EVALUATION OF THE EFFECTIVENESS OF STEREOTACTIC BIOPSY OF SUPRATENTORIAL TUMORS AT MILITARY HOSPITAL 103

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Summary

Objectives: To evaluate the histological diagnostic results using stereotactic biopsy of supratentorial tumors at Military Hospital 103. ***Subjects and methods:*** A retrospective cross-sectional study on 9 stereotactic biopsies of supratentorial tumors at Military Hospital 103 from 6/2021 - 9/2022. ***Results:*** 9 patients in the study included 5 men and 4 women, aged from 29 to 79 years old. The clinical features were dominated by headache (77%), hemiplegia (22.2%), and epilepsy (11.1%). The deep lesions (capsula interna lesions and thalamic lesions) were 44.4%. The histological diagnostic accuracy rate was 88.9%. Histological types include low-grade astrocytoma (44.4%), high-grade astrocytoma (11.1%), oligodendroglioma (11.1%), lymphoma (22.2%), metastatic carcinomas (0%), and brain tissue (11.1%). The mortality rate was 0%. ***Conclusion:*** Stereotactic biopsy of supratentorial tumors is a safe procedure that provides a very accurate histological diagnostic result with a low incidence of complications and mortality rate.

** Key words: Biopsy; Stereotactic biopsy; Brain tumor; Supratentorial.*

INTRODUCTION

Today, with the development of imaging tools, especially computed tomography and magnetic resonance imaging, the number of patients with brain disease, who want to have a better treatment, is increasing. The choice of treatment method and prognosis of a disease depends on the nature of the lesion. The nature of the lesion is the result of histopathology from a brain tumor, which is the "gold standard" for diagnosis. Nowadays, brain tumor biopsy can be performed by craniotomy or stereotactic biopsy. A craniotomy is easily performed for the lesions of the brain surface.

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However, for lesions in deep or functional brain locations, it is difficult to obtain tissue samples accurately without causing damage. Besides, brain tumor biopsies under neurogenic positioning are minimally invasive, relatively safe surgery with high histological accuracy and a very low mortality and complication rate. Our study was conducted: *To evaluate the results of histopathological diagnosis and the rate of complications of stereotactic brain biopsy at Military Hospital 103.*

SUBJECTS AND METHODS

1. Subjects

9 patients treated at Military Hospital 103 from 6/2021 - 9/2022, who had brain tumor with clinical and visual symptoms. They were operated on by frameless stereotactic brain biopsy.

2. Methods

The study followed a retrospective cross-sectional method.

Data were processed using SPSS 20.

RESULTS

1. Age and sex

There were 5 males and 4 females in the study. The rate of male/female is 1.25.

The youngest is 29 years old, and the oldest is 79 years old. Most patients are in the age group of 40 - 60, accounting for 5/9 (55.5%).

2. Clinical and visual symptoms

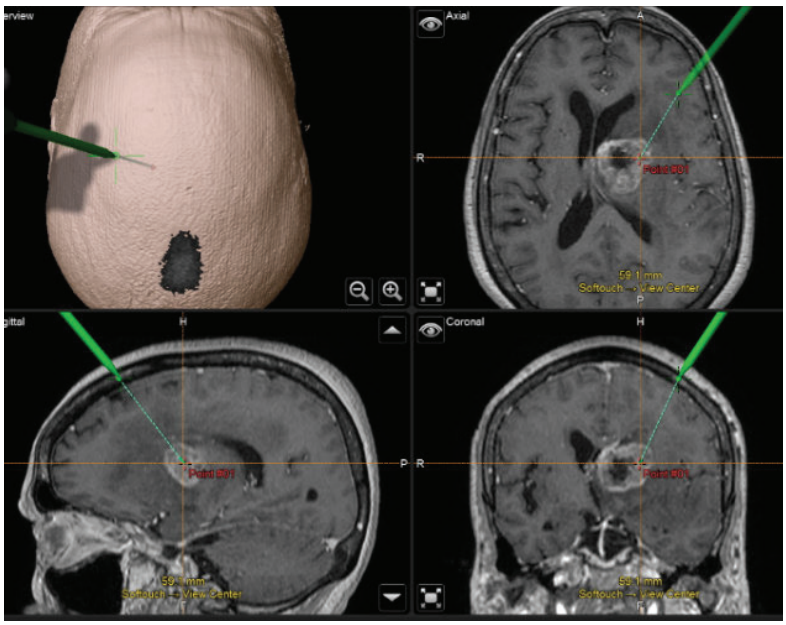
Table 1: Clinical and visual symptoms.

