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Accuracy of Fine Needle Aspiration (FNA) in Diagnosis of Major Salivary Gland Tumors

[1]Sied Ziaodin Madani, [2]Noushin JalayerNaderi, [3]Mohsen Merati,
[2]Hedieh HaghShenas and [2]Mahdi Ashouri
[1]Department of Pathology, Amir Alam Hospital,
Tehran University of Medical Sciences, Tehran, Iran
[2]Department of Oral and Maxillofacial Pathology,
Faculty of Dentistry, Shahed University, Tehran, Iran
[3]Department of Orthodontics, Faculty of Dentistry,
Mashhad University of Medical Sciences, Mashhad, Iran

Abstract: Salivary glands tumors consist a major part of human tumors which their differentiation and treatment are very different. In addition to clinical experiments, biopsy is helpful method to obtain an accurate diagnosis. The biopsy of oral lesions is provided in different ways and one of them is Fine Needle Aspiration (FNA) which is a non-invasive, easy, quick and low cost experiment. The aim of this study was to define the accuracy of FNA in identifying major salivary glands tumors. The study was descriptive, retrospective. The medical records of Department of Pathology, Amir Alam Hospital were reviewed from 1994-2004. Data including age, gender, lesion site and FNA reports of all cases were registered. Histopathologic results of FNA samples and surgical gross reports were matched. Descriptive data was used for registered data analyzing. The SPSS 11.5 software was used for statistical analysis. From 656 specimen of FNA, there were 235 cases with both results of FNA and excisional biopsy. About 55 cases in gross experiment had not been shown tumor like lesion and 11 cases in FNA had not a definite diagnosis because of non sufficient of specimen; all these cases were rejected from study. Next study was for other 169 specimen. Considering negative for benign and positive for malignant, 37, 104, 10 and 18 cases were true positive, true negative, false positive and false negative, respectively. Sensitivity, specificity and accuracy were obtained about 67, 91 and 83%, respectively. Positive Predictive Value (PPV) and Negative Predictive Value (NPV) also were computed 78 and 85%, respectively. FNA is a safe, useful and quick method for identifying tumors of major salivary glands.

Key words: Fine Needle Aspiration (FNA), major salivary glands tumors, accuracy, sensitivity, specificity, Iran

INTRODUCTION

Salivary gland tumors form a considerable part of human tumors therefore their diagnosis and treatment is of great importance. To histopathologically diagnose, biopsy is necessary. Biopsy can be done in several ways. Fine Needle Aspiration (FNA) is a kind of quick and easily performable biopsy method in which a part of the lesion is being detached from the main lesion by using a fine needle. After depleting the containing of the needle onto the lamella, they are histopathologically evaluated (Rosai, 2004). It is accepted that FNA is a useful method for salivary gland tumors diagsnosis (Peterson *et al*., 2003). Sensivity and specifity of this method for diagnosing of salivary gland tumors has been reported as 73-98% and 91-98%, respectively (Hughes *et al*., 2005; Boccato *et al*., 1998; Postema *et al*., 2004). The aim of this study was to define the accuracy of FNA in identifying the major salivary glands tumors.

MATERIALS AND METHODS

The study was descriptive, retrospective. The medical record of Department of Pathology, Amir Alam Hospital were reviewed from 1994-2004. The FNA reports of major salivary gland tumors were retrieved from the archive. Data including age, gender, lesion site and FNA result of all cases were registered.

By using the data bank of the oral lesions, the main informations for each lesion such as surgical gross histopathologic report was studied. For all cases, both FNA and gross reports were matched. For statistical

Corresponding Author: Noushin JalayerNaderi, Department of Oral and Maxillofacial Pathology, Faculty of Dentistry, Shahed University, Tehran, Iran

analysis, all benign tumors were considered as negative (-) and all malignant ones were considered as positive (+). In cases which two or more lesions were proposed for probable diagnosis of the FNA report, the first one was considered as the main diagnosis.

The results were statistically analyzed and reported descriptively. Sensitivity was calculated as the ratio of true positive cases to aggregate of true positive and false negative cases. Specificity is calculated as the ratio of true negative cases to the aggregate of true negative and false positive cases. Total accuracy was also obtained from dividing the aggregate of true positive and true negative cases to all the cases. Positive predictive value was calculated by dividing true positive cases to all positive cases and negative predictive value was calculated by dividing true negative cases to all negative cases. The SPSS 11.5 software was used for statistical analysis.

