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**Original Article**

# Fine Needle Aspiration Cytology of Intraocular, Orbital and Eyelid Lesions

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**Abstract**

**Background:** Fine-Needle Aspiration Cytology (FNAC) is used for diagnosis of intraocular, orbital and eyelid lesions. In this study we evaluated the outcome and the accuracy of using this technique in diagnosis of benign or malignant behavior of lesions.

**Methods:** FNAC was performed on 26 specimens obtained from 25 patients with intraocular, orbital and eyelid tumors and the results were compared with the histopathologic findings in a prospective double-blind observational study.

**Results:** In 22 specimens (85%) a concordant definitive diagnosis was established that comprised five retinoblastoma, four basal cell carcinomas, four inflammations and two dermoid cysts. All specimens were diagnosed as benign or malignant with reasonable concordance. Definitive cytologic diagnosis was also made in two rare, if ever reported, conditions namely orbital fibrous histiocytoma and eyelid leishmaniasis.

**Conclusion:** FNAC seems to be a simple, rapid, relatively safe and cost-effective technique with considerable diagnostic value in the assessment of selected ophthalmic lesions, especially when sampling and interpretation are performed by experienced personnel.

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**Keywords** ● Cytology ● FNA ● intraocular ● orbital ● tumors

## Introduction

Fine-Needle Aspiration cytology (FNAC) is considered as an important preliminary diagnosis before attempting any invasive procedure and is used extensively for the diagnosis of various lesions in different organs,[1,2] and also has been implied in the field of ophthalmology.[5-7] Diagnosis of intraocular, orbital and eyelid lesions often poses problems. Although clinical data, CT-scan and MRI are helpful in solving these problems sometimes it is difficult to have a definitive diagnosis.[8-10] Routine surgical biopsy of globe and deeply seated orbital lesions need aggressive procedures and surgical biopsy of the anterior orbital lesions and lid tumors, although possible, is harmful and needs special considerations, such as facilities for anesthesia, operating room etc. In comparison FNAC is minimally invasive and much cheaper with fast results.[6,9,11]

FNAC can easily be used for eyelid and palpable orbital tumors, with the aid of sonography and with CT-Scan is may be used for deeply seated orbital tumors and in especial conditions

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for suspicious intraocular tumors.[12] Naib described the cytology of ocular lesions in 1972,[13] and Schyberg used fine needle aspiration biopsy in the diagnosis of orbital tumors in 1975,[14] however, its usefulness in ophthalmology field reflected only limited reports.[8-12,15-22] Many studies have tried to establish the extent of the surgery or changing the management from surgery to chemotherapy, radiotherapy or only observations as well as determination of grading and prognosis.[2-4]

The aim of the present study, therefore, is to present FNAC as a diagnostic tool for intraocular, orbital and eyelid lesions. The study also evaluated the accuracy of this test in diagnosing the benign or malignant behavior of these lesions and in definitive pathological diagnosis. It also presents the possibilities and the limitations of this procedure in the field of ophthalmology and cytomorphology of various lesions.

## Patients and Methods

This is a prospective blind comparative study of 25 patients with eyelids, orbital and intraocular lesions who were subjected to excisional biopsy at Khalili Hospital of Shiraz University of Medical Sciences. The study was approved by the Ethical Committee of the University. All of the patients were informed about the study and FNAC was done on whom accepted to participate in the study prior to the excision of the lesion. Eyelids and palpable orbital lesions were immobilized by hand without using anesthesia for adults, but using general anesthesia to children. The FNAC then was performed with a 10 ml disposable plastic syringe with a 22-gauge and three-cm long needle. Once the needle was in the lesion, maximum retraction of the plunger was maintained and after a gentle to and fro movement the plunger was released before withdrawing the needle, and at least four smears were made for each case. Two air dried smears were stained by Wright-Giemsa and two alcohol fixed smears were stained by Papanicolaou method. The same procedure was performed for deeply seated orbital tumors removed by surgery.

As for irretrievably lost eyes, harboring intraocular lesions and following the enucleation, the aspiration of the lesions over or under the retina was done by means of a two ml plastic syringe connected to a 27-gauge and 1.5-cm long needle passed through clear cornea for preparation of the same number of slides from non-centrifuged aspirated materials by using the same methods. From all the patients, but one, after surgical removal of the mass or enucleation, tissue was prepared for routine histopathological evaluation. These tissues were embedded in 10% formaldehyde solution and stained with Hematoxylin and Eosin under standard procedures. In one patient with intraocular lesion, who had no need for enucleation, after pars plana vitrectomy or vitreous tap, the result of cytology was compared to the bone marrow biopsy reports.

