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Original article

Efficacy of ultrasound-guided core needle gun biopsy in diagnosing cervical lymphadenopathy

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ABSTRACT

Objective: Ultrasound-guided fine needle aspiration cytology (US-FNA) is useful for diagnosing cervical lymphadenopathy. However, FNA, has a high false negative rate, especially in patients with lymphoma. Ultrasound-guided core needle gun biopsy (US-CNB) has recently become important for diagnosing cancers, but its value remains undetermined. This study evaluates the efficacy of US-CNB, performed in an outpatient setting, in diagnosing cervical lymphadenopathy and the spectrum of related diseases.
Materials and methods: This retrospective study included 79 subjects who were not squamous cell carcinoma suspects and did not have a history of malignancy between January 2006 and July 2009. A US-CNB was performed on enlarged cervical lymph nodes (> 1.0 cm) in all subjects. Diagnostic sensitivity, specificity, and accuracy of US-CNB in differentiating between malignant and benign lymphadenopathy were evaluated. All enrolled subjects underwent a planned US-FNA before the study US-CNB was performed. Results of US-CNB and US-FNA were compared.
Results: The correct histopathological diagnoses were made in 73 of 79 subjects (91.1%) using US-CNB samples. Of these, the most common diagnoses were reactive hyperplasia (26 subjects), Kikuchi's disease (17 subjects), tuberculous lymphadenitis (15 subjects), lymphoma (8 subjects), and metastatic carcinoma (3 subjects). The US-CNB was very good at differentiating between malignant and benign lymphadenopathy, with a diagnostic sensitivity, specificity, and accuracy of 91.6%, 100%, and 98.6%, respectively. Additionally, US-CNB was more accurate than US-FNA in identifying lymphoma (88.8% vs. 11.1%) and Kikuchi's disease (89.4% vs. 29.4%). No US-CNB related-complications were observed.
Conclusion: The US-CNB is safe, effective, and has a high diagnostic yield for cervical lymphadenopathy. The US-CNB may also be useful for diagnosing lymphoma and Kikuchi's disease.

1. Introduction

Cervical lymphadenopathy can result from many different underlying diseases, including lymphoma, viral or bacterial adenitis, Kikuchi's disease, tuberculosis, toxoplasmosis, sarcoidosis, carcinoma, collagen vascular disease, and reticuloendothelial system disease. A cervical lymphadenopathy diagnosis should be made as soon as possible to lessen patient anxiety about symptoms, including cervical mass, swelling, and tenderness. Moreover, a delayed lymphoma diagnosis can lead to treatment failure. A thorough medical history and physical examination, along with laboratory tests and radiologic evaluation, are important components of the diagnostic process. However, a definitive diagnosis usually requires an adequate biopsy specimen. Fine needle aspiration cytology (FNA) is performed to diagnose and evaluate cervical lymphadenopathy. Unfortunately, FNA diagnostic accuracy varies between several disease entities, including metastatic carcinoma, lymphoma, and tuberculosis [1–7]. Although FNA is non-invasive and is a useful test for cervical lymphadenopathy, its diagnostic abilities are limited [8]. In recent years, ultrasound-guided core needle gun biopsy (US-CNB) has become an important diagnostic tool, but, unlike diagnostic work-ups for breasts, kidneys, and livers, the use of this approach for cervical lymphadenitis has been limited [9–12]. The present study directly and retrospectively compares the diagnostic abilities of US-CNB and US-FNA.

2. Materials and methods

2.1. Subjects

We conducted a retrospective, observational study of patients referred to the Otorhinolaryngology-Head and Neck Surgery

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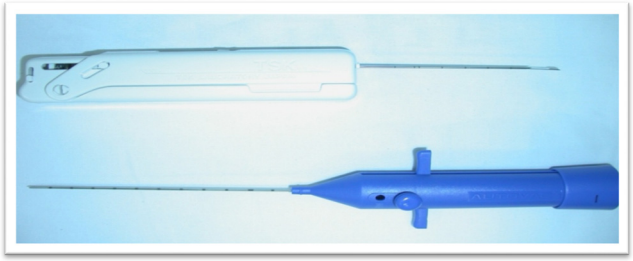

Fig. 1. Photograph of the ACECUT (TSK, Japan), an automated core needle biopsy system.

Department of Korea University's Ansan Hospital. To be included in the study, patients had to be lymphadenopathy suspects, have unresolved symptoms after two weeks of antibiotic therapy and four weeks of observation, and have a history of a recurrent lymphadenopathy mass more than 1 cm in diameter (measured with a sonographic study). Patients suspected to have metastatic malignant lymph nodes were excluded. Ultimately, 79 patients (33 male, 46 female) were included and retrospectively studied between January 2007 and July 2009. A US-CNB was performed in all subjects and US-FNA was performed in 62 subjects. Mean subject age was 25.3 ± 12.2 years (range: 7–72 years). Lesion size ranged between 1.0 and 3.5 cm. The advantages and disadvantages of FNA and core needle biopsies, including potential complications, were fully explained and all subjects provided written informed consent. This study was approved the Institutional Review Board of Ansan Hospital, a Korea University College of Medicine hospital.