RESULTS

From 656 FNA specimens, 235 cases had both FNA and excisional biopsy results. About 55 lesions that were identified as non-tumoral lesions in gross evaluation along with 11 cases with insufficient specimens were excluded from the study. Following examinations were done on the remaining 169 (25.76%) cases. About 152 (89.94%) lesions were from parotid, 15 (8.87%) lesions were from submandibular glands and 2 (1.18%) were from sublingual glands.

The age of the patients ranged from 22 months to 81 years with an average of 41.5 years. About 95 cases (56.21%) were male and 74 (43.78%) were female. Both histopathologic and FNA reports of 37 (21.89%) cases were malignant tumor. These were considered as true positive. About 104 specimens (61.53%) in both FNA reports and gross evaluation were diagnosed as benign tumor.

These were considered as true negative. About 10 (5.91%) were false positive. About 18 (10.65%) were false negative. About 421 cases had not any final histopathological reports, their FNA reports were as follows: 82 (19.47%) malignant tumor, 218 (51.78%) benign tumor, 103 (24.46%) inflammatory or fungal lesions. In 18 cases (4.27%) the specimens were insufficient and repeating the FNA test was needed. According to the above findings, sensitivity, specificity, Positive Predictive Value (PPV), Negative Predictive Value (NPV) and accuracy were 67.27, 91.22, 78.72, 85.26 and 83.43%, respectively.

Based on these findings, 67% of malignant salivary tumors and 91% of benign salivary tumors were correctly diagnosed under FNA method. The probability that a malignant FNAs (containing dysplastic cells) is really related to a malignant tumor is 78% and the probability that a benign FNA (containing non-dysplastic tumoral cells) is really related to a benign tumor is approximately 85%. The accuracy of FNA that explains its true diagnostic value is 83%, meaning that 83% of the tumors undergone biopsy by this method will lead to correct diagnosis.

DISCUSSION

Fine needle aspiration biopsy is an effective and important method in pathology. If performed correctly, this method can provide practitioner with useful information about the lesion and subsequently about treatment modalities. In this study, sensitivity and specificity of FNA method were achieved 67.27 and 91.22%, respectively.

Hughes *et al.* (2005) by studying 6249 cases of salivary gland tumors, reported the sensitivity and specificity as 73 and 91%, respectively. This finding is accordance to the finding (Hughes *et al.*, 2005). In other studies the range of FNA accuracy was 88 and 98% with average 92% (Mihashi *et al.*, 2006; Oka *et al.*, 2002; Stewart *et al.*, 2000; Das *et al.*, 2004; Shintani *et al.*, 1997; Jayaram *et al.*, 1994; Nettle and Orell, 1989). It is not in agreement with this study. This difference can be caused by sample size.

There was 10 (5.91%) false positive and 18 (10.65%) false negative cases in this study. Rajwanshi *et al.* (2006) in an investigation containing 172 specimens with FNA method reported 5 false positive and 4 false negative cases (Rajwanshi *et al.*, 2006). Hughes *et al.* (2005) reported 8 and 32 cases of false positive and false negative, respectively (Hughes *et al.*, 2005).

It has been considered that the occurrence of false negative results to be related to errors in the sampling process (David *et al.*, 2007). The lowest rate of false positive and false negative cases was related to the study of Kraft *et al.* (2008). They reported just one false negative and one false positive case in a sample size of 106. They believe that having full information of history, clinical evaluation, sonography and cytology are necessary for correct diagnosis (Kraft *et al.*, 2008). These differences are attributed to the differences in sample size. One of the principal limitations was inaccessibility to the final pathologic reports following FNA that forced us to undergo the investigation on only 169 cases, despite the considerable number of FNAs (469 cases) accomplished on major salivary gland tumors. In other words, the FNA reports were available in the archives while the final surgical gross reports were absent that shows the patient refused to continue the treatment or pursed it in another medical center. Essentially in these studies, the sample

size is an important factor in its validity. It means larger sample sizes are related to more valid results because they will cover experimental errors that may happen during the investigation. In this field, studies with sample sizes of 6249, 388, 325, 217 and were accomplished and favorable results were achieved (Hughes *et al*., 2005; Postema *et al*., 2004; Orell, 1995; Rajwanshi *et al*., 2006). In this study, despite the 469 FNAs from salivary gland tumors that was an ideal sample size 300 cases were omitted.

CONCLUSION

The results of this study show that fine needle aspiration is a useful and significantly accurate method for diagnosis of major salivary gland tumors. Further studies with larger samples are needed.

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