
수술시 뇌종양 흡인액의 세포학적 검사의 유용성

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= Abstract =

Usefulness of Cytologic Study of Intraoperative Suction Fluid in Brain Tumors

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In diagnosing a brain tumor, it is essential to obtain samples from many areas of the tumor. Although there are reports about the suitability of material obtained by cavitron ultrasonic surgical aspirator(CUSA), there is a paucity of reports regarding conventional intraoperative suction. This study was performed to evaluate the usefulness of the suction fluid and the effect of different hemolytic fixatives.

Intraoperative suction fluid was obtained from 2 pituitary adenomas and 2 choroid plexus carcinomas. In two cases of mixed astro-oligodendroglioma, one of glioblastoma multiforme and 3 of meningioma, the fluid was collected by CUSA. Each sample was divided into four bottles for the different fixatives such as 0.1N HCl, 10% acetic acid, 95% alcohol, and no additive. All cases were evaluated by the both cytologic smear and cell block preparations, and were reviewed with concomitant histologic diagnosis. The result showed a good correlation between the cytologic study and the histologic diagnosis and 95% alcohol was found to be superior to other fixatives in cell preservation.

Key words: Brain tumor, Cytology, Intraoperative suction fluid, Hemolytic fixative

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INTRODUCTION

Because the diagnosis of a brain tumor is based on the most aggressive area of the tumor, it is essential to obtain enough samples from the various tumor areas for a correct diagnosis. However, the life-threatening condition of the neurosurgical procedure itself makes it difficult to get enough samples. Although many trials to improve the diagnostic yield are ongoing, intraoperative suction fluid has not received paid enough attention.¹⁻⁵⁾ This is a cytologic study of the intraoperative suction fluid using different fixatives. The diagnostic usefulness of the fluid and the ability of fixatives to preserve cellular detail were evaluated.

MATERIALS AND METHODS

Fluid sampling

The intraoperative suction fluid was obtained by a routine suction system in 4 cases (case 1 to 4) and a cavitron ultrasonic surgical aspirator (CUSA) in 6 cases (case 5 to 10). A sterile suction tip and a collection bottle were used during the suction and aspiration. At the end of the surgical procedure, the sample was immediately transported to the laboratory.

Cytologic evaluation

The submitted bloody intraoperative suction fluids contained some floating sponge like soft tissue over the fluid. The floating soft tissue was collected and the cell block was prepared. Because the fluid was bloody, we divided it into two groups: one was for hemolysis fixatives and the other for non-hemolysis fixatives. We divided the hemolysis group into two parts and added the same volume of 10% acetic acid to one part and the same volume of 0.1N HCl to the other. For the non-hemolysis procedure, we separated the sample into two parts: one was mixed with same volume of 95% alcohol and nothing was added to the other. All 4 groups of the bloody samples were stored in a refrigerator for 1 hour to settle. After 1 hour, the settled material was

collected from the bottom for a cell block and the remaining fluid was centrifuged at 1000 rpm for 5 minutes at 4°C. Subsequently, a conventional Papanicolaou-stained cytologic smear and cell block were made. All specimens were assessed for their adequacy, the degree of cellular preservation according to the different fixatives. The cytologic findings of the intraoperative suction fluid was compared to the histopathologic examination. In terms of cellular preservation, the nuclear chromatin patterns, including clumping and clearing, were evaluated.

RESULTS

The cases consisted of 2 pituitary adenomas, 2 choroid plexus carcinomas, 2 mixed astro-oligodendrogliomas, one glioblastoma multiforme, and 3 meningiomas.

All cases, except two pituitary adenomas, contained diagnostic material in the cytological smear and the cell block preparation in accordance with the biopsy material (Table 1). In two pituitary adenomas, scattered benign looking glandular epithelia without solid or papillary architecture were observed in the cell block (Fig. 1). In two cases of choroid plexus carcinoma obtained from same patient, we could see innumerable hyperchromatic malignant cells in the smear and many highly cellular solid tissue fragments with focal papillary architecture in the cell block (Fig. 2). The cell blocks displayed architectural patterns simulating those of surgical biopsy.

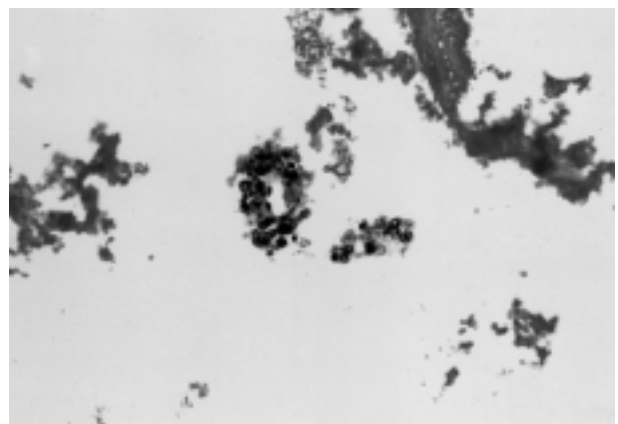


Fig. 1. Photomicrograph of the cell block of pituitary adenoma. Some scattered benign looking glandular epithelia are present. (H-E)

Table 1. Clinicopathologic features of the patients

Age(yrs)/Sex	Site	Cytologic Diagnosis	Cell Block	Tissue Diagnosis
2/M	Lt. lat ventricle	Malignancy	Papillary growing Ca	Choroid plexus Ca
2/M	Lt. lat ventricle	Papillary growing Ca	Papillary growing Ca	Choroid plexus Ca
70/M	Pituitary gl	Benign glandular cells	Benign glandular cells	Pituitary adenoma
36/F	Pituitary gl	Benign glandular cells	Benign glandular cells	Pituitary adenoma
64/F	Lt. temporal	High grade glioma	High grade glioma	Glioblastoma
35/M	Lt. frontal	High grade glioma	High grade glioma	Mixed oligoastrocytoma
65/F	Rt. frontal	Meningioma	Meningioma	Meningioma
42/M	CP angle	Meningioma	Meningioma	Meningioma
35/F	Cerebellum	Meningioma	Meningioma	Meningioma
23/M	Rt. temporal	Mixed glioma	Glioma	Mixed glioma

CP : cerebello-pontine; lat : lateral; Ca : carcinoma; gl : gland

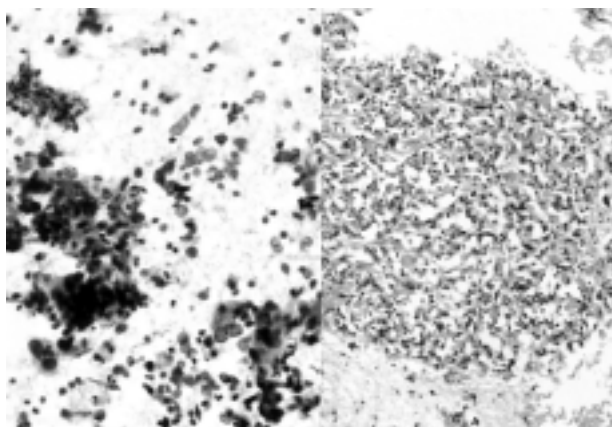


Fig. 2. Photomicrograph of the choroid plexus carcinoma. Many hyperchromatic atypical cells are observed in the cytologic smear using the suction fluid (left). (Papanicolaou). Papillary growing carcinoma cell fragments are seen in cell block (right). (H-E)

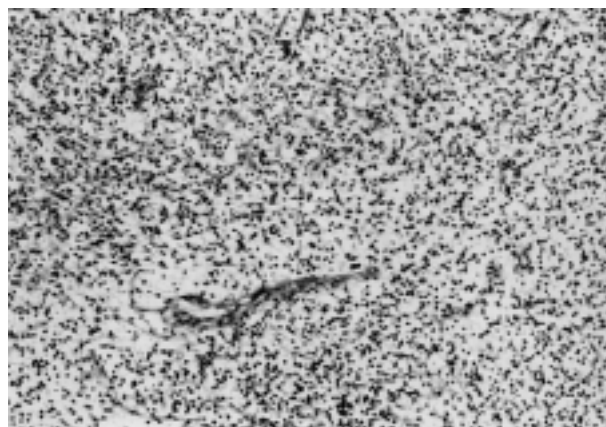


Fig. 3. Photomicrograph of the mixed astro-oligodendroglioma. Loose low cellular area with prominent thin vasculature suggest oligodendroglioma. (H-E)

In the mixed astro-oligodendroglioma, there was a larger quantity fragment in the cell block than in the standard histologic section. Also in one case of mixed astro-oligodendroglioma the area with the loose myxoid architecture containing clear cells suggesting the oligodendroglioma (Fig. 3) was identified only in the cell block but not in the biopsy specimen. In the cases of two mixed astro-oligodendrogliomas and one glioblastoma multiforme, where the surgeon used CUSA, there were multifocal areas showing smudged nuclei suggesting

crushing artifacts with well preserved cellular and anaplastic areas. We have tried Diff-Quik stain in the cases of a choroid plexus carcinoma and a mixed glioma, it was not easy to diagnose the type and grade of these tumors precisely except for the presence of a tumor.

We evaluated the cellular preservation according to four different fixatives. There was no significant difference in the chromatin pattern among them. However, the nuclear fine chromatin texture was quite well preserved in the 95% alcohol fixed non-hemolytic sample but the fine chromatin texture seemed to be slightly fuzzy in the 0.1N HCl and 10% acetic acid samples.

DISCUSSION

In the past, the sample obtained by intraoperative suction procedures such as CUSA was discarded without any pathologic examination. Richmond and Hawksley¹⁾ evaluated whether the CUSA-aspirated fragments from intracranial tumors could be used for diagnostic purposes. Blackie and Gordon²⁾ examined the tissue fragments obtained by the CUSA from 17 cases and compared them with conventional tumor biopsy tissue.

Because the brain is composed of relatively few types of cellular components, and is separated from other organs by a special blood brain barrier, the abnormal cells can be evaluated without significant contamination by other cell types.

Although we could not separate the fluid according to the clinically significant lesions, an examination of pooled tissue fragments obtained from intraoperative suction procedure was helpful by adding another specimen to be surveyed. The cell block was more useful for the diagnosis. In a mixed astro-oligodendroglioma, a glioblastoma multiforme, and two choroid plexus carcinomas, we could make a diagnosis on the basis of cell blocks without biopsy results and the amount was larger than a biopsy specimen.

We thought that this type of examination is particularly useful when: most of the tumor tissue has been removed by intraoperative suction procedures such as CUSA; only a small amount of sample is obtained by a conventional

biopsy procedure; the location of the tumor is not easy to approach; and the tumor consistency is myxoid or difficult for biopsy such as an oligodendroglioma.

In terms of cellular preservation, the hemolysis solutions, 0.1N HCl and 10% acetic acid, which had been used to induce cellular lysis by osmotic pressure differences, appeared to harm the cells.

In conclusion, the cytologic examination of the intraoperative suction fluid seems to be important and useful for making diagnosis of brain tumors.

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