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# Correlation of Frozen Section and Routine Histopathological Findings in Brain Tumors

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## ABSTRACT

**Introduction:** One of the most crucial part of the line of management of patients having space occupying lesions of central nervous system is intra-operative consultation. In order to maintain the integrity of quality assurance in surgical pathology, correlation between intra operative frozen section diagnoses with final histopathological diagnosis is fundamental.

**Aim of Study:**

1) To learn the correlation between routine histopathology and frozen section in the diagnosis of various brain tumors. 2) To find out incidence of various types of tumors of Central Nervous System. 3) To study the comparative sensitivity of frozen section and routine histopathology for the diagnosis of SOLs of CNS. 4) To evaluate the diagnostic parameters of intra operative frozen sections in suspected intracranial tumors that are to be reported with frozen section followed by routine histopathology

**Materials and Methods:** Total 130 cases of brain tumors in tertiary care centre from January 2016 to February 2017 were studied retrospectively. These cases were reported both on frozen section and paraffin section. The diagnosis on frozen sections were compared with the final assessment to assess the concordance and discordance rates between both as well as to find out the incidence of various lesions of CNS.

**Results:** In present study, the overall concordance rate was 81.5%, discordance rate was 18.5%.In cases where the frozen section and the routine histopathology diagnosis were discordant the final diagnosis was derived from the findings of routine histopathological examination. Astrocytoma (44.6%) was the most common brain tumor. Concordance rate varies and lowers in low-grade tumors than in high-grade tumors.

**Key Words:** Frozen Section, Brain tumor, Histology

## INTRODUCTION

The technique of frozen section was first introduced by the pathologist, William H. Welch, in 1891. In 1920s the technique became popular and was used for intra operative consultation.

In the 1960s, the preparation of frozen section was made easier by the use of cryostat, a cabinet with -20 to -30 degree Celsius cooling and enclosing a microtome blade.

Intra operative frozen section diagnosis is now a day a routine practice in most institutions, thus accuracy in diagnosis of frozen section must be assessed and compared with the final diagnosis of routine histopathology.

Intra operative frozen section examination has been remain an excellent diagnostic tool for neurosurgeon to confirm that the target lesion is tumor tissue or not and to plan surgical strategy [(1).] While awaiting the result of histopathology which takes longer time, frozen section result is useful to inform patient and start adjuvant therapy [(2).]

Internationally published studies have confirmed the overall accuracy of intra operative frozen section and squash preparation examination [(3) (4) (5).]

## MATERIALS AND METHODS

A retrospective study of 130 cases (table -I)of frozen sections and routine histopathology was done at tertiary care hospital,

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Ahmadabad for period of 1st January 2016 to 31 February 2017. Five-micrometer sections were cut by use of cryostat and sections were stained by the rapid H&E method. Afterwards, the specimen was fixed overnight in 10% buffered formalin and subsequently taken the next day for grossing wherein appropriate representative sections were taken. The permanent sections were evaