Available online at www.sciencerepository.org

Science Repository

Research Article

Pilot Study of the Difference C-TBNA with EBUS-TBNA in Mediastinal Bronchial-Derived Cysts

Yue-feng Sheng[1#], Zi-yi Liu[1#], Jing-yu Mao[1], Da-xiong Zeng[1], Jian-an huang[1] and Jun-hong Jiang[1]*

Department of Respiratory medicine, the First Affiliated Hospital of Soochow University, Suzhou, China

[#]Contributed equally

ARTICLE INFO

Article history:
Received: 29 February, 2020
Accepted: 20 March, 2020
Published: 31 March, 2020

Keywords:
Mediastinal
bronchial cyst
conventional transbronchial needle aspiration
endobronchial ultrasound-guided transbronchial needle aspiration

ABSTRACT

Objective: To investigate the difference value of conventional transbronchial needle aspiration (C-TBNA) and endobronchial ultrasound-guided transbronchial needle aspiration (EBUS-TBNA) in mediastinal bronchogenic cysts.

Method: A retrospective analysis of clinical data and follow-up data of 27 patients using conventional TBNA and EBUS-TBNA techniques diagnosed as mediastinal bronchogenic cysts from May 2008 to December 2016 in the First Affiliated Hospital of Soochow University was done.

Results: In 8 years, there were 13 cases of C-TBNA and 14 cases of EBUS-TBNA-diagnosed mediastinal bronchogenic cysts. C-TBNA extracted clear liquid and its volume was 8.9 ± 1.5 ml. The 14 patients examined by EBUS had a homogenous anechoic signal. Clear liquid was extracted, and its volume was 29.1 ± 7.5 ml. The cyst liquid extracted with EBUS-TBNA was significantly more than that extracted with C-TBNA ($P < 0.05$). During follow-up, 1 patient had cyst rupture after being punctured by C-TBNA, secondary pulmonary infection and right pleural effusion, followed by surgical treatment. The recurrence rate for C-TBNA was 100.00% (13/13), and that for EBUS-TBNA was 14.29% (2/14) ($P < 0.05$).

Conclusion: The C-TBNA and EBUS-TBNA technologies have high diagnostic value for the mediastinal bronchogenic cysts. Both C-TBNA and EBUS-TBNA technologies have the risk of secondary infection and recurrence of cysts.

Introduction

Mediastinal cyst accounts for 20% of mediastinal masses, while the bronchogenic cyst is a relatively rare disease in adults and accounts for 60% of all mediastinal cysts [1]. C-TBNA and EBUS-TBNA are mainly used to obtain the specimens of the mediastinal and hilar lymph nodes [2, 3]. We compared the C-TBNA and EBUS-TBNA in the diagnosis and staging of lung cancer, and there are no significant difference between the two techniques [4]. Then, whether EBUS-TBNA has its superiority in the diagnosis and treatment of mediastinal bronchogenic cyst must be tested. Here, we review the clinical data and follow-up data of 27 patients, including two cases whose clinical data were typical, and analyze the applicability of C-TBNA and EBUS-TBNA for mediastinal bronchogenic cyst.

Materials and Methods

I Clinical Characteristics of Patients with Mediastinal Bronchogenic Cysts

27 patients diagnosed with mediastinal bronchogenic cyst were selected from the Department of Respiratory Medicine, the First Affiliated Hospital of Soochow University from May 2008 to December 2016. There were 14 males and 13 females, aged 29-71 years, with an average of 47±15.2 years. Chest computed tomography (CT) examination reported as mediastinal lesions and were then diagnosed by C-TBNA or EBUS-TBNA. The clinical data and follow-up data were analyzed (Table 1).

[*]Correspondence to: Jun-hong Jiang, Department of Respiratory medicine，the First Affiliated Hospital of Soochow University, Suzhou 215006, China; E-mail: jiang20001969@163.com

http://dx.doi.org/10.31487/j.JICOA.2020.01.12

Table 1: Clinical characteristics of patients with mediastinal bronchogenic cysts.

Clinical characteristics	C-TBNA（n=13）	EBUS-TBNA(n=14)	P value
Sex(male)	6	8	0.706
Age	51(old)	59(old)	0.063
Location			0.441
Middle mediastinum	4	7	
Posterior mediastinum	9	7	
CT Maximum level area (mm^2)	3390.91	3611.35	0.827
Operation (YES)	4	5	1.000

The liquid specimens of the mediastinal cysts was processed and sent to the laboratory for routine examination and bacterial culture. One patient complicated with infection and one complicated with esophageal cancer were sent for pathological examination.

II C-TBNA Inspection and EBUS-TBNA Inspection

The procedure was done by flexible bronchoscopy, using local anesthesia (2% lidocaine). The patients' pulse, oxygen saturation and heart rate were monitored in real time. The puncture site was determined by a detailed review of the CT scan of the chest. C-TBNA inspection chosen Wang's MW-121 puncture needle was passed through the working channel and then punctured the mediastinal bronchogenic cyst. Ultrasound bronchoscope (Olympus BF-UC180F 22mm working clamp) was inserted into the trachea via the nose or mouth. the endoscopic probe was fixed at the puncture site to determine the puncture distance and position. The puncture site was checked again by the doppler blood flow and then the mediastinal bronchogenic cyst was punctured. The cystic fluid collected was immediately smeared on a slide, which was fixed in a 95% alcohol solution for pathological examination, and the rest of it was sent for bacterial culture.

III Statistical Method

All data were statistically analyzed using SPSS 20.0. The count data is expressed as a percentage of the line 2 test. The difference was statistically significant at $P < 0.05$.

Results

EBUS examination and ultrasonogram was performed on 14 patients, who showed uniform echo-free signals. In one patient, the cyst could not be punctured due to the thick wall when performing EBUS examination. Among the 14 bronchogenic cyst patients examined by EBUS-TBNA, 5 cases combined with malignant tumors or lymphoma were transferred to the hematology department for further diagnosis and chemotherapy. After 6 months of treatment, 2 patients with cysts underwent an outpatient re-examination. The bronchogenic cysts decreased or disappeared significantly.

13 patients underwent C-TBNA, and the extracted liquid was clear. Based on the aspiration liquid specimens, 13 patients were diagnosed by C-TBNA with mediastinal bronchogenic cyst. The cyst of CT maximum level area by C-TBNA and EBUS-TBNA are 3390.91 mm^2 and 3611.35 mm^2 ($P>0.05$) respectively. The amount of liquid was 8.9 ± 1.5 ml by C-TBNA, and its volume was 29.1 ± 7.5 ml. The cyst liquid extracted with EBUS-TBNA was significantly more than that with C-TBNA ($P < 0.05$) (Table 2).

Table 2: Results of C-TBNA & EBUS-TBNA examination.

Inspection method (n)	Recurrence rate (%)	Extraction volume（ml）
C-TBNA	100.00	8.9 ± 1.5
EBUS-TBNA	14.29	29.1 ± 7.5
P value	0.098	0.002

One patient after C-TBNA had mediastinal infection and was then treated with thoracic surgery (Figures 1A & 1B). The recurrence rate of C-TBNA was 100.00% (13/13), and that of EBUS-TBNA was 14.29% (2/14) ($P < 0.05$). Here, we reported one recurrence patient (Figures 2A-2C).

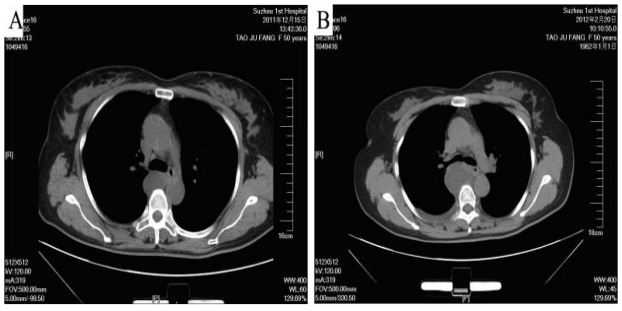

Figure 1: One patient after C-TBNA caused mediastinal infection. **A)** CT before C-TBNA. **B)** CT after C-TBNA.

