Is fine-needle aspiration a reliable tool in the diagnosis of malignant salivary gland tumors?

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ABSTRACT

Purpose: The purpose of the present study was to establish the reliability of fine needle aspiration (FNA) in the diagnosis of malignant salivary gland tumors in our population and to compare our results with those of other authors.

Material and methods: This was a retrospective study of clinical data from 172 patients, 153 parotid tumors and 19 submandibular tumors who underwent preoperative FNA between January 2004 and December 2013. Sensitivity, specificity, positive and negative predictive values of FNA for the preoperative diagnosis of malignancy were analyzed.

Results: For the diagnosis of malignancy an S value of 60% was obtained, which means that 40% of malignant tumors were not diagnosed by FNA. Besides an E value of 97.5% was obtained, thus indicating that FNA was negative for malignancy in up to 97.5% of all benign neoplasms. According to predictive values, we observe that FNA hit in 83.3% cases given as malignant and in 92% of cases giving as benign (PPV = 83,3%; NPV = 92%).

Conclusion: With a scarce 60% sensitivity value in our series, fine needle aspiration has evident limitations for diagnosis of malignancy in major salivary gland neoplasms. Being highly conditioned by the staff and the conditions in which it is performed, FNA is a complementary test that helps the preoperative diagnosis of the major salivary glands with radiological tests, medical history and physical examination, but that alone it is not defining of malignancy.

1. Introduction

Salivary gland tumors occur very infrequently. In the Western world they have an annual incidence of 2.5–3 cases per 100,000 people (Speight and Barrett, 2002). They are divided into major gland (parotid, submandibular and sublingual) and minor gland neoplasms. Histologically, this is a heterogeneous group of tumors, with several different patterns that often overlap, making differentiation between benign and malignant nature difficult (Herrera Hernández et al., 2008; Alphs et al., 2006).

Major salivary gland neoplasms represent up to 3% of head and neck tumors (Ali et al., 2011).

Benign tumors are the most common — the most prevalent being pleomorphic adenomas followed by Warthin's tumors. Among the malignant types, the most common is the mucoepidermoid carcinoma, which accounts for about 10% of all salivary gland neoplasms, and approximately 35% of all malignancies (Speight and Barrett, 2002; Amedee and Dhurandhar, 2001).

Preoperative diagnosis of salivary gland tumors by fine-needle aspiration (FNA) is established as a diagnostic test for tumors of the salivary glands (Martin and Ellis, 1930; Schmidt et al., 2011). A correct preoperative diagnosis determines the therapeutic approach to adopt, including whether or not to sacrifice vital structures, such as the facial nerve. FNA is considered to have a high diagnosis accuracy for neoplasm of the salivary glands (Sergi et al., 2004), but it remains controversial when dealing with a suspicion of malignancy, due to its low sensitivity and high false negative rate (Zbären et al., 2001; Ashraf et al., 2010; Fundakowski et al., 2014). Some studies conclude that FNA alone cannot determine the course

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of surgical treatment of malignancies of the parotid glands (Balakrishnan et al., 2005). According to the published data, FNA sensitivity varies from 38% (Stow et al., 2004) to 97% (Al-Khafaji et al., 1998), but the technique shows greater specificity, with values ranging from 81% (Longuet et al., 2001) to 100% (Qizilbash et al., 1985). Despite this, it is still used because of its low cost (Sahai et al., 2002), safety, speed and low morbidity (Fakhry et al., 2014).

The purpose of this study was to establish the reliability of FNA in the diagnosis of malignant salivary gland tumors in our population.

2. Materials and methods

Between January 2004 and December 2013, 208 patients presenting tumors of the major salivary glands were operated on in our department. 170 tumors were located in the parotid gland, whereas 38 were located in the submandibular gland. 153 parotid tumors and 19 submandibular tumors underwent preoperative FNA. Evaluation of the surgical specimens was carried out by the same pathologist at our Institution.

Preoperative diagnosis referred by FNA was classified as benign or malignant. In some cases, the pathologist classified the tumor as indeterminate if he/she did not find clear histological evidence for classifying the tumor as benign or malignant. After surgery was completed, results from FNA were compared with the final diagnosis obtained from the analysis of the surgical specimens by conventional histology. Sensitivity, specificity, and positive and negative predictive values for FNA in the preoperative diagnosis of malignancy were analyzed.

To analyze these data statistically we needed a clear diagnosis of malignancy or benignity by the FNA. Indeterminate cases were considered invalid and excluded from the analysis, because when there were doubts about the tumor's malignant nature, FNA was not clinically considered and an intraoperative biopsy was initially performed. Whether or not surgery was radicalized by the resection of branches of the facial nerve depended on the result of the biopsy. Results from the present study were compared with the most relevant studies in the literature, selecting those with a sample size of over 40 patients, published from January 2000 to December 2015 in the English or Spanish literature, with all of them providing values for sensitivity (S), specificity (SP), positive predictive value (PPV) and negative predictive value (NPV) (Herrera Hernández et al., 2008; Sergi et al., 2004; Fundakowski et al., 2014; Zerpa et al., 2013; Muñoz Palza et al., 2010; Novoa et al., 2016; Zbären et al., 2001; Tryggvason et al., 2013; Layfield et al., 2006).

3. Results

Over the course of 10 years (from January 2004 to December 2013) 208 patients underwent excision of major salivary gland tumors in our department. Among these, 172 patients underwent a preoperative diagnostic FNA, involving 153 parotid and 19 submandibular glands. The female/male distribution was 52/48%, with a mean age of 51 years (from 12 to 94 years old).

The presence of a progressive tumor growth was the most frequent clinical presentation. Pleomorphic adenoma was the most common tumor (27.2%). Among the 172 FNAs performed, 126 (73.25%) were benign tumors, 18 (10.46%) were malignant tumors (Figs. 1–3) and 28 (16.28%) had a doubtful diagnosis for malignancy.

In relation to the analysis of these data, two options were available according to the published literature: 1) include doubtful cases within the malignant group, obtaining 126 (73.25%) benign and 46 (26.75%) malignant tumors; or 2) remove them from the

Fig. 1. We report the case of a 72-year old male patient who was derived by other Service for a month of evolution nodular lesion in the left parotid region. The tumor had cystic consistency, drained away to skin, caused facial paralysis and had a previous FNA reported as carcinoma. We ordered a CT-Scan and due to its accessibility through the skin we performed a biopsy to confirm the diagnosis of malignancy.
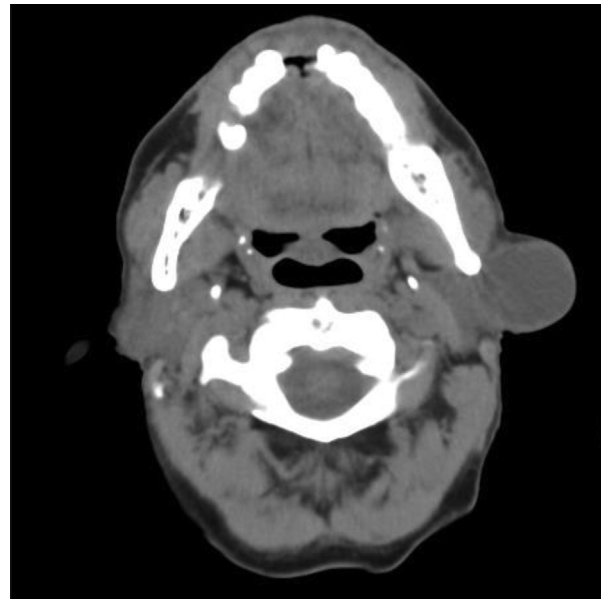

Fig. 2. In the TC a cystic formation of 3 cm × 2.6 cm depending on the parotid gland was appreciated. Cervical lymphadenopathies in level IIb were also observed. The result of the biopsy was myoepithelial carcinoma. It was decided to perform a radical left parotidectomy and modified radical neck dissection with excision of spinal nerve.

sample, obtaining 87.5% benign and 12.5% malignant tumors in a sample of 144 patients.

Results concerning S, E, PPV and NPV from both statistical analyses are shown in Tables 1 and 2. In our opinion, more reliable results are obtained by eliminating doubtful cases. This is because, in our protocol, when FNA is not able to differentiate between benign and malignant tumors, then intraoperative biopsy is indicated for an accurate diagnosis of the neoplasia, thus consequently determining if radicalization is mandatory or not.

For the diagnosis of malignancy an S value of 60% was obtained, which means that 40% of malignant tumors were not diagnosed by FNA. An E value of 97.5% was obtained, thus indicating that FNA was negative for malignancy in up to 97.5% of all benign neoplasms. According to predictive values, we observed that FNA guesses the 83.3% of cases given as malignant and in 92% of cases given as benign (PPV = 83.3%; NPV = 92%).