

Pneumologia

Endobronchial ultrasound: Indispensable or Dispensable- Our experience through Case Series

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Abstract

English:

EBUS has been an important interventional Pulmonology (IP) tool in respiratory medicine practice. We enlist our observations after including EBUS in our services.

A total of 35 cases referred for EBUS were assessed. Of these, 33 underwent linear EBUS and 2 VBN. EBUS could be done in 21/33 (63.6%) cases. In 12/33 (36.4%), EBUS was not done as it was unindicated or due to contraindications. Of the 21 cases wherein EBUS was performed, FNA/FNB could be done in 17 (81%) but could not be done on 4 (19%). Of these 17 cases, FNA/FNB was conclusive in 9 (53%), inconclusive with alternate site biopsy yielding diagnosis in 6 (35%), and inconclusive with no other biopsy evidence in 2 (12%). The final etiology in the 35 cases was TB, malignancy, sarcoidosis, and others in 19 (54%), 9 (26%), 3 (9%), and 4 (11%) cases, respectively. Of the 12/19 cases of TB wherein EBUS FNA/FNB was feasible, 8 were diagnostic (all cases of IMHL), 3 yielded diagnosis on other EP site biopsies, and in one case, no biopsy could be done. EBUS, while optional, proves indispensable in situations like IMHL (Isolated Mediastinal and Hilar Lymphadenopathy). The utility of TB was important to achieving biopsy evidence.

Keywords

EBUS FNA • IP • Bronchoscopy

Ecografia endobronșică: indispensabil sau dispensabil - Experiența noastră printr-o serie de cazuri

Rezumat

Romanian:

EBUS reprezintă o tehnică importantă în pneumologia intervențională (IP). În lucrarea de față prezentăm observațiile după includerea EBUS în serviciile noastre.

Au fost evaluate în total 35 de cazuri trimise pentru EBUS. Dintre acestea, 33 au suferit EBUS liniar și 2 VBN. EBUS ar putea fi realizat în 21/33 (63,6%) cazuri. În 12/33 (36,4%), EBUS nu a fost efectuat deoarece nu a fost indicat sau din cauza contraindicațiilor. Din cele 21 de cazuri în care a fost efectuat EBUS, FNA/FNB s-a putut face în 17 cazuri (81%), dar nu s-a putut face în 4 cazuri (19%). Dintre aceste 17 cazuri, FNA / FNB a fost concludentă în 9 (53%), neconcludentă cu biopsie alternativă care a dat diagnostic în 6 (35%) și neconcludentă fără alte dovezi de biopsie în 2 (12%). Etiologia finală în cele 35 de cazuri a fost TBC, malignitate, sarcoidoză și altele în 19 (54%), 9 (26%), 3 (9%) și, respectiv, 4 (11%) cazuri. Din cele 12/19 cazuri de TBC în care EBUS FNA / FNB a fost fezabil, 8 au fost diagnostice (toate cazurile de IMHL), 3 au dat diagnostic la alte biopsii la locul EP și, într-un caz, nu s-a putut face nicio biopsie. EBUS, deși opțional, se dovedește indispensabil în situații precum IMHL. Utilitatea tuberculozei a fost importantă pentru obținerea dovezilor biopsice.

Cuvinte-cheie

EBUS FNA • IP • Bronhosocopia

Introduction

EBUS has been an important interventional Pulmonology (IP) tool in respiratory medicine practice. While it is practiced widely in the USA, Europe and Australia; EBUS practice in

India was limited to centers where the expertise is available. While basic bronchoscopy and other IP procedures are practiced widely, the availability of EBUS is recent in many

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centers. We put forth information about the utility of same at our center. As a step towards further improvisation of facilities in our medical school, we embarked towards inclusion of EBUS in our IP armamentarium. We enlist our observations.

Case Summary

EBUS inclusion in our IP services needed training and procurement of the equipment as an essentiality. Two faculty members were trained in EBUS. Two senior residents were further trained in the next phase. All junior residents were trained for monitoring and care as during basic bronchoscopy procedures. EBUS procurement was done with help of administrative protocols and permission. Once available all cases referred for EBUS were evaluated.

