	16	16
	Positive	0	15	15
	Total	0	31	31
Sensitivity 15/31=48%				
False negative 16/16=100%				
Accuracy 15/31=48%				

Ultrasound-guided FNA biopsies				
Standard				
	Negative	Positive		Total
FNA	Negative	2	27	29
	Positive	0	131	131
	Total	2	158	160
Sensitivity 131/158=83%				
False negative 27/29=93%				
Accuracy 133/160=83%				

Ultrasound-guided FNA + core biopsies				
Standard				
	Negative	Positive		Total
FNA	Negative	0	1	1
	Positive	0	17	17
	Total	0	18	18
Sensitivity 17/18=94%				
False negative 1/1=100%				
Accuracy 17/18=94%				

Ultrasound-guided FNA and FNA + core biopsies combined				
Standard				
	Negative	Positive		Total
FNA	Negative	2	28	30
	Positive	0	148	148
	Total	2	176	178
Sensitivity 148/176=84%				
False negative 28/30=93%				
Accuracy 150/178=84%				

RESULTS (CONTINUED)

Table 2 Associations with accuracy of palpation-guided FNA biopsies, N=28

Feature*	Inaccurate N=14	Accurate N=14	P-value
Age at diagnosis in years	57 (55-63)	54 (51-65)	0.53
Male	14 (100)	13 (93)	NE
Weight at start of primary treatment in kg (N=13:14)	91 (76-107)	93 (83-104)	0.92
BMI at start of primary treatment in kg/m ² (N=13:14)	27.7 (24.8-35.0)	28.6 (26.3-33.6)	0.59
Clinical N stage			
cN0	0	0	0.96
cN1	13 (93)	13 (93)	
cN2	1 (7)	0	
cN3	0	1 (7)	
Number of positive ipsilateral lymph nodes	1 (1-3)	2.5 (2-6)	0.03
Size of largest lymph node involved by tumor in cm	3.8 (3.5-4.8)	4.3 (3.6-4.6)	0.80
Extracapsular spread (N=13:14)	6 (46)	9 (64)	0.34
Facility where biopsy performed			
Mayo Rochester	3 (21)	4 (29)	0.06
Mayo Health System	2 (14)	7 (50)	
Outside hospital	9 (64)	3 (21)	
Provider who performed biopsy (N=11:14)			
Radiologist	0	0	0.56
Otolaryngologist	9 (82)	13 (93)	
All other providers	2 (18)	1 (7)	

Table 3. Associations with accuracy of image-guided FNA biopsies, N=166

Feature*	Inaccurate N=25	Accurate N=141	P-value
Age at diagnosis in years	55 (51-65)	59 (52-62)	0.46
Male	20 (80)	126 (89)	0.19
Weight at start of primary treatment in kg (N=25:139)	89 (73-97)	92 (81-106)	0.12
BMI at start of primary treatment in kg/m ² (N=25:139)	26.8 (24.8-30.2)	29.3 (26.2-31.7)	0.10
Clinical N stage			
cN0	0	2 (1)	0.66
cN1	23 (92)	121 (86)	
cN2	1 (4)	12 (9)	
cN3	1 (4)	6 (4)	
Number of positive ipsilateral lymph nodes (N=23:141)	1 (1-2)	2 (1-4)	0.05
Size of largest lymph node involved by tumor in cm (N=23:139)	3.5 (2.7-4.3)	4.0 (3.2-4.8)	0.06
Extracapsular spread (N=21:139)	8 (38)	83 (60)	0.06
Facility where biopsy performed			
Tertiary care center	13 (52)	68 (48)	0.73
Outside hospital	12 (48)	73 (52)	
Provider who performed biopsy (N=22:113)			
Radiologist	15 (68)	85 (75)	0.55
Otolaryngologist	6 (27)	25 (22)	
All other providers	1 (5)	3 (3)	

Both accuracy and sensitivity were significantly different among palpation-guided FNA and image-guided needle biopsies (**Table 1**). Aside from number of positive ipsilateral nodes, there were no statistically significant differences accuracy when comparing by patient specific factors in both image-guided and palpation-guided groups (**Table 2, 3**).

DISCUSSION

In this study, we showed:

- The accuracy of needle biopsy was improved with US guidance (83% vs. 48% p = <0.001)
- There was no difference in accuracy between US-guided FNA and US-guided core biopsies – *limited numbers of US guided core biopsies*
- Accuracy of US-guided FNA was lower than previously reported for other types of head and neck neoplasms (84% vs. 92-98%)
- Patient specific factors were essentially non-predictive of biopsy success.

Our results have direct implications on clinical practice and the optimal diagnostic pathway for this disease, which often poses a challenge for primary care providers and otolaryngologists alike

CONCLUSION

The cystic nature of cervical lymph node metastases in HPV(+)**OPSCC** poses a unique diagnostic challenge. The use of US guidance in FNA biopsies for nodal metastases in HPV(+)**OPSCC** improves both accuracy and sensitivity compared to palpation guidance alone.