## Results

A total of 26 specimens from 25 patients (14 children, and 11 adults) were studied. The age of the patients ranged from three months to 15 yrs (average 7.5±4.4 yrs) for children and 25 to 70 yrs (average 55±13.6 yrs) for adults. Retinoblastoma with extension to the orbit was found in one case, and was warranted to prepare specimens from both sites (globe and orbit). Specimens were from eyelid (12 cases), globe (7 cases) and orbit (7 cases). Of orbital lesions four were palpable and three deeply seated.

As for consistency, three orbital lesions were cystic; one was subretinal fluid whereas the others were solid. In regard to the nature of the tumors, one was intraocular with metastasis from acute lymphocytic leukemia, one orbital with local extension from intraocular retinoblastoma and the others were primary. Fourteen lesions were benign and 12 malignant and none deemed unsatisfactory for cytological diagnosis due to inadequate cellularity. Cytologic and histopathologic findings are summarized in Table 1. Overall concordant definitive diagnosis was established in 22 cases (85%), including 12 malignant (100%) and 10 benign lesions (71%). Consistent diagnosis in regard to benignity or malignancy was established in all cases. Light microscopic findings of two rarely diagnosed conditions (Leishmaniasis and fibrous histiocytoma) are presented in Figs 1 and 2.

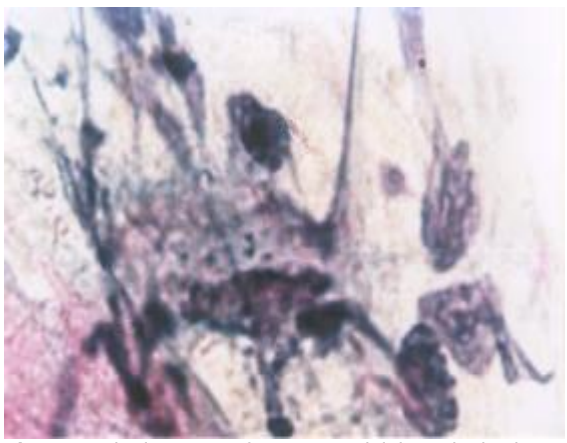

**Fig 1:** Cytologic smear of cutaneous leishmaniasis showing reactive histiocytes engulfing Donovan-like bodies. (Wright Gimsa staining×1200)

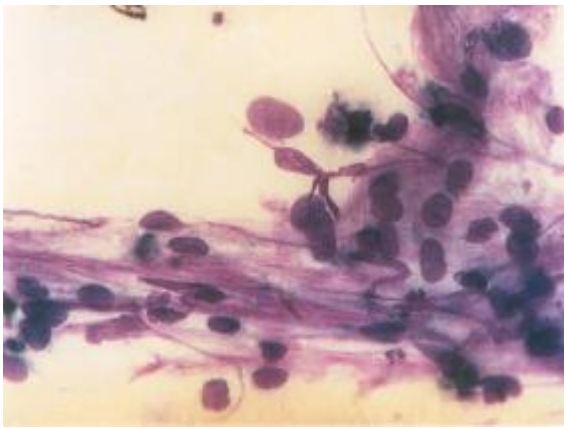

**Fig 2:** Cytologic smear of fibrous histiocytoma showing fibroblastic like cells. (Wright Gimsa stain ×320)

**Table 1:** Cytologic and histopathologic diagnoses

| Histopathologic Diagnosis | # of cases |
|---|---|
| Retinoblastoma | 5 |
| Basal cell carcinoma | 4 |
| Squamous cell carcinoma | 1 |
| Malignant melanoma | 1 |
| Acute lymphoblastic leukemia | 1 |
| Inflammation | 4 |
| Dermoid cyst | 2 |
| Coat's disease | 1 |
| Leishmaniasis | 1 |
| Fibrous histiocytoma | 1 |
| Lymphoid hyperplasia | 1 |
| Cystic coloboma* | 1 |
| Osteochondroma * | 1 |
| Capillary hemangioma* | 1 |
| Pilomatrixoma* | 1 |
| Total | 26 |

*Correlate only in the diagnosis of benignity or malignancy

## Discussion

Since the clinical diagnosis of ocular and orbital lesions by noninvasive methods are highly accurate, and because of concern about the possible complications, FNAC is not performed on a routine basis in ophthalmic field.[19] According to the results of the present study, and those of previous reports, [4,8,9,11,14] in view of its high accuracy, the FNAC seems to be the procedure of choice whenever, because of significant diagnostic uncertainty, a definitive diagnosis is requested by the patient prior to the treatment.

