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Oral core-needle biopsy in the diagnosis of malignant parapharyngeal space tumors

Renhui Chen, Qian Cai*, Faya Liang, Peiliang Lin, Ling Chen

Department of Otolaryngology-Head and Neck, Sun Yat-sen Memorial Hospital, Sun Yat-sen University, Guangzhou, China

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ABSTRACT

Objective: To confirm the pre-treatment diagnosis of parapharyngeal space malignancy could aid the treatment plan.

Methods: For patients with suspected malignant parapharyngeal space tumors following preoperative imaging, oral biopsy was conducted for pathological diagnosis with the use of 22-G biopsy needles.

Results: A total of 11 patients were enrolled. There were three previously diagnosed cases of head and neck malignancy, and eight cases were newly diagnosed. The tumor diameters were in the range of 3 to 5.5 cm. Ten cases (90.9%) achieved positive results, of which eight cases (72.7%) obtained positive results with one puncture and two cases obtained positive pathological results with two punctures. One case did not obtain positive results with two punctures; open surgical resection was performed for this patient. There were no complications such as needle track implantation, heavy bleeding or neurological damage symptoms during the puncture process.

Conclusions: Oral biopsy is a minimally invasive, safe and effective technique for the diagnosis of parapharyngeal space tumors. It is easy to operate and could facilitate a comprehensive treatment plan for parapharyngeal space malignancies.

1. Introduction

Parapharyngeal space tumors (PPST) account for 0.5% of all head and neck masses. The anatomical relationships and histological diversity of PPST present difficult diagnostic and management challenges [1]. The parapharyngeal space is a complex potential space in the suprahyoid neck, classically described as an inverted pyramid with the base formed by the skull base and the apex pointing to the greater cornu of the hyoid bone. The parapharyngeal space is divided into anterior and posterior space, and the proportion of tumors in the anterior space is high. There are many types of pharyngeal space tumors, including benign tumors such as pleomorphic adenoma and schwannoma. There are also malignant tumors, including primary and metastatic tumors such as nasopharyngeal carcinoma parapharyngeal lymph node metastasis, thyroid carcinoma parapharyngeal lymph node metastasis [2], and oropharyngeal carcinoma parapharyngeal lymph node metastasis. Different tumors indicate different treatment regimens. Pharyngeal space tumor diagnosis before treatment depends on computed tomography (CT), magnetic resonance imaging (MRI), and other imaging examinations. Due to the specificity of the location of the parapharyngeal space tumors, it is difficult to perform operations to obtain the pathology results.

In cases with parapharyngeal space tumor as initial symptom, primary malignant tumors as well as occult pharyngeal space metastasized malignant tumors with indefinite primary lesions might be present. Confirmation of the preoperative diagnosis would guide the development of the treatment program. Patients often do not obtain a pathological diagnosis before surgery; a large traumatic open surgery is often performed to remove tissue samples for a clear diagnosis. This treatment does not present a problem for benign tumors but may have a detrimental effect on the prognosis of metastatic tumors. If a simple method can be used to confirm the nature of the tumor before surgery in these patients, the use of open surgery for the treatment of metastatic lesions can be avoided. To confirm tumor diagnosis before a comprehensive treatment plan is greatly helpful to the prognosis. For occult primary lesions nasopharyngeal carcinoma patients initialized with parapharyngeal space lymph node metastasis, the surgical treatment can even be avoided.

To this end, we performed preoperative biopsy using core-needle biopsy (CNB) in patients with suspected malignant parapharyngeal space tumor; using this approach, many of the patients were properly diagnosed before surgery.

* Corresponding author at: Department of Otolaryngology-Head and Neck, Sun Yat-sen Memorial Hospital, Sun Yat-sen University, 107, Yan Jiang West Road, Guangzhou 510120, China.

E-mail address: caiqian2@mail.sysu.edu.cn (Q. Cai).

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2. Materials and methods

The cases included 11 patients diagnosed with parapharyngeal space tumors from November 2009 to June 2017 in the Department of Otolaryngology, Sun Yat-sen Memorial Hospital of Sun Yat-sen University, China. There were seven males and four females, aged 31 to 75 years, with an average of 51 years. All patients underwent CT or MRI. The study was approved by the Hospital Ethics Committee.

Inclusion criteria:

1. The patients had one of the following circumstances: a history of head and neck cancer, rapid increase in the tumor in a short time period, cranial nerve compression symptoms, or suspected malignant tumor by CT or MRI examination.

2. Generally had a solid tumor with a greater than 3 cm diameter in the anterior pharyngeal space, with the carotid sheath located behind the tumor. The imaging features of the tumor included having an unclear boundary, adhesion to the surrounding tissue, strengthened border, necrotic foci in the center, and other characteristics.