2.2. Methods

Before US-FNA and US-CNB were performed, each subject underwent a careful physical and sonographic examination of the head and neck to record the number and distribution of enlarged lymph nodes and to evaluate biopsy target sonographic features. Color-coded duplex sonography was used to ensure that the mass was not a highly vascularized tumor and to determine the safest pathway to the region of interest. Fine needle aspiration was performed with the usual method and the sample slide smear was examined by a cytologist. The ACECUT equipped with an 18-, 20-gauge cutting needle (TSK Laboratory, Tochigi, Japan) was used to perform an automated core needle gun biopsy (Fig. 1). This biopsy system uses an automatic spring-loaded needle equipped with a retractable outer cannula and inner stylet. The handpiece has a safety switch, trigger, and thumb tabs to retract the cannula and stylet. After being positioned against the mass, firing the biopsy gun rapidly advances the needle forward 2 cm, cutting a 17 mm long core of tissue. The needle system may be fired multiple times, but is intended for use in only one patient. In patients with multiple enlarged lymph nodes, we chose to biopsy the dominant or most abnormal lymph node, determined by lesion size and sonographic appearance. Core needle gun biopsy was performed after injection of a local anesthetic agent into the area surrounding the mass. A stab incision over the mass was then made using a scalpel with a No. 11 blade, which allowed easy insertion of the long needle tip. To avoid contact with vascular structures, the needle was positioned at an angle (away from the carotid sheath for neck lesions), while the tip was positioned against the superficial surface of the mass. This system should not be used for lesions that are smaller than 1 cm and that abut the carotid sheath. The trigger was then pulled, which automatically advanced the needle into the mass. When the needle was removed, the biopsy specimen was retrieved by retracting only the outer cannula. The biopsy procedure was repeated a total of 2 or 3 times. Subjects were monitored in the radiology department for at least 30 minutes before being released to go home. Biopsy specimens were embedded in paraffin and, if needed, histologically examined with immunohistochemistry. Additional testing, including open biopsy, was performed if needed for diagnosis. Samples obtained with US-FNA and US-CNB were evaluated separately. Sensitivity, specificity, and accuracy were calculated for each method.

2.3. Statistical analyses

All data analyses were performed using SPSS statistical software (version 12.0, SPSS, Inc., Chicago, IL).

3. Results

None of the 79 patients undergoing US-CNB had neurologic or vascular injury during the procedure. No evidence of tumor "seeding" was observed in any subject.

3.1. Ultrasound-guided fine needle aspiration cytology

The US-FNA procedure was initially performed in 62 of 79 subjects (78.5%). The US-FNA cytology (US-FNAC) results were insufficient, or "nondiagnostic" in 23 of 62 subjects (37.0%). The diagnoses made with US-FNA included "negative for malignancy" in 15 subjects, "suspicious for malignancy" in 1 subject, "reactive hyperplasia" in 11 subjects, "suggested Kikuchi's lymphadenitis" in 5 subjects, "atypical cells present" in 5 patients, and "malignant cells present" in 2 patients (Table 1).

3.2. Ultrasound-guided core needle gun biopsy

In 73 of 79 subjects (91.3%), US-CNB biopsy specimens were sufficient to obtain a diagnosis. Excisional biopsy was performed on 4 of 6 (66.7%) subjects who were not diagnosed using US-CNB samples. These patients were diagnosed as reactive hyperplasia by excisional biopsy. Two of 6 subjects had symptom resolution during follow-up and were diagnosed with reactive hyperplasia. Excisional biopsy was not performed in these 2 subjects. Core needle biopsy results of the 73 subjects diagnosed using US-CNB

Table 1
Results of US-FNA and US-CNB.

US-FNA		
Results	Numbers	Proportion (%)
Insufficient	23	37.0
Negative for malignancy	15	24.1
Reactive hyperplasia	11	17.7
Suggestive of Kikuchi's disease	5	8.0
Atypical cell present	4	6.5
Malignant cell present	3	4.8
Suspicious for malignancy	1	1.6
Total	62	100

US-CNB		
Diagnosis	Numbers	Proportion (%)
Reactive hyperplasia	26	32.9
Kikuchi's disease	17	21.5
Cervical tuberculosis lymphadenopathy	15	18.9
Lymphoma	8	10.1
Not diagnostic	6	7.5
Metastatic lymph node	3	3.7
Infectious mononucleosis	2	2.5
Kimura's disease	1	1.2
Langerhan's cell histiocytosis	1	1.2
Total	79	100

US-CNB: ultrasound-guided core needle gun biopsy; US-FNA: ultrasound-guided fine needle aspiration.