

Endoscopic ultrasound-guided fine needle biopsy in the diagnostic work-up of thoraco-abdominal lymphadenopathies: a monocentric experience

A. N. R. Fernandopulle^{1,2}, D. Senanayake¹, G. Wimalasena¹, J. Mithushan¹, H. Wijesinghe³, A. Priyani³, D. Subasinghe^{1,2}, S. Sivaganesh^{1,2}

¹Department of Surgery, Faculty of Medicine, University of Colombo, Sri Lanka

²University Surgical Unit, National Hospital Sri Lanka, Colombo, Sri Lanka

³Department of Pathology, Faculty of Medicine, University of Colombo, Sri Lanka

Keywords: Sri Lanka, Endoscopic-ultrasound, lymph adenopathy, TB Lymph nodes

Abstract

Background

Endoscopic Ultrasound (EUS) guided transluminal biopsy has transformed the diagnostic approach for patients with enlarged lymph nodes (LNs) in the mediastinum, para-aortic, and hilar regions, which previously required more invasive surgical procedures. This study conducted in Sri Lanka demonstrates the efficacy of EUS in obtaining histological samples from these anatomically challenging sites.

Materials and methods

A retrospective study was conducted from a prospectively maintained data base on 27 patients with lymph node (LN) masses requiring EUS-guided biopsy over a six-year period from 2018 to 2024 at a tertiary care center. All procedures were performed by a single endoscopist (ANR).

Results

The mean age was 49.4 years (SD ± 15.5), of whom 16 (59.3%) were male. The distribution of lymph node (LN) locations was as follows: 11 (40.7%) para-aortic, 5 (18.5%) at the porta hepatis, 4 (14.8%) mediastinal, 4 (14.8%) coeliac, and 3 (11.1%) para-esophageal. LN sizes ranged from 10 to 47 mm. A definitive diagnosis was obtained in the majority (n=21, 77.8%), while 6 cases remained inconclusive. Among the confirmed diagnoses, 11 (52.4%) were malignant. The specific diagnoses included 4 (19.0%) cases of adenocarcinoma, 3 (14.3%) Hodgkin lymphoma, 2 (9.5%) non-Hodgkin lymphoma and 2 (9.5%) poorly differentiated carcinomas. 03 biopsies were positive for TB. Neither morbidity nor mortality were reported during the procedure.

Conclusions

EUS-guided biopsy is a safe and effective diagnostic tool for LN masses accessible via the upper gastrointestinal tract, providing a non-invasive alternative to surgical methods.

Introduction

Lymphadenopathy (LN) surrounding the gastrointestinal tract, such as para esophageal area, mediastinum, porta hepatic area can pose a significant diagnostic challenge, and the causative factors can range from benign conditions such as reactive lymphadenopathy to infective and inflammatory causes to malignant disease. [1] Whilst imaging techniques such as computed tomography (CT) or Positron Emission Tomography (PET) scans can identify lymph node masses, its diagnostic precision is inadequate to differentiate benign from malignant etiology, or infection for reactive LNs. [2] Obtaining the histology of the LN is crucial in the management of the patient, and conventional methods of obtaining tissue samples via mediastinoscopy, thoracoscope, thoracotomy or laparoscopy/laparotomy may be overly invasive, require general anesthesia, can potentially associated cause complications and entail a significant burden to the healthcare setting. [3].

Endoscopic ultrasound (EUS), since its invention in 1980s has been utilized as an imaging modality in gastrointestinal tract and there's a growing interest in using EUS as a diagnostic tool in lymph node masses providing a minimally invasive means of obtaining tissue samples for histological analysis. EUS combines ultrasound images with diagnostic endoscopy to visualize any masses around the upper gastrointestinal tract, including lymph nodes. It allows for acquiring multiple tissue samples for cytology (FNAC), histology (FNAB), flow cytometry, and culture with minimal invasiveness, as it passes a needle through the wall of the gastrointestinal tract directly into the suspected LN mass. [4] In recent years, several diagnostic and therapeutic algorithms of gastrointestinal and pancreatic malignancies have validated the use of EUS-FNAB in their diagnosis. [5] EUS guided biopsy is considered a safe procedure, with minimal