3. Primary tumors in the head and neck were not found by routine physical examination, fiber nasopharyngeal laryngoscopy, imaging, and other tests. There was obvious palatine arch uplift during oropharyngeal examination.

No biopsy was performed on the blood vessel lesions or cystic lesions. CNB was avoided for patients who were uncooperative or sensitive or those who had too many concerns.

Operation method: 22-G biopsy needles were used. Oral approach: Topical local anesthesia was performed by spraying 1–2 ml of tetracaine (1%) onto the pharynx. After conventional disinfection, the needle was usually inserted from the obvious palatine arch uplift in front of the tonsil with the needle tip facing outward, with a 30–45 degree angle between the needle and sagittal, and attention was paid to avoid the tonsils. After the needle penetrated the mucosa into the submucosal tissue, the depth of the tumor from the pharyngeal mucosa was determined by imaging. When the needle tip was near the edge of the lesion, the ejection device was activated, the needle was retracted, and the specimen was removed. The needle penetrated into the tissue from the same point, moving the needle tip to different parts of the tumor, and the process was repeated twice to take additional specimens. The specimens were sent to the pathology department for paraffin-embedding. The puncture point was pressed with a cotton ball for 5–10 min to stop the bleeding.

3. Results

There were three cases with a previous history of malignant head and neck tumor and eight newly diagnosed cases. The tumor diameter was between 3 and 5 cm.

Pathology results of the puncture: Ten cases (90.9%) achieved positive results. Eight cases (72.7%) obtained positive results with one puncture: one case of pleomorphic adenoma, five cases of metastatic squamous cell carcinoma, one case of papillary thyroid carcinoma, and one case of adenoid cystic carcinoma. One case of adenoid cystic carcinoma and one case of pleomorphic adenoma obtained positive pathology results with two punctures, with the first puncture yielding muscle fiber tissue. Considering that tumor tissue may not be punctured if the needle pointed inward during the oral puncture, the second puncture was performed by adjusting the direction of the puncture and obtained positive results. One case did not obtain positive results with two punctures; open surgical resection was performed for this patient (the postoperative pathology result was pleomorphic adenoma).

There were no complications such as heavy bleeding or neurological damage symptoms during the puncture process and needle track implantation.

There were five cases of metastatic squamous cell carcinoma, of which three cases had a history of head and neck cancer recurrence, including nasopharyngeal carcinoma in two cases and one case of oropharyngeal carcinoma. There were two cases of metastatic squamous cell carcinoma, including one case of undifferentiated squamous cell carcinoma and one case of well-differentiated squamous cell carcinoma. The patient with undifferentiated squamous cell carcinoma was an indigenous resident in Guangdong Province, China; therefore, nasopharyngeal carcinoma was considered and was confirmed by ipsilateral nasopharyngeal biopsy. Positron emission tomographic (PET)–computed tomographic (CT) imaging suggested that the primary foci of the well-differentiated squamous cell carcinoma was located in the junction of the tongue root and tonsil, and the diagnosis was later confirmed by biopsy.

4. Discussion

In general, part of parapharyngeal space tumors are malignant tumors [3,4]. Among the malignant tumors, more prevalent are metastatic lymph nodes. As such, we should be cautious before developing treatment programs. For suspected malignant tumors, application of fine-needle pathological biopsy diagnosis before the treatment will provide important reference information to clinicians to avoid nonstandard treatments. Diagnosis could also be provided for patients with benign tumors before the treatment. Primary foci should be found for metastatic cancer patients whose first symptom is parapharyngeal space tumor. The ability to develop treatment programs that treat the primary tumor and metastases as a whole will enable better prognoses. In this study, biopsy-confirmed thyroid papillary carcinoma patients experienced thyroid resection, parapharyngeal lymph node dissection, cervical lymph node dissection, and postoperative I^{131} treatment. Newly diagnosed and relapsed nasopharyngeal carcinoma cases were given radiotherapy. Oropharyngeal cancer patients were given surgery combined with postoperative radiotherapy. These cases all benefitted from the preoperative biopsy.

As the position of the parapharyngeal space is relatively subtle, the tumor is not easy to detect at an early stage. Patients generally seek treatment at a late stage, as symptoms appear when the tumor has grown larger. Early-stage patients are generally clinically asymptomatic. With an increasing tumor volume, the patient could have one-sided pharyngeal discomfort or pharynx foreign body sensation; swallowing and vocal changes may occur later. Symptoms including dysphagia, hoarseness, and tongue paralysis may appear at a later stage due to tumor compression or violation of the nerve. Invasion of the nasopharyngeal space can also lead to tinnitus, hearing loss, and other symptoms, and a low incidence of pharynx obstructions can cause breathing difficulties and lead to nasal congestion. Generally, the tumor size, location, and adjacent relation with surrounding tissues can be determined by imaging examination (MRI is better than CT), and the difficulty of the biopsy attempt can therefore be understood.

