

## VALIDITY OF CORE NEEDLE BIOPSY IN THE HISTOPATHOLOGICAL VERIFICATION OF PAROTID GLAND LESIONS

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**Abstract: Background and purpose:** An adequate diagnosis of a parotid gland enlargement is crucial for an appropriate treatment. The aim of the study was to evaluate effectiveness and minimal invasiveness of diagnostic procedures of core-needle biopsy.

**Materials and Methods:** This study involved 67 patients, aged 40 to 90 years, with a tumor mass in the submandibular and parotid region. Method used for taking samples of pathological masses was BD Disposable guillotine spring-loaded needle for biopsies on soft tissues. Final diagnoses were established on the basis of surgical-pathological results in 67 cases, and on the basis of histopathological analysis of core-biopsy samples.

**Results:** Compared with results of surgical biopsy, core-needle biopsy had sensitivity of 100% in differentiating benign from malignant lesions and in setting up an adequate diagnosis. Its positive predictive values were 100% in diagnosing malignancy. There were found 28 non-malignant and 39 malignant lesions with fewer disadvantages for patients.

**Keywords:** Core-needle biopsy, surgical biopsy, parotid gland masses, validity.

### INTRODUCTION

Considering localization and anatomy of parotid gland, lesions can remain indolent, as well as undiagnosed, that often happens with lesions in parapharyngeal region and deep parotid region. As a result, many parotid gland lesions have been found accidentally, on the X-ray made for other indications, such as headaches or trauma (1). Enlargements of the biggest salivary gland and associated lymph nodes represent a wide spectrum of pathological processes that are ran-

ked from inflammation and reactive hyperplasia to benign and malignant neoplasms (2).

Many pathological processes manifest with swelling of parotid region, so it is often hard to determine the type of pathological mass only on the basis of clinical examination. Adequate diagnose is necessary, especially when surgical removal of the mass is considered, because many of the non-tumor as well as some tumor masses do not require surgery, what is specifically important when it comes to patients of risk for introduction into general anesthesia (3).

Tumors of parotid gland are present in 2-4% cases of neoplasm of maxillofacial region. They are classified in benign neoplasm, neoplasm-like masses and malignant neoplasm. 70% of salivary tumors have origin from parotid gland (4).

For adequate diagnosis of parotid gland disease, clinical examination is insufficient method, considering the fact that treatment modalities differ significantly depending on the diagnosis (2).

The least invasive method to obtain biopsy material is fine-needle aspiration (FNA), but because of significant number of samples inadequate for histopathological (HP) analysis it is considered as imprecise, and often requires additional diagnostic tests (5).

Core-needle biopsy represents a method of choice which is less invasive compared to surgical, 'opened' biopsy, and obtained material is more adequate for HP analysis than material obtained by FNA (6).

Although open-biopsy is considered gold standard, advantage of core-biopsy is avoiding general anesthesia and effectiveness of the procedure (7, 8, 9). In every day surgical praxis, because of the priority of emergencies, surgical biopsy is often delayed, so in

these cases, core-biopsy is indicated in order to diagnose disease on time (10).

Core-biopsy is described as a method for extirpation of large tissue samples from parotid gland lesions, but it has risks and limits, because it is more invasive procedure than FNA (2).

The main problem when talking of core-biopsy of parotid gland is risk of injury of facial nerve, with consequential paralysis and facial deformities, injury of vascular elements and hematoma formation, as well as seeding the tumor cells. To prevent these complications, the needle tip has to be limited to the mass before and after cutting, avoiding penetration deep into the glandular tissue (11, 12).

**The aim of the study** was to investigate validity of core-needle biopsy for diagnosing parotid gland lesions, comparing patho-histological results obtained by this method with patho-histological results obtained by analysis of samples after surgical removal of the mass.

## MATERIALS AND METHODS

The study was conducted from January 2008 to December 2015 at the Department of Otorhinolaryngology and Maxillofacial Surgery, University Hospital Center "Zemun". The study comprised of 67 patients, aged from 40 to 90 years, with clinically and radiographically verified tumor mass in parotid and submandibular region larger than 2 cm in diameter before hospitalization.

Data were collected during hospitalization and three months after surgery. Criteria for exclusion from the study were patients whose tumor mass was not HP verified after surgical removal. All patients gave written consent to participate in the study, and used method was core biopsy, which was performed by a trained surgeon. For the implementation of the method BD Disposable guillotine spring-loaded needle for biopsies on soft tissues was used.

Core-biopsy was performed after application of a local anesthetic of 1% lidocaine with epinephrine 1:100 000 (Xylocaine TM - Astra Pharmaceutical Products Inc., Westboro, MA), subcutaneously, with insulin needle and minimal tissue trauma. The process was repeated twice, and the resulting samples were stored in formaldehyde solution (Figure 1).

HP analysis were conducted in laboratory of University Hospital Center "Zemun". Depending on the HP findings obtained by the described method, therapeutic modalities have been as follows: resection and extirpation of the complete mass (carcinomas, adenomas and cysts), conservative treatment (toxoplasmosis, sarcoidosis, tuberculosis), representation to the Oncology board (metastatic cancer). Tumor-like lesions (sialoadenosis and lymph-epithelial lesions) were



**Figure 1.** A method of performing a core-biopsy

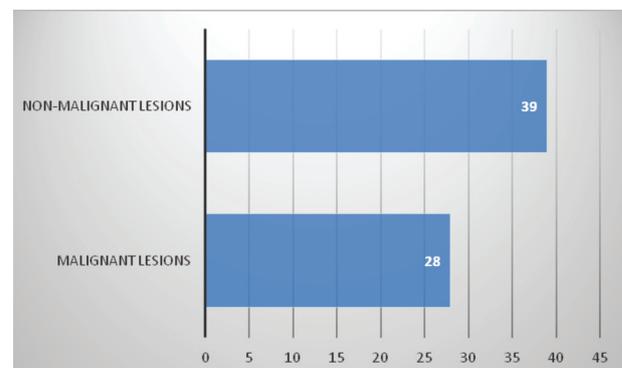
clinically and ultrasonically controlled. Patients with verified lymphomas were treated by a hematologist at appropriate protocol and controlled by the competent doctor. After receiving HP results, the analysis included only patients who had the lesions fully surgically removed, so it would be impossible to adequately compare the findings obtained by core biopsy.

## RESULTS

The study comprised of 67 patients, 41 were males and 26 were females. No patient had intraoperative and postoperative complications (injury of facial nerve with consequential paralysis and facial deformities, injury of vascular elements and hematoma formation, seeding the tumor cells, allergy to anesthetic, expressed bleeding, wound infection, intraoperative cardiac complications).

It was registered 28 malignant lesions (42.79%), 26 benign tumors (38.8%) and 13 (19.4%) non-tumor lesions (Figure 2). 16 malignant lesions were verified in male patients and 12 in female patients, while in non-malignant lesions that relation was 25 to 14.

For all lesions, HP findings obtained by core-biopsy were the same as results obtained by surgical bi-



**Figure 2.** The incidence of malignant and benign lesions

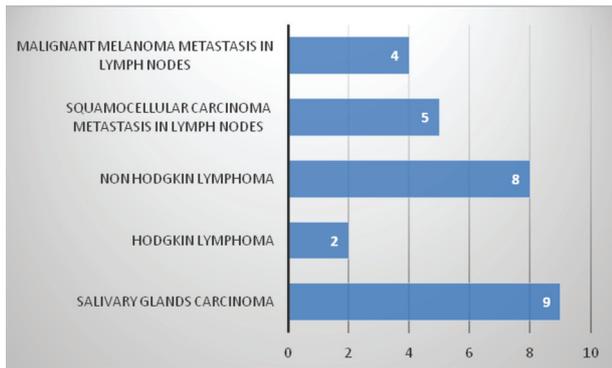


Figure 3. Distribution of malignant lesions

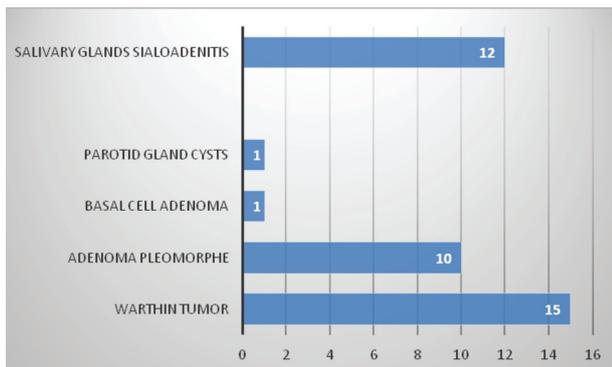


Figure 4. Distribution of non-malignant lesions

opsy. Based on the surgical and pathologic results of all 67 cases, core-biopsy showed sensitivity of 100% and a positive predictive value of 100% in setting up adequate diagnosis and differentiation of benign from malignant lesions.

Malignancies have had the following distribution: It was registered 9 salivary gland carcinoma, 2 Hodgkin lymphoma, 8 Non-Hodgkin lymphoma, 5 squamous cell carcinoma metastasis in the lymph nodes, and 4 malignant melanoma metastases in the lymph nodes (Figure 3).

Non-malignant lesions consisted of 15 Warthin tumors, 10 pleomorphic adenomas, 1 basal-cell adenoma, 1 cyst of the parotid salivary gland, and 12 chronic sialoadenitis of salivary glands (Figure 4).

## DISCUSSION

As a result of many studies (13, 5, 14), fine-needle biopsy is not precise enough in differentiating malignancy, so that core-biopsy is proposed as a method of choice for diagnosing large masses of maxillo-facial region.