Patients were evaluated with multi-disciplinary discussion (MDD). Once a decision to do an EBUS was made, cases were hospitalized at least 24 hours prior to the procedure. Pre-procedure a CXR and ECG was done on the day of admission. The bleeding profile (INR), CBC, RBS, BUN, S.creatinine recent reports were noted. The patients were kept NBM overnight for the procedure to be done next day morning. Written informed consent was taken. EBUS was done with the EBUS scope (Make- Pentax, Model EB19-J10U). A22 G EBUS needle (Make- Cook, Model – EchoTipProCore Endobronchial HD biopsy needle) was used for FNA/FNB. The procedure was done in the bronchoscopy suite under local anesthesia using 10% lignocaine spray to anesthetize the oropharynx and intratracheal 2% lignocaine was instilled to anesthetize the larynx and vocal cords. Conscious sedation with fentanyl and midazolam was practiced. The IP suit personnel during the procedure consisted of the proceduralist, a co-proceduralist, one or two senior/ junior resident doctors, a staff nurse and a ward boy.

Total 35 cases were referred for EBUS in the first 6 months of initiation. This meant approximately 1 patient was referred per week in spite of being a new center, suggesting a distinct need and workload of the said procedure. Of the 35 cases, eventually 33 were considered for EBUS. We had virtual bronchoscopy navigation (VBN), hence two cases for radial EBUS were subjected to VBN. The 2 cases of VBN underwent VBN successfully. In one case, the VBN guided TBLB was diagnostic for lung cancer. In the other case, we had to abandon the procedure in view of bleeding and desaturation with the first biopsy attempt. Lung cancer was confirmed later with a CT guided lung biopsy in this case. The sample size was too small for analysis.

Thirty three cases referred for EBUS were screened with detailed clinical, radiological and other records before the procedure was planned. EBUS was performed in 21/33 (63.6%) cases. In 12/33 (36.4%) cases EBUS was not done due to a) In 8 (24.3%) cases EBUS was not indicated as final diagnosis was already achieved with clinicoradiological correlation, follow up reports and Multi-disciplinary discussion (MDD) in six cases; one case was a 12 year old patient who was referred to the gastromedicine department for EUS, one case was an anterior mediastinal mass and referred to the radiology department for CT guided biopsy b) In 3 (9.1%) cases there were contraindications to EBUS and it could not be performed (moribund patient, high oxygen requirement, deranged INR); c) In one (3%) case there was a vasovagal response on administering local anesthesia and hence the procedure was abandoned.

Of the 21 cases wherein EBUS was performed, FNA/FNB was done in 17/21 (81%) and could not be done on 4/21 (19%). FNA/FNB could not be done in 4 cases due to desaturation, severe tachycardia, lymph node delineation unclear for a clear path, bleeding respectively in one case each. Diagnosis was achieved by a CT guided biopsy in them. Of the FNA/ FNB was done in 17 cases; the sample collected was a clear aspirate in 11, pus in 3, bloody aspirate in 1 and core biopsy in 2. Of these 17 cases, FNA/FNB was conclusive in 9 (53%) cases. It was inconclusive in 6 (35%) cases where an alternate biopsy yielded the diagnostic evidence. In 2 (12%) cases, alternate biopsies could not be done to achieve the diagnostic biopsy evidence and the diagnosis was arrived with clinicoradiological and laboratory parameter correlation. Both were follow-up cases of sarcoidosis. Of the 12 cases of TB wherein EBUS FNA/FNB was feasible; 8 were diagnostic (all cases of isolated mediastinal and hilar lymphadenopathy-IMHL), 3 yielded diagnosis on other EP site diagnosis and in 1 no other site biopsy could be done. Most commonly biopsied lymph nodes were station 7 and station 4R.

Final etiology in the 35 cases was TB, malignancy, sarcoidosis and others in 19, 9, 3 and 4 cases respectively. This was an interesting finding considering the use of this technique in TB cases in our country. The details of all 35 cases are mentioned in Table 1.

Discussion

Interventional Pulmonology era started way back in the 1900s when Gustav Killian, Chevalier Jackson invented the rigid bronchoscopes to Shigeto Ikeda in the 1960s who invented the flexible bronchoscope. Further procedural advancements included the use of transbronchial lung

Table 1. Summary of diagnostic details

S. No.	Diagnosis	N	Age	M/F	EBUS/VBN		FNA/ FNB		Biopsy evidence for diagnosis				
			Mean (SD)		ND	D	ND	D	BiopsyNI	No site Biopsy done	EBUS diagnostic	Other Biopsy diagnostic	Other biopsy could not be done
1	Tuberculosis	19	29.1 (11.4)	8/11	5	14	2	12	3	0	8	7	1
2	Malignancy	9	55.4 (16.5)	8/1	4	5	2	3	0	3	2	4	0
3	Sarcoidosis	3	45.3 (10.3)	1/2	0	3	0	3	0	2	0	1	0
4	Others	4	23.2 (7.9)	2/2	3	1	1	0	4	0	0	0	0

ND-Not done, D-Done, NI-Not indicated.

biopsy and the transbronchial needle aspiration (C-TBNA). C-TBNA proved very vital to access and sample mediastinal lymph nodes (1). However, the direct visualization of the underlying peribronchial structures was still a hinderance. Ultrasound technology made it possible to noninvasively access most regions of the body. Investigators integrated this real-time target visualization technique to the C-TBNA. Heinrich Becker applied the ultrasound technology to the endobronchial region and the development of EBUS. Hurter and Hanrath reported the usefulness of radial probe EBUS. A major limitation of radial probe EBUS was that after localizing the lesion, sampling was still performed in a blind fashion. This lead to the invention of the convex probe EBUS. Convex Probe Endobronchial Ultrasound (CP-EBUS) was developed to utilize real-time ultrasound technology to sample mediastinal lymph nodes and lung lesions. The distal end of the EBUS bronchoscope has a larger diameter than a flexible bronchoscope, with an angulated forward view at a 10-30 degree inclination. This images the lymph nodes and lung lesions and allows anchoring the scope to the airway while the needle comes out of a slightly proximal opening. Kazuhiro Yasufuku and colleagues first demonstrated the high diagnostic yield of the convex probe EBUS (CP-EBUS) in sampling mediastinal lesions (2–4). While the EBUS was targeted to evaluate lung cancers it proved an important tool for diagnosis of perihilar, peribronchial and peritracheal lesions and its utility now extends to diseases like TB and sarcoidosis. With the availability of EBUS in our center we recount our experience through this case series.

In our case series, all EBUS referrals needed a complete clinical evaluation with MDD before the procedure was planned. In 24.3% of the cases referred, there was no indication to subject the patient to EBUS. This is an important finding for training institutes who do not have EBUS and feel left out due to the same. Our 9.1% cases had contraindications to EBUS. A rare vasovagal reaction was noted in the pre-procedure period however mandating the need for monitoring

in the periprocedural care. Generally, the procedure was safe and more and more existing tertiary care bronchoscopy centers should consider upgradation to include EBUS in their services. Thus, EBUS like basic bronchoscopy had similar clinical situations which could be easily dealt by a bronchoscopy trained pulmonologist. The pulmonologist only needs to get trained on the ultrasound anatomy and practice, the EBUS scope negotiation which is per oral and no different than the routine bronchoscopy procedures with the newer EBUS scopes.

TB and malignancy consisted of the 2 major group of diseases. We observed that the EBUS and FNA/FNB could be easily done in cases wherein TB was suspected rather than malignancy. This could be due to the referral bias as our center received cases of malignancy which were referred in at advanced stages with patients often unfit for the procedure without adequate anesthesia backup. This also serves as a learning lesson for our center to improvise our IP suite to ensure availability of an anesthetist in future.

The diagnostic yield was best in TB. Even in TB it was best in cases with isolated mediastinal and/or hilar lymphadenopathy (IMHL). Cases with other extrapulmonary (EP) site involvement or disseminated TB demonstrated a good yield from the other EP site rather than the mediastinal lymph node. Of the 12 cases of TB wherein EBUS FNA/FNB was done; 8 were diagnostic (all cases of IMHL), 3 yielded diagnosis on other EP site diagnosis and in 1 no other site biopsy could be done. IMHL cases on MDD could thus be subjected to EBUS FNA/FNB as a part of evaluation protocol instead of the CT modality, thus triaging and facilitating the availability of already constrained radiology services for other lung biopsies. The facilitation of a successful EBUS is incomplete with out an intradepartmental, interdepartmental discussion (if the institute has separate IP and pulmonary medicine teams) and interdisciplinary integration with the radiology, pathology and microbiology teams.

Thus, we encourage the existing tertiary care pulmonology centers to consider adding EBUS services when considering expansion in future due to its apt utility and indispensable nature in selected cases (like IMHL) on similar lines as year ago when we included the basic bronchoscopy services in our routine practice. Its utility in obtaining a biopsy evidence in TB was indispensable.

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Institutional Review Board Statement

Not applicable.

Informed Consent Statement

No informed consent was necessary. Written informed consent from the patients was taken.

Data Availability Statement

Data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare no conflict of interest.

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