In this study, the consistent definitive diagnosis by FNAC and the accuracy of this test to differentiate benign from malignant lesions were 85% and 100% respectively. These results are in accordance with those of other reports, in which the respective positive identification rates were 80 to 100% with or without adjunct immunohistochemistry.[3,8,19,20,22-24] Therefore, it was suggested that FNAC was a fairly accurate technique for the diagnosis of lesions in ophthalmic field.[5,6] However, in our study, the problem for definitive diagnosis was only seen in benign lesions, which was of lesser clinical significance.

Although, cytological diagnosis of retinoblastoma is usually believed to be rather difficult,[25] most of our cases had characteristic morphologic features. In some cases there was calcification and sometimes rosette-like structures which are not found in other small cell tumors.[20] Whenever, on the basis of morphology alone, retinoblastoma could not be distinguished from metastatic small cell carcinoma,[15,19] the age of the patient and its clinical appearance helped us to classify them.

The other previously reported problem is the differentiation of pseudolymphoma from true lymphoma, a condition that also exists with histopathologic specimens. The finding of polymorphic populations of lymphoid cells, mainly mature lymphocytes and plasma cells, usually shows the benign picture of pseudolymphoma but sometimes for final diagnosis there is a need for immunohistochemistry studies, thereby monoclonal antibodies were used for detecting cell surface markers and even electron microscopy or PCR.[6,22,24,26]

In our study, the definitive diagnosis of other malignant lesions was made with no difficulty. Also, we made definitive cytologic diagnosis of two rarely conditions in regard to benign conditions. These comprised leishmaniasis and fibrous histiocytoma. In cutaneous leishmaniasis, reactive histiocyte engulfing Donovan-like bodies were the prominent findings (Fig 1). Cytological examination of fibrous histiocytoma showed fibroblastic and histiocytic-.like cell types, without any evidence of malignancy (Fig 2).

In our study, no complication of FNAC technique was encountered because, direct aspiration was only performed on anterior palpable orbital and eyelid lesions. Whereas, in previous reports serious complications, such as intraocular and orbital hemorrhages and damage to the optic nerve, were always present after aspiration from the globe or deeply seated orbital lesions. [27]However, It should be emphasized that with due care these complications could be avoided.[19,24,28]

It should be emphasized that case selection is very important in regard to FNAC, because it is impossible to make an accurate diagnosis, if sufficient material is not obtained. Furthermore, FNAC is not a procedure of choice for lesions under five mm in size, especially if they have a fibrous nature.[22]

In cases of significant diagnostic uncertainty, and in view of the high accuracy of FNAC, and the inherent risks of surgical biopsy for diagnosis of deep-seated orbital lesions, it is advisable to perform FNAC after localization of the lesions by CT-scan or sonography as also mentioned by Dey et al.[24] This can elimi-

nate the need for further surgery and in some cases, especially local recurrences or metastasis, it is suggested to perform a limited instead of a radical surgery.[22]

Also in regard to the end-stage ocular cases and suspicious intraocular tumors, needing enucleation, fine needle aspiration can provide definitive diagnosis and obviate the enucleation in some cases.[19,20] Transcorneal procedure is more reliable to perform,[9] in order to prevent the rarely reported complications of seeding of tumor cells via the canal of aspiration.[19,29] However, sufficient knowledge and experience with cytopathology and ophthalmic pathology are essential to achieve accurate results.[2,19,22] Even though, FNAC is accurate in diagnosis of pleomorphic adenoma,[5] it is contraindicated for well-circumscribed lesions such as pleomorphic adenomas and hemangiopericytomas in which the capsule must not be violated during biopsy.[30]

## Conclusion

As an initial screening procedure, fine needle aspiration cytology is a rapid, cost-effective, accurate and relatively safe diagnostic technique in the assessment of selected ophthalmic lesions.

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