In patients who were previously exposed to the X-ray therapy, extirpation of suspected metastasis is difficult because of the scar tissue, and in these cases, core-needle biopsy is especially recommended (15, 16, 17, 18). The authors showed that the evaluation of new methods such as core-needle biopsy should be based

on a comparison of HP findings obtained with the new method with PH findings obtained after surgical extirpation of the masses.

Core-needle biopsies compared to the fine-needle biopsy provide better differentiation of lymphoid hyperplasia from lymphoma, as well as better determination of subtypes and cancer grading (19). On the other hand, complications of core-needle biopsy (bleeding, infection, nerve injury) are no greater nor more frequent in relation to the complications of fine-needle biopsies (19). Regarding that for some neoplastic and non-neoplastic masses surgery extirpation is not indicated, accurate diagnosis is crucial for the adequate treatment of the patient (7). In the opinion of some authors, core-needle biopsy can lead to the spread of cancer cells into the surrounding structures (needle-track seeding), but many studies have confirmed that the spread of cancer cells rarely happens, and does not increase with the increase of the needle diameter for core-needle biopsy (3, 8, 9, 20).

In a study by Grundman et al (21), tips of needles for core-biopsy were evaluated by electron microscopy and tissue was not found on any tip, so that authors concluded that there is no seeding of cancer cells this way.

In the study where diagnostic value of core-needle biopsy and fine-needle aspiration in salivary gland lesions was compared, Novoa et al did not find any displaced tumor cells as a complication of core-needle biopsy (22). Diaz et al (23) performed excision of the region through which the needle was placed after the core-needle biopsies of breast cancer patients and showed no malignant cells in the examined region.

In the study by Kraft et al (24), needle-track seeding was found in only one sample of 75 patients. In the mentioned study, core-needle biopsy was performed with 20 gauge-sized needle, and neck dissection was performed on the same day, so it cannot be said with certainty that the cells would survive longer in the tissue after seeding. In the same study, the authors described that in masses smaller than 1 cm in diameter was hard to do a biopsy at the first time, and that it was difficult to aspirate the contents of cystic masses by core-biopsy.

Howlett et al showed the specificity, sensitivity and fluency of 100% in HP verification and detection of malignant neoplasms in the study with 135 patients in whom core-biopsy of parotid region was performed (3).

In a similar study, Sreaton (7) described a sensitivity of 98%, specificity of 100% and accuracy of 99% in differentiating benign from malignant lymphadenopathies, but only 23% of 260 patients underwent open-extirpation of lymph nodes and neck dissection, while in other cases, definitive diagnosis was confirmed by clinical and laboratory findings (8).

## CONCLUSION

Based on obtained results, it can be concluded that the core-biopsy is highly specific and highly sensitive method, which is a safe alternative to open surgical extirpation of the masses of the neck. The described method is useful in all patients, due to the shorter duration of the procedure and a significantly smaller number of complications of intervention in relation to extirpation biopsy. The absence of the introduction into general anesthesia, shorter periods of hospitalization and return to normal activities, present a significant financial benefits of the core-biopsy. Based on the results of this

study, we recommend core biopsy as a good and reliable diagnostic method for determining the type of parotid region lesions.

## Conflicts of interest

The authors declare that there are no conflicts of interest.

## Abbreviations

**FNA** — fine-needle aspiration

**HP** — histopathological

## Sažetak

# VALIDNOST CORE-BIOPSIJE U HISTOPATOLOŠKOJ VERIFIKACIJI LEZIJA PAROTIDNE ŽLEZDE

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**Uvod:** Pravilno uspostavljena dijagnoza uvećanja parotidne žlezde je osnova za adekvatno lečenje pacijenta. Cilj ove studije bio je evaluacija efikasnosti i minimalne invazivnosti core biopsije.

**Materijal i metod:** U studiji je učestvovalo 67 pacijenata, od 40 do 90 godina, sa prisutnom tumorskom masom u submandibularnom ili parotidnom regionu. Korišćen metod za uzimanje uzoraka patoloških promena bio je BD Disposable guillotine spring-loaded needle for biopsies on soft tissues. Definitivna dijagnoza bila je uspostavljena na osnovu hirurško-pato-

loških rezultata u 67 slučajeva, i na osnovu histopatološke analize uzoraka dobijenih core-biopsijom.

**Rezultati:** U poređenju sa rezultatima hirurške biopsije, core-biopsija imala je senzitivnost od 100% u diferencijaciji benignih od malignih lezija i u uspostavljanju adekvatne dijagnoze. Pozitivna prediktivna vrednost u dijagnostikovanju maligniteta bila je 100%. Ovom metodom, dijagnostikovano je 28 ne-malignih i 39 malignih lezija, sa manje nelagodnosti za pacijente.

**Ključne reči:** Core-biopsija, hirurška biopsija, uvećanja parotidne žlezde, validnost.

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