A 50-year-old female was referred to our hospital with complaints of cough for a half month. The chest CT showed that a mass was posterior to the right main bronchus and adjacent to the fourth thoracic vertebra. 10 ml of a light yellow liquid was extracted for routine pathological test and bacterial culture. Seven days after C-TBNA, the patient experienced high fever and right chest pain. The chest CT indicated right pleural effusion, and the mass increased significantly. Thoracic surgery was performed and proved to be mediastinal bronchogenic cyst rupture with infection.

A 60-year-old female who had chest tightness and cough for a month. Chest CT scan showed that a mass of 44×37 mm^3 compressed the trachea. A total of 70ml clear fluid was extracted, and then the mass was significantly smaller. The patient was readmitted after a month for chest tightness and shortness of breath. The chest CT showed that a mass of 45mm beside the right upper mediastinum compressed the trachea. 150ml of fluid was extracted in the operation.

Among 27 cases, 9 cases were treated by follow-up surgery, 3 cases died of cancer, 2 cases recovered by follow-up, 2 cases were treated by EBUS-TBNA, and13 cases were in follow-up.

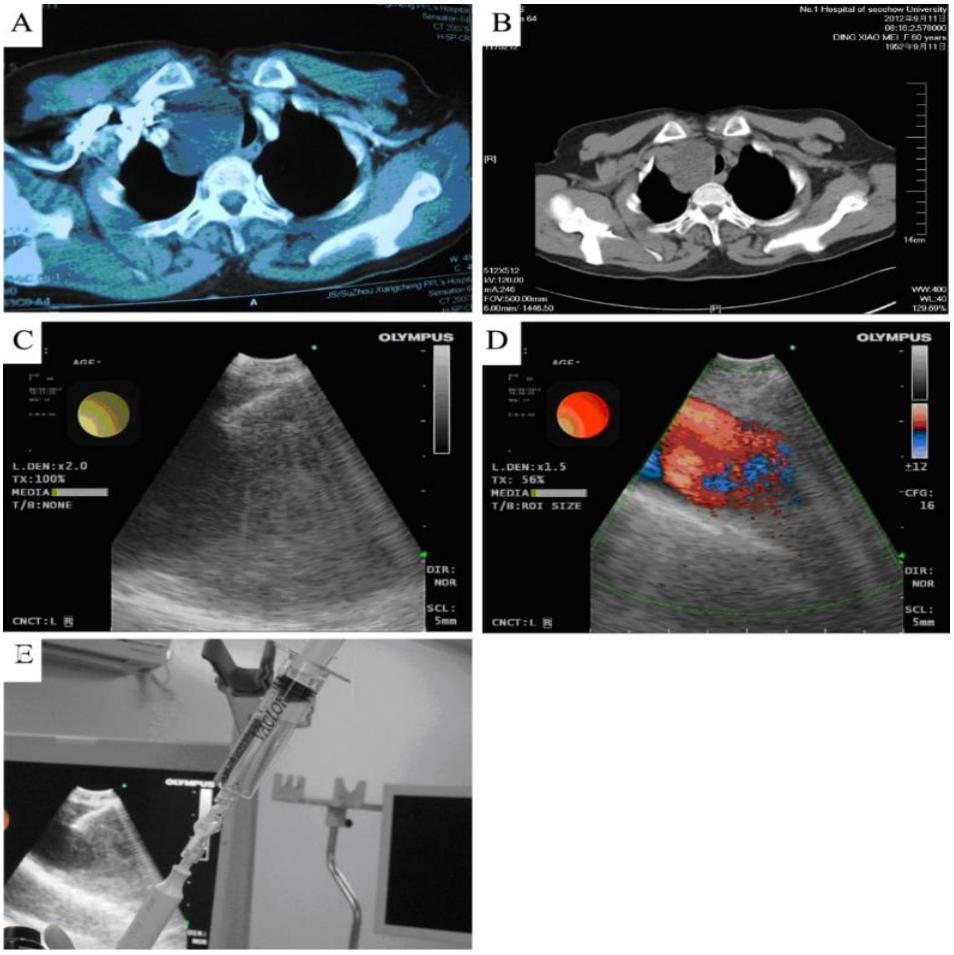

Figure 2: One recurrence patient after EBUS-TBNA treatment. **A)** CT before C-TBNA. **B)** CT after C-TBNA. **C)** ultrasound image before EBUS-TBNA. **D)** Ultrasound image after EBUS-TBNA. **E)** Image about aspiration cyst.

Discussion

Congenital mediastinal cysts are not common, accounting for 12-30% of all mediastinal tumors and 60% of mediastinal bronchial cysts. So far, the specific pathogenesis of bronchogenic cysts is still unclear. Bronchogenic cysts are often asymptomatic and found incidentally as a radiographic finding in adults. It is generally difficult to detect when there is no compression, small lesions, and no infection [5, 6]. At present, the diagnostic methods for bronchogenic cyst are mainly as follows. First, chest CT, especially enhanced CT, has good imaging characteristics. Chest CT is the main way to differentiate other diseases. The common complications of mediastinal cysts are infection and hemorrhage, but when there are complications, becomes difficult to diagnose it by CT imaging [1, 5]. Second, ultrasound – because the cyst is mostly fluid, it can be clearly distinguished from the density of surrounding tissue in a homogeneous anechoic area beyond the left. Third, the cyst fluid is aspirated with TBNA. Once the liquid can be aspirated, it can be diagnosed as the mediastinal cyst.

