Comparison of 18 and 20-Gauge Ultrasound-Guided Fine-Needle Aspiration in Detecting Persistent Nodal Disease after Chemoradiation

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Introduction

- Viable malignant disease is uncommon in patients with persistent adenopathy following definitive chemoradiotherapy (CRT) for head and neck squamous cell carcinoma (HNSCC).
- Preoperative ultrasound-guided fine needle aspiration (USFNA) can prevent unnecessary salvage neck dissection.
- Post-radiation fibrosis can complicate the approach, resulting in an inadequate aspirate volume when using standard 20 or 22-gauge needles.
- We assessed the comparative 18 and 20-gauge diagnostic accuracy of USFNA at detecting persistent viable nodal malignancy in patients with HNSCC with nodal metastasis treated with CRT.

Methods

- We identified a cohort of 209 patients (193 male, 60.4 ± 9.8 years) presenting between 2002 and 2023 with HNSCC and biopsy proven cervical nodal metastases.
- All patients were treated with definitive CRT. Following CRT, a suspicious nodal remnant underwent biopsy with an 18 or 20-gauge needle.
- 71 patients received biopsy with a 20-gauge needle and 138 received a biopsy with an 18-gauge needle.
- Biopsy results were compared to either post-biopsy surgical pathology results when available, or at least 3 months of CT or PET imaging follow-up.

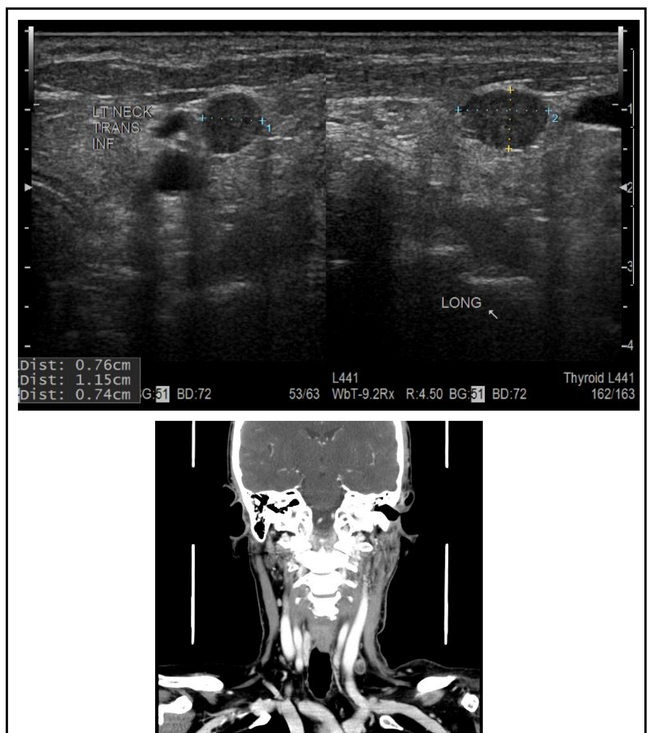


Fig. 1 The top image shows a left lateral neck diagnostic ultrasound depicting a cervical lymph node in transverse and long axis views. The bottom image shows a contrast-enhanced coronal CT scan highlighting the left cervical lymph node in the ultrasound above.

Results

- FNA in 167 of 209 (79.9%) cases revealed no evidence of viable metastatic disease on cytology evaluation.

Table 1: Comparing USFNA Results to Post-Biopsy Results

	Neck Dissection	Imaging Follow-Up
PC	18/24 (75%)	17/18 (94.4%)
NC	14/14 (100%)	152/153 (99.3%)
Overall	32/38 (84.2%)	169/171 (98.8%)

Abbreviations: PC, Positive Concordant; NC, Negative Concordant

USFNA results (both 18 and 20-gauge) were compared to either post-biopsy surgical pathology (neck dissection) results when available, or at least 3 months of CT or PET follow-up.

- A neck dissection was performed within 90 days in 38 patients. 18 of 24 cases were positive concordant between FNA and surgical pathology. 14 of 14 cases were negative concordant between FNA and surgical pathology. The overall FNA and surgical concordant rate was 32/38 (84.2%)
- The overall FNA and imaging follow-up concordance was 169/171 (98.8%). 152 of 153 cases without surgery were negative concordant between FNA and imaging follow-up. 17 of 18 cases without surgery were positive concordant between FNA and imaging follow-up.