Correspondence: A. N. R. Fernandopulle

E-mail: nilesh@srg.cmb.ac.lk

 <https://orcid.org/0000-0002-2169-8394>

Received: 23-11-2025 Accepted: 30-11-2025

DOI: <https://doi.org/10.4038/sljs.v43i3.9306>



complications. Pain, infection, acute pancreatitis and bleeding are the primary complications and seen in about 1-2% of the procedures.[6]

Despite its widespread use internationally EUS guided biopsy is rarely requested in Sri Lanka, partly because of the lack of awareness among the medical community. There's no published data available with regards to experience with EUS guided biopsy, especially in resource poor settings like Sri Lanka. This study aims to assess the utility of the use of EUS guided biopsy as a diagnostic tool in lymph node masses surrounding gastrointestinal tract.

Materials and Methods

Patients and methods

The Gastroenterology and endoscopy unit of the National Hospital Sri Lanka, Colombo (NHSL) is the main tertiary referral center in Sri Lanka for endoscopic ultrasound assessment of patients. The patients who were referred for EUS to NHSL with lymph node masses surrounding the upper gastrointestinal tract were included in this study. A retrospective analysis was done from the prospectively maintained database from 2018 to 2024. Overall, 27 patients underwent EUS guided biopsy for lymph node masses over a six-year period.

EUS biopsy technique

All procedures in this study were performed with a curvilinear EUS scope (Olympus GF-UCT180 Curvilinear Array Ultrasound Gastro-videoscope) and a 22–25-gauge EUS fine-needle aspiration biopsy needle (Acquire™ Endoscopic Ultrasound Fine Needle Biopsy, Boston Scientific) (Figure 1)

After the initial puncture, 10–15 back-and-forth motions of the needle were made per pass using the “fanning” technique to maximize tissue sampling. A “slow pull technique” where the stylet is withdrawn while the biopsy is being taken was used to obtain maximal tissue. Two passes per lymph node were performed. Macroscopic on-site evaluation (MOSE) of the core tissue obtained from EUS-FNB was done by the operator to assess sample adequacy. After collection, the samples were immediately fixed in formalin saline and alcohol emersed slides and sent to the pathologists for routine histological analysis. After completion of the EUS, the patient was observed in the endoscopic recovery unit for 2–4 hours, depending on the endoscopist's preference, and discharged if no immediate complications were noted. All EUS FNAs were performed by the first author of this study (ANR), who was experienced in performing EUS FNA.

EUS-FNA was not performed or was considered contraindicated in cases of uncorrectable coagulopathy (INR > 1.5), thrombocytopenia (platelet count < 50,000/mm³), active use of P2Y12 receptor antagonists or oral anticoagulants, including vitamin K antagonists and direct oral anticoagulants, as well as in patients who were pregnant, breastfeeding, or unable to provide informed consent.

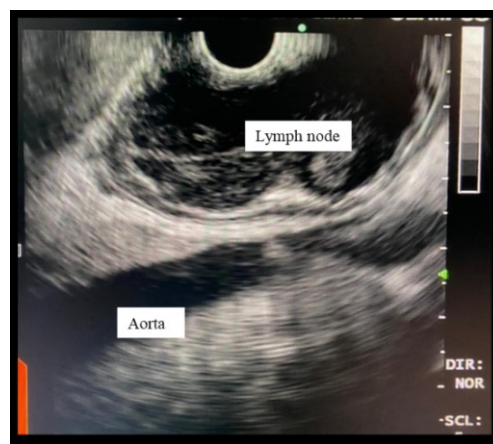


Figure 1: Endoscopic ultrasound-guided lymph node sampling

Results

The mean age of the study population is 49.4 years (SD ±15.5), of whom 16 (59.3%) were male. The samples were taken from lymph node masses in the following locations, as shown in Table 1.

Table 1: Lymph node masses locations

Region	Frequency	Percentage
Para aortic	11	40.7
Mediastinal	4	14.8
Para esophageal	3	11.1
Porta hepatis node	5	18.5
Coeliac nodes	4	14.8
Total	27	100.0

Lymph node mass sizes ranged from 10 mm to 47 mm, with the majority (n = 23, 85.2%) appearing as solid lesions on EUS. A definitive diagnosis was established in 21 cases (77.8%) (Figure 2). In six cases, diagnosis was inconclusive due to inadequate tissue sampling or excessive blood contamination. Among the confirmed cases, 11 (52.4%) were malignant, 6 (28.6%) were benign reactive lymph nodes, and 4 (19.0%) were associated with infections. Table 2 provides a detailed breakdown of specific diagnoses, which included 4 (19.0%) cases of adenocarcinoma, 3 (14.3%) Hodgkin

lymphoma, 2 (9.5%) non-Hodgkin lymphoma, and 2 (9.5%) poorly differentiated carcinomas.

There was no reported procedure-related morbidity or mortality, and all patients were discharged from the endoscopic unit on the same day.

Figure 2: Diagnostic accuracy of EUS-FNA of LN

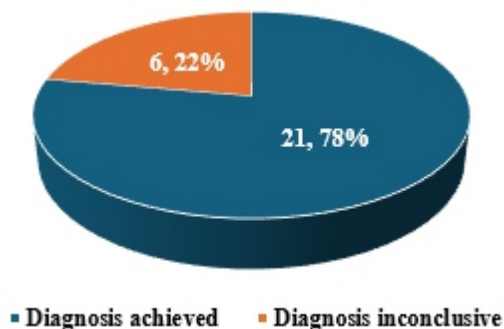


Table 2: Diagnoses breakdown

Region	Frequency	Percentage (%)
Adenocarcinoma	4	14.8
Hodgkin lymphoma	3	11.1
Non-Hodgkin lymphoma	2	7.4
Poorly differentiated carcinoma	2	7.4
Tuberculosis	3	11.1
Abscess	1	3.7
Reactive lymphadenopathy	6	22.2
Inconclusive	6	22.2
Total	27	100

Discussion

Since its invention in the 1980s, EUS has been a major diagnostic tool in clinical practice due to its ability to provide high-resolution, real-time images of the structures in and around the gastrointestinal tract combined with its ability to obtain tissue samples. [5] Previously lymph node masses surrounding gastrointestinal tract, were sampled using more invasive techniques such as mediastinoscopy, thoracoscopy and laparoscopy.

Para-aortic lymphadenopathy poses a significant diagnostic challenge due to its proximity to vital structures, making the process of obtaining histological samples difficult. Real-time visualization of the lesion and needle puncture is crucial for ensuring a safe and effective procedure. The diagnostic approaches commonly utilize laparoscopy-guided surgical biopsy and image-guided percutaneous biopsy. Laparoscopy-guided surgical biopsy requires general anesthesia, has a longer procedure time, is more invasive, and entails higher costs to the healthcare system. Percutaneous biopsy is done

under the guidance of various imaging modalities such as USS, CT, and MRI. CT fluoroscopy guided biopsy has the advantage of having a larger field of view and having better visualization of deeper tissue, compared to percutaneous USS imaging. However, it requires contrast, takes more time and all para-aortic lymph nodes may not be in accessible sites to biopsy [6]. In our analysis 11 samples from para-aortic lymph nodes were biopsied and diagnosis were available in 10 (90.9%) of the cases making it a practical and effective option for sampling para-aortic masses. The potential limitation would be the lesions that are located away from the upper gastrointestinal tract.

Mediastinal lymphadenopathy which can be a result of both benign and malignant aetiologies are detected using imaging modalities such as chest X ray, CT, MRI and PET scans. Especially when it's an isolated lymphadenopathy it's desirable to achieve a tissue diagnosis, as treatment based on clinical and radiological profile can potentially lead to misdiagnosis. Obtaining tissue samples can be done both by minimally invasive and surgical methods. [7] Minimally invasive methods include bronchoscopy/endosonographic approaches or image-guided biopsy: Transbronchial Needle Aspiration (TBNA), Endobronchial Ultrasound-Guided Transbronchial Needle Aspiration (EBUS-TBNA), Endoscopic Ultrasound-Guided Fine Needle Aspiration (EUS-FNA), and Transesophageal Bronchoscopic Ultrasound-Guided Fine Needle Aspiration (EUS-B-FNA). The decision of which modality to use is mainly based on the location of the lymph nodes. [7]

EUS FNA has access to lymph node groups, 2L, 3p, 4L, 4R, 7-9, partial access to 2R, 10R and if the lymph node group is distinctively enlarged has access to group 5. It has the added advantage of being able to access infra diaphragmatic sites of potential metastases (left adrenal, left liver lobe, celiac lymph nodes) which is important in staging lung cancers. It has no access to groups 3, 11-14. EBUS-FNA, has access to 3, 2 L/R, 4 L/R, 10-11 L/R, but has no access to 5, 6, 8, 9, 12-14 and it is unable to access to infra diaphragmatic sites. EUS-FNA is also better tolerated by patients compared to EBUS-FNA where patients experience coughing and dyspnea. [8]

Image guided biopsy techniques such as CT guided transthoracic approach, though minimally invasive has higher risk of complications, such as pneumothorax and damaging major blood vessels. [9] Ultrasound guided transthoracic biopsy is limited to very superficial masses. Surgical approaches such as mediastinoscopy were historically the gold standard for accessing mediastinal lymphadenopathy.

[10] However, given the complexity of the procedure there is a steep learning curve, and success depends on the skills of the operator [10] and several vital anatomical structures are potentially at risk of damage during the procedure. EUS-FNA is an effective and safe diagnostic tool and in our study all four mediastinal samples yielded diagnoses without complications which enabled the healthcare teams to treat patients with the definite treatment.

In addition to being able to diagnose malignancies, in our study EUS FNA samples also identified three samples with tuberculosis which is a highly prevalent diagnosis in Sri Lanka. Tuberculosis is known to cause lymphadenopathy in various locations, which requires histological and microbiological sampling of the nodes for the diagnosis. [11] When lymphadenopathy is surrounding the gastrointestinal tract EUS is an effective option as a diagnostic tool when tuberculosis is suspected.

In this retrospective study, we analyzed 27 patients who had clinically significant abdominal and mediastinal lymphadenopathy for which EUS-FNB were performed. Overall, the diagnostic efficacy was 77.8%. The efficacy of EUS FNA depends on several limitations inherent to the procedure, such as biopsy technique, needle type and availability of onsite histopathologist etc.

While this study presents new data of its kind in the region, the main limitation is the limited sample size owing to the lack of EUS guided biopsy requests from clinicians. In addition, the follow up data are not included in this study as the study was conducted via a retrospective analysis of the ward database. Therefore, creating more awareness among clinicians will increase utilization of EUS guided biopsy in the diagnostic workup of lymphadenopathy surrounding the gastrointestinal tract and in turn help future prospective research to remedy these limitations.

Conclusion

Obtaining good tissue samples with preserved lymph node architecture to accurately diagnose etiology is paramount in patients with nodal pathology. In a Sri Lankan setting where tuberculosis is a significant differential diagnosis, obtaining adequate tissue not only for histology but also for tissue culture in normal saline is important. Thus, EUS-guided biopsy is an effective and safe diagnostic tool that enables clinicians to obtain tissue samples in a minimally invasive technique from lymph nodes surrounding the gastrointestinal tract, compared to more invasive biopsy techniques currently in use. Greater awareness should be created among

physicians about EUS-guided biopsy to ensure more patients are referred, resulting in faster diagnoses and lower healthcare costs.

Ethical approval

NHSL Ethics review committee: Ethical approval was deemed unnecessary by the institutional ethics committee as the paper reports a single unit experience that emerged during normal practice.

Informed consent

An informed written consent was taken from all the patients for publication and any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Competing Interests

The Author(s) declare(s) that there is no conflict of interest.

Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Author contributions

Fernandopulle ANR – Performing all the procedures Writing the original draft and there after reviewing and editing the final manuscript

Senanayake D - Data collection and writing-original draft

Wimalasena G – Data collection and writing-original draft

Mithushan J - Data collection and writing- review and editing

Subasinghe D – Writing- review and editing, supervision

Sivaganesh S – Writing- review and editing, supervision

Wijerathne H – Histopathology reporting

Priyani A – Histopathology reporting

References

- 1.Importance of human immunodeficiency virus-associated lymphadenopathy and tuberculous lymphadenitis in patients undergoing lymph node biopsy in Zambia [Internet]. Vol. 83,British Journal of Surgery. 1996. Available from: <https://academic.oup.com/bjs/article/83/1/75/6167497>
- 2.Chen L, Li Y, Gao X, et al. High Diagnostic Accuracy and Safety of Endoscopic Ultrasound-Guided Fine-Needle Aspiration in Malignant Lymph Nodes: A Systematic Review and Meta-Analysis. Dig Dis Sci. 2021 Aug 1;66(8):2763–75.
- 3.Annema JT, Versteegh MI, Veselić M, et al. Endoscopic ultrasound-guided fine-needle aspiration in the diagnosis and staging of lung cancer and its impact on surgical staging. Journal of Clinical Oncology. 2005;23(33):8357–61.
- 4.Karsenti D, Palazzo L, Perrot B, et al. 22G Acquire vs. 20G Procore needle for endoscopic ultrasound-guided biopsy of

- pancreatic masses: a randomized study comparing histologic sample quantity and diagnostic accuracy. *Endoscopy* [Internet]. 2020;52(9):747–53. Available from: <http://dx.doi.org/10.1055/a-1160-5485>
5. Ishigaki K, Nakai Y, Sasahira N, et al. A prospective multicenter study of endoscopic ultrasound-guided fine needle biopsy using a 22-gauge Franseen needle for pancreatic solid lesions. *Journal of Gastroenterology and Hepatology (Australia)*. 2021 Oct 1;36(10):2754–61.
6. Jenssen C, Alvarez-Sánchez MV, Napoléon B, et al. Diagnostic endoscopic ultrasonography: assessment of safety and prevention of complications. *World journal of gastroenterology: WJG* [Internet]. 2012;18(34):4659–76. Available from: <http://dx.doi.org/10.3748/wjg.v18.i34.4659>
7. Gkolfakis P, Crinò SF, Tziatzios G, et al. Comparative diagnostic performance of end-cutting fine-needle biopsy needles for EUS tissue sampling of solid pancreatic masses: a network meta-analysis. *Gastrointest Endosc* [Internet]. 2022;95(6):1067-1077.e15. Available from: <http://dx.doi.org/10.1016/j.gie.2022.01.019>
8. Tanisaka Y, Mizuide M, Fujita A, et al. Comparison of Endoscopic Ultrasound-Guided Fine-Needle Aspiration and Biopsy Device for Lymphadenopathy. *Gastroenterol Res Pract*. 2021;2021.
9. Bellisario F, Attili F, Campana F, et al. Endoscopic ultrasound-guided fine needle biopsy in the diagnostic work-up of deep-seated lymphadenopathies and spleen lesions: A monocentric experience. *Diagnostics (Basel)* [Internet]. 2023;13(17). Available from: <http://dx.doi.org/10.3390/diagnostics13172839>
10. Van Riet PA, Larghi A, Attili F, et al. A multicenter randomized trial comparing a 25-gauge EUS fine-needle aspiration device with a 20-gauge EUS fine-needle biopsy device. *Gastrointest Endosc* [Internet]. 2019;89(2):329–39. Available from: <http://dx.doi.org/10.1016/j.gie.2018.10.026>
11. Mert A, Tabak F, Ozaras R, Tahan V, Öztürk R, Aktuğlu Y. Tuberculous lymphadenopathy in adults : A review of 35 Cases. Vol. 102, *Acta Chirurgica Belgica. ARSMB-KVBMG*; 2002. p. 118–21.