Surgical resection is the most common treatment for mediastinal cyst. With the use of C-TBNA and EBUS-TBNA, TBNA technology has been case reported in the treatment of mediastinal cyst. Wang ko pen reported one patient follow-up for 1 year, without recurrence; the amount of the cyst puncture fluid reached 70ml [7, 8]. Takahiro Nakajima reported a case of central airway stenosis caused by the compression of a 65 × 57 × 49 mm^3 mediastinal cyst [9]. In this case, EBUS-TBNA was used to aspirate 80 ml cystic fluid, and no recurrence occurred after 1 year of follow-up. Andrew Twehues *et al*. used EBUS-TBNA to treat 2 cases of mediastinal cysts [10]. In one patient, no recurrence occurred after 16 months of follow-up. But in another, with a diameter of 4.3 x 5.7 cm^2 was treated by thoracoscopic surgery for recurrence after extraction of 33 ml.

EBUS-TBNA has two dominant factors to compare with C-TBNA. First, the needle length is more than that of C-TBNA. Second, EBUS-TBNA involves real time puncture. According to the clinical data of 27 patients, although there was no statistical difference about the cyst of CT maximum level area. The cyst liquid with EBUS-TBNA extraction was significantly more than that with C-TBNA. The recurrence rate for C-TBNA was 100.00% (13/13), and that for EBUS-TBNA was 14.29% (2/14) ($P < 0.05$). Both EBUS-TBNA and C-TBNA have the risk of recurrence because of characteristic of cystic disease.

With the application of EBUS-TBNA, the complication about mediastinal infection have been reported one after another. Goohyeon Hong *et al*. reported a case of bronchogenic cyst rupture and pneumonia after EBUS-TBNA [11]. Similarly, Parker KL, Moffatt and Huang have also reported serious mediastinal infection complications caused by EBUS-TBNA [12-14]. We had a patient after C-TBNA caused mediastinal infection. Is infection more likely to happen without lymph

node's self-purification function, especially in the process of the treatment of mediastinal cysts?