		Number of cases	Percentage
Clinical symptoms	Headache	7	77.8
	Epilepsy	1	11.1
	Hemiplegia	2	22.2
	Aphasia	1	11.1
	Consciousness	2	22.2
Location of brain tumor	Frontal	2	22.2
	Temporal	2	22.2
	Parietal	1	11.1
	Thalamus	3	33.4
	Capsula interna	1	11.1

The clinical symptoms of patients are quite diverse. In which, headache symptoms have 7/9 cases, accounting for 77.8%. There are 2/9 cases of hemiplegia. In addition, 1/9 of cases have epilepsy and aphasia.

Patient status before surgery was based on the Glasgow coma scale. There were 7 patients with a Glasgow coma score of 15, only 1 patient score of 14, and 1 patient score of 13.

The majority of cases were deeply located in the brain. There were 4 patients who had tumors in the thalamus and capsula interna region, accounting for 44.4%. Tumors in the frontal lobe were 2/9 cases, the temporal lobe was 2/9 cases and the parietal was 1/9 cases.



Picture 1: Brain tumor biopsy in the left thalamus.
(Source: Photo taken at the operating room of Military Hospital 103)

3. Result of surgery

* Anesthesia methods and surgical time: All patients received endotracheal anesthesia (100%). The average surgery time was 61.6 ± 2.3 minutes

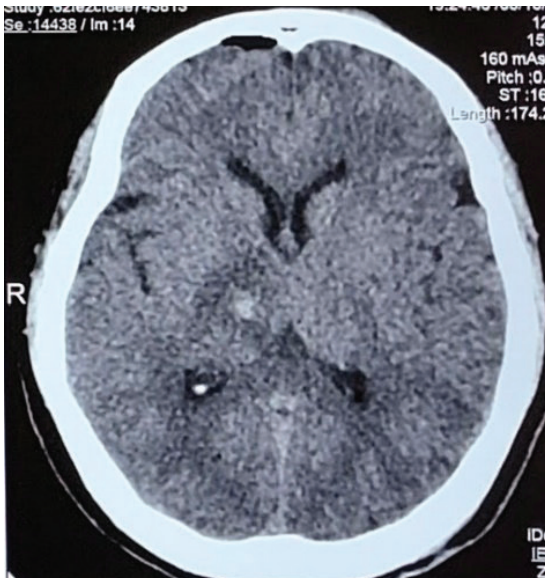
** Complications of surgery:* Hemorrhage during surgery: There was no patient who had a hemorrhage during the operation after taking tissues. There was no case re-operated by craniotomy.

Table 2: Complications and mortality after surgery.

Symptoms	Number of cases	Percentage
Epilepsy	0	0
Brain hemorrhage	1	11.1
Hemiplegia	0	0
Cerebral edema	0	0
Reduced consciousness	0	0
Re-operating	0	0
Dead	0	0
Total	1	

In out of 9 cases, only one had complications after operating, accounting for 11.1%. This complication is brain hemorrhage.

There were no cases of re-operating by a craniotomy, as well as death after brain biopsy surgery.



Picture 2: Hemorrhagic lesions at the biopsy site on CT.
(Source: Photo taken at Military Hospital 103)

** Histopathologic diagnoses:*

Table 3: Histopathological results.