Table 2: Comparing Performances of 18 and 20-Gauge USFNA

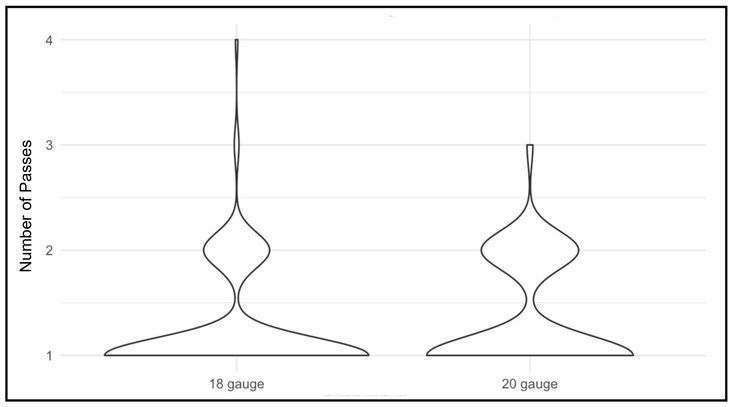
	20-Gauge	18-Gauge	Overall
PC and PPV	21/23 (91.3%)	14/19 (73.7%)	35/42 (83.3%)
NC and NPV	46/48 (95.8%)	118/119 (99.2%)	166/167 (99.4%)
Sensitivity	91.3%	93.3%	97.2%
Specificity	95.8%	95.9%	95.9%
Accuracy	94.4%	95.7%	96.2%

Abbreviations: PC, Positive Concordant; NC, Negative Concordant; PPV, Positive Predictive Value; NPV, Negative Predictive Value

Comparison of 18 and 20-Gauge USFNA performance in accurately detecting persistent viable nodal malignancy.

- Overall FNA showed a positive concordance of 35/42 and negative concordance of 166/167 for a sensitivity of 97.2%, specificity of 95.9%, accuracy of 96.2%, positive predictive value of 83.3% and negative predictive value of 99.4%.
- 20-gauge FNA showed positive concordance of 21/23 and negative concordance of 46/48 for a sensitivity of 91.3%, specificity of 95.8%, accuracy of 94.4%, positive predictive value of 91.3% and negative predictive value of 95.8%.
- 18-gauge FNA showed a positive concordance of 14/19 and negative concordance of 118/119 for a sensitivity of 93.3%, specificity of 95.9%, accuracy of 95.7%, positive predictive value of 73.7% and negative predictive value of 99.2%.

Graph 1: Comparing Passes between 18 and 20-Gauge USFNA



A violin plot was made to compare the distribution of the number of passes that were made between 18 and 20-gauge needles.

- 20-gauge cases were performed with 1.36 ± 0.51 passes. 18-gauge cases were performed with 1.08 ± 0.27 passes (p = 0.03).

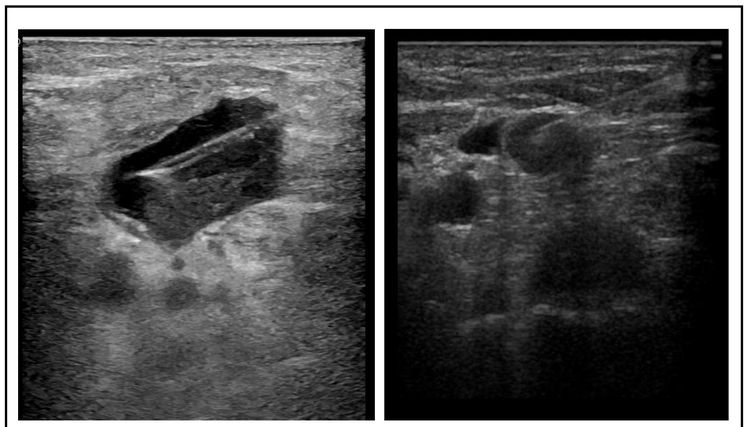


Fig. 2 The left image shows a left lateral neck ultrasound depicting fine needle aspiration of a cervical lymph node with a 20-gauge needle. The right image also shows a left lateral neck ultrasound depicting fine needle aspiration of a cervical lymph node, though with an 18-gauge needle.

Conclusions

- Residual cervical lymph node fine needle aspiration after radiation therapy is a highly accurate procedure.
- There were minimal performance differences between 18 and 20-gauge needles.
- Although the positive predictive value was lower for 18-gauge needles, the biopsies were performed with a lower number of passes for satisfactory cytopathological acceptance.

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