To sum up, the chest CT of the mediastinal cyst revealed uniform mass shadow with a smooth or sharp boundary, circular or oval. C- TBNA extraction liquid can assist in the diagnosis. EBUS can provide good ultrasonographic images of lesions and present a no echo signal. C-TBNA cannot aspire cystic lesions completely, thus leading to postoperative recurrence. EBUS-TBNA has the advantage to aspire cystic lesions completely under ultrasound guidance; but it may cause mediastinal infection complications and recurrence of cysts. So, we should pay attention to follow up after the operation. We believe that we should be cautious on the use of TBNA technology in mediastinal bronchogenic cyst.

REFERENCES

1. Takeda S, Miyoshi S, Minami M, Ohta M, Masaoka A et al. (2003) Clinical spectrum of mediastinal cysts. *Chest* 124: 125-132. [Crossref]
2. Yasufuku K, Chiyo M, Koh E, Moriya Y, Iyoda A et al. (2005) Endobronchial ultrasound guided transbronchial needle aspiration for staging of lung cancer. *Lung Cancer* 50: 347-354. [Crossref]
3. Wang KP, Marsh BR, Summer WR, Terry PB, Erozan YS *et al*. (1981) Transbronchial needle aspiration for diagnosis of lung cancer. *Chest* 80: 48-50. [Crossref]
4. Jiang J, Browning R, Letchtzin N, Huang J, Terry P et al. (2014) TBNA with and without EBUS: a comparative efficacy study for the diagnosis and staging of lung cancer. *J Thorac Dis* 6: 416-420. [Crossref]
5. Bullock R, Soares DP, James M (2010) An infected branchial cyst complicated by retropharyngeal abscess, cervical osteomyelitis and atlanto-axial subluxation. *BMJ Case Rep* 2010: bcr0420102933. [Crossref]
6. Levien AS, Summers BA, Szladovits B, Benigni L, Baines SJ (2010) Transformation of a thymic branchial cyst to a carcinoma with pulmonary metastasis in a dog. *J Small Anim Pract* 51: 604-608. [Crossref]
7. Schwartz AR, Fishman EK, Wang KP (1986) Diagnosis and treatment of a bronchogenic cyst using transbronchial needle aspiration. *Thorax* 41: 326-327. [Crossref]
8. Kuhlman JE, Fishman EK, Wang KP, Zerhouni EA, Siegelman SS (1988) Mediastinal cysts: diagnosis by CT and needle aspiration. *AJR Am J Roentgenol* 150: 75-78. [Crossref]
9. Nakajima T, Yasufuku K, Shibuya K, Fujisawa T (2007) Endobronchial ultrasound-guided transbronchial needle aspiration for the treatment of central airway stenosis caused by a mediastinal cyst. *Eur J Cardiothorac Surg* 32: 538-540. [Crossref]
10. Twehues A, Islam S (2011) Cystic lesions of the thorax: role of endobronchial ultrasound-guided transbronchial needle aspiration. *J Bronchology Interv Pulmonol* 18: 265. [Crossref]
11. Hong G, Song J, Lee KJ, Jeon K, Koh WJ et al. (2013) Bronchogenic cyst rupture and pneumonia after endobronchial ultrasound-guided transbronchial needle aspiration: a case report. *Tuberc Respir Dis (Seoul)* 74: 177-180. [Crossref]
12. Moffatt Bruce SD, Ross P Jr. (2010) Mediastinal abscess after endobronchial ultrasound with transbronchial needle aspiration: a case report. *J Cardiothorac Surg* 5: 33. [Crossref]
13. Parker KL, Bizekis CS, Zervos MD (2010) Severe mediastinal infection with abscess formation after endobronchial ultrasound-guided transbrochial needle aspiration. *Ann Thorac Surg* 89: 1271-1272. [Crossref]
14. Huang CT, Chen CY, Ho CC, Yu CJ (2011) A rare constellation of empyema, lung abscess, and mediastinal abscess as a complication of endobronchial ultrasound guided transbronchial needle aspiration. *Eur J Cardio thorac Surg* 40: 264-265. [Crossref]