Histopathological	Number of cases	Percentage
Low-grade astrocytoma	4	44.4
High-grade astrocytoma	1	11.1
Oligodendroglioma	1	11.1
Lymphoma	2	22.2
Carcinoma	0	0
Brain tissue	1	11.1
Total	9	100

The positive histopathological result was 8/9 cases, reaching 88.9%. The majority of cases were astrocytoma, with 5/9 cases accounting for 55.5%. There was no case of carcinoma.

There was one patient with brain tissue. This patient was not allowed to have biopsy again because the patient's relatives asked to be discharged.

DISCUSSION

1. Clinical symptoms

Most of the patients in the study were aged 40 - 60, and the oldest was 79.

The most common symptoms were headache 7/9 (77.8%) and hemiplegia 2/9 (22.2%). Before surgery, there were 2 patients with Glasgow coma scores of 13 and 14. Both cases were given corticosteroids, anti-cerebral edema, and these patients did not reduce consciousness after surgery.

2. Location of brain tumors

The tumor location is commonly located in the thalamus and capsula interna region, accounting for 44.4%. With deep lesions, performing a craniotomy to pick the tumor is high risk. Therefore, stereotactic brain biopsy for these cases is a better choice, as well as limiting risks during and after surgery.

3. Results of surgery

** Anesthesia and surgical time:*

All patients in the study received endotracheal anesthesia. With frameless stereotactic brain biopsy, it is very important to fix the patient and the frame positioning nerve. That helps to limit errors and reduces the risk of complications. Out of 9 cases, there was no case of complications during surgery.

The average surgery time was 61.6 ± 2.3 minutes, which is similar to Sciortino et al.'s study [1].

** Complications and death:*

According to Table 2, the rate of hemorrhagic complications is 11.1%. This result is consistent with the rate of hemorrhagic complications (0 - 11.5%) in studies by Hall, Grossman and Noer [2, 3, 4]. This patient had a small hemorrhage at the biopsy site, and there was no clinical symptom.

The mortality rate in the study was 0%, consistent with the mortality rate of 0 - 2% in other studies [2, 3, 4].

** Histopathological diagnosis:*

In our study, the histopathological diagnostic efficiency reached 88.9%. The report of Khatab et al. [5] reviewed 16 different studies, which showed that the average diagnostic rate is 93.8% (approximately 87 - 100%). In comparison with Khatab's study, our study had good diagnostic efficiency.

One patient had a histopathological diagnostic with brain tissue. It is possible that the positioning system was displaced because it was not surely fixed or the selection of the biopsy site was not within the brain tumor. The patient was explained to have another biopsy. However her family did not wish and asked for her to be discharged.

CONCLUSION

Stereotactic biopsy of supratentorial tumors is a safe procedure that provides a very accurate histological diagnostic result with a low incidence of complications and mortality rate.

REFERENCES

1. Sciortino T., Fernandes B., Conti Nibali M., Gay L.G., Rossi M., Lopci E., Colombo A.E., Elefante M.G., Pessina F., Bello L., et al. (2019). Frameless stereotactic biopsy for precision neurosurgery: Diagnostic value, safety, and accuracy. *Acta neurochirurgica*; 161(5): 967-974.

2. Æbelø A.M., Noer V.R., Schulz M.K., Kristensen B.W., Pedersen C.B., Poulsen F.R. (2019). Frameless stereotactic neuronavigated biopsy: A retrospective study of morbidity, diagnostic yield, and the potential of fluorescence: A single-center clinical investigation. *Clinical neurology and neurosurgery*; 181: 28-32.

3. Grossman R., Sadetzki S., Spiegelmann R., Ram Z. (2005). Haemorrhagic complications and the incidence of asymptomatic bleeding associated with stereotactic brain biopsies. *Acta neurochirurgica*; 147(6):627-631; discussion 631.

4. Hall W.A. (1998). The safety and efficacy of stereotactic biopsy for intracranial lesions. *Cancer*; 82(9): 1749-1755.

5. Khatab S., Spliet W., Woerdeman P.A. (2014). Frameless image-guided stereotactic brain biopsies: emphasis on diagnostic yield. *Acta neurochirurgica*; 156(8): 1441-1450.