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# Analysis of efficacy and safety of core-needle biopsy versus fine-needle aspiration cytology in patients with cervical lymphadenopathy and salivary gland tumour

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*Abstract.* In this study, we compared the diagnostic accuracy and safety of fine-needle aspiration cytology and core-needle biopsy in patients with cervical lymphadenopathy or salivary gland tumour, and provided a basis for selecting the appropriate diagnostic method in clinical situations. A total of 278 patients were included in this study. The sensitivities of fine-needle aspiration cytology and core-needle biopsy were 66.7% and 100%, respectively, and negative predictive values were 92.6% and 100%, respectively, for diagnosing malignancy. In diagnosing lymphoma, fine-needle aspiration cytology gave false-negative results in all patients. In diagnosing tuberculous lymphadenopathy, the sensitivities of fine-needle aspiration cytology and core-needle biopsy were 33.3% and 91.15%, respectively, and the negative predictive values were 90.0% and 95.1%, respectively. The sensitivities of fine-needle aspiration cytology and core-needle biopsy were 42.9% and 100% in diagnosing malignant salivary gland tumours, and the negative predictive values were 91% and 100%, respectively. The results of this study showed that core-needle biopsy was superior in diagnosing and distinguishing critical diseases such as malignant lymphadenopathy and tuberculosis in patients with cervical lymphadenopathy and salivary gland tumour.

Key words: core-needle biopsy; cervical lymphadenopathy; salivary gland tumour.

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Patients with cervical lymphadenopathy or salivary gland tumour frequently visit head and neck surgeons with complaints of neck masses. Cervical lymphadenopathy can occur in a variety of diseases including malignant tumour, tuberculosis and self-limiting inflammatory disease. In malignant tumour and tuberculosis, a rapid differential diagnosis is an absolute prerequisite to proceed to proper treatment. Delays in diagnosing these diseases can pose significant risks to patients. Although few salivary gland tumours are malignant, they account for 5% of all head and neck cancers and include various histologic subtypes[1]. Some histologic subtypes of malignant salivary gland tumours have very aggressive features and a poor prognosis. Therefore, accurate and rapid differential diagnosis is essential for patients with salivary gland tumours. Fine-needle aspiration cytology (FNAC) is often used for differential diagnosis of cervical lymphadenopathy and salivary gland tumour, but the diagnostic accuracy varies greatly depending on the disease entity[2–4]. Non-diagnostic or unsatisfactory sampling rates are relatively high in patients who received FNAC as an initial diagnostic tool. If lymphoma is suspected, additional surgical excision is often required due to false-negative results or incomplete classification after FNAC[5,6]. In contrast, core-needle biopsy (CNB) can provide better histologic examination because it can obtain a sufficient amount of tissue[7,8]. However, haemorrhage and procedure-related pain are more common with CNB than with FNAC. The risk of tumour cell seeding is also higher in patients who undergo CNB. Physicians have a responsibility to select and prescribe an appropriate diagnostic method for patients with cervical lymphadenopathy or salivary gland tumour and should be knowledgeable about the diagnostic accuracy and safety of these two procedures. In this study, we compared the diagnostic accuracy and safety of FNAC and CNB in patients with cervical lymphadenopathy or salivary gland tumour and provided a basis for selecting the appropriate diagnostic method in clinical situations.

## Materials and methods

This retrospective study was conducted at a tertiary medical institution and was approved by the Institutional Review Board of Korea University. The medical records of patients with cervical lymphadenopathy or salivary gland tumour who visited Korea University Guro Hospital from January 2005 to December 2015 were reviewed. As CNB presents technical difficulties in paediatric patients, only patients aged 15 years or older were enrolled in the study. Only patients with at least 2 years of follow-up after initial diagnosis were included to confirm the final clinical course of the disease. Only patients in which cervical lymph nodes were palpable for more than 1 month were included. According to the 2001 report of the American Head and Neck Society (AHNS), the lesions of cervical lymph nodes in level I–VI were included in this study. The following patients were excluded from the study: (1) a cervical lymphadenopathy associated with acute febrile disease less than 1 month; (2) an obvious benign mass, such as a branchial cleft cyst or a thyroglossal duct cyst; (3) definite presence of a primary malignant tumour in the head and neck region; (4) a previous history of other malignancies.

The medical history of each patient was thoroughly examined when they first visited the outpatient clinic, and a complete physical examination of the head and neck area was performed. FNAC or CNB was selectively used to obtain a specimen based on the head and neck surgeon's preference and clinical situation. When choosing the method to obtain tissues of the lesions, we preferred FNAB to CNB in the initial period of the study. However, with more experience of CNB, our policy changed in favor of CNB as an initial diagnostic method, especially in patients with huge mass, suspected malignancy, and suspected tuberculosis infection. Also, CNB was recommended in highly cooperative patients who have no fear of needles. When tuberculosis was suspected, a tuberculosis polymerase chain reaction (PCR) test was carried out simultaneously with histologic examination. The diagnostic flow of patients who received FNAC and CNB was analysed (Figs 1, 2). Sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) were analysed to evaluate the accuracy of each diagnostic method. When the initial FNAC or CNB results were inconsistent with the clinical course of the disease, a second biopsy was performed. The rate of second biopsy in the FNAC and CNB groups was analysed. The proportion of inadequate specimens after each test was analysed.

In all cases, FNAC and CNB were performed with ultrasonography guidance. All procedures were performed by two experienced radiologists. All patients were informed of the risk of complications related to the procedure, and the procedure was performed after obtaining consent.

Chi-squared or Fisher's exact test was used to evaluate differences in categorical variables between groups. An independent, two-sample *t*-test was used to assess differences in continuous variables between groups. A $P$-value $<0.05$ was considered statistically significant. Statistical analyses were performed with IBM SPSS Statistics for Windows, version 20 (IBM Corp., Armonk, NY, USA).

## Results

A total of 278 patients were included in this study. To confirm the disease, 112 patients underwent FNAB as an initial diagnostic method, and 166 underwent CNB. Gender and age did not differ significantly between the FNAC and CNB groups. Lesion location and final diagnosis differed significantly. Table 1 summarizes other clinical information.

During the study period, 184 patients presented with cervical lymphadenopathy. Of these, 62 patients underwent FNAC as an initial diagnostic method (Fig. 1A). Of these patients, eight had carcinoma, two had tuberculosis, and 38 had benign disease. Eleven patients had indeterminate results, and six of them had additional CNB. Of these, one patient had lymphoma, one had carcinoma, and four had tuberculosis. Five of the 11 patients with indeterminate results underwent surgical excision without CNB procedure because their lesions had significant amounts of necrotic components. Of these, one patient had lymphoma, one had carcinoma, one had tuberculosis, and two had Kimura disease. Three patients in the FNAC group had an insufficient specimen and were closely followed-up without further diagnosis or treatment, and their symptoms improved.

Of the 184 patients with cervical lymphadenopathy, 122 had CNB (Fig. 1B). Nineteen of these had carcinoma, 26 had lymphoma, 41 had tuberculosis, and 29 had benign disease. Seven patients had indeterminate results, and three of them underwent surgical excision. Of these, one had benign disease, and two had tuberculosis. The remaining two patients were closely followed-up and another two received empirical tuberculosis treatment on the basis of their clinical situation. Their symptoms resolved with medication.

During the study period, 94 patients presented with salivary gland tumours. Of these, 50 underwent FNAC as an initial diagnostic method (Fig. 2A). Three patients were positive for malignancy, 42 were negative, and one was indeterminate. Four patients had an inadequate

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