The parapharyngeal space is adjacent to the oropharyngeal space, and the oral route is a very good channel for biopsy. Anatomically, the anterior parapharyngeal space is located at the lateral tonsil; between the tissue and the space is the pharyngeal constrictor muscle. The tumor undergoes expanding growth, with its boundaries generally close to the pharyngeal constrictor muscle. Thus, the puncture needle can reach the location of the parapharyngeal space tumor after penetrating through the pharyngeal constrictor muscle. The needle can penetrate from the location of the pharyngeal wall and tonsil, where they were significantly pushed to the medial position by the tumor. CT-guided fine needle aspiration biopsy (FNAB) has been used by some scholars [5] in cytological diagnosis. The results showed that an accurate cytopathologic diagnosis was rendered in 48% of patients. The positive predictive value for CT-guided FNAB to identify benign tumors is 90%, but the ability to identify malignant PPS tumors is 75%. Because of the need for CT guidance, a clinical operation is not convenient. Through the preoperative assessment, we selected parapharyngeal anterior gap tumors with a diameter of more than 3 cm and having the characteristics of a pharyngeal wall moving inward, which did not need CT guidance and

was safe and effective under direct vision. Arnason et al. [5] performed fine needle aspiration (FNA) under direct vision and found that FNA under direct vision is safe and accurate for the diagnosis of malignancy. However, nondiagnostic FNAs are common. Notably, core-needle biopsies can obtain more tissue volume than fine needle aspiration biopsies. The specimens could be used for pathological diagnosis and even immunohistochemical examination, which provides more diagnostic data. Core-needle biopsy achieved a lower number of nondiagnostic and inconclusive results [6].

Many parapharyngeal space tumors already have diameters above 2.5–3 cm when discovered [7,8]. Oropharyngeal mass features account for 51% [9], so this biopsy method is applicable in many parapharyngeal space cancer patients. Selection of a tumor diameter of 2.5–3 cm or more is conducive to positioning and operation and can also prevent the puncture needle piercing the tumor mass or damaging large blood vessels. For some smaller tumors, a B-ultrasound or CT-guided puncture will help locate the tumor so a higher positive rate can be achieved and the risk of vascular injury is reduced.

5. Conclusion

Oral biopsy is a minimally invasive, safe, effective pharyngeal space tumor diagnosis technique that is easy to perform and contributes to the development of a comprehensive treatment scheme for parapharyngeal space malignancies.

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Conflict of interest

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Author contributions

Qian Cai, study design, patients' treatment, patients' follow-up, article revising;

Renhui Chen, patients' follow-up, data gathering, analysis, manuscript preparation;

Faya Liang, data gathering, analysis, manuscript preparation;

Peiliang Lin, patients' follow-up, manuscript preparation;

Ling Chen, data gathering, analysis, manuscript preparation.

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References

[1] Riffat F, Dwivedi RC, Palme C, et al. A systematic review of 1143 parapharyngeal space tumors reported over 20 years. Oral Oncol 2014;50:421–30.
[2] Thomas G, Pandey M, Jayasree K, et al. Parapharyngeal metastasis from papillary microcarcinoma of thyroid: report of a case diagnosed by peroral fine needle aspiration. Br J Oral Maxillofac Surg 2002;40:229–31.
[3] Abemayor E, Lufkin R. Enhancing access to the parapharyngeal space. Laryngoscope 2002;112:757–9.
[4] Ducic Y, Oxford L, Pontius AT. Transoral approach to the superome-dial parapharyngeal space. Otolaryngol Head Neck Surg 2006;134:466–70.
[5] Arnason T, Hart RD, Taylor SM, et al. Diagnostic accuracy and safety of fine-needle aspiration biopsy of the parapharyngeal space. Diagn Cytopathol 2012;40:118–23.
[6] Choi SH, Baek JH, Lee JH, et al. Thyroid nodules with initially non-diagnostic, fine-needle aspiration results: comparison of core-needle biopsy and repeated fine-needle aspiration. Eur Radiol 2014;24:2819–26.
[7] Khafif A, Segev Y, Kaplan DM, et al. Surgical management of parapharyngeal space tumors-a 10 year review. Otolaryngol Head Neck Surg 2005;132:401–6.
[8] Myers EN, Johnson JT, Curtin HG. Tumors of parapharyngeal space. In: Myers EN, Suen JY, Myers JN, Hanna EY, editors. Cancer of the head and neck. 4th ed.vol. 22. Philadelphia: WB Saunders; 2003. p. 511–3.
[9] Dimitrijevic MV, Jesic SD, Mikic AA, et al. Parapharyngeal space tumors: 61 case reviews. Int J Oral Maxillofac Surg 2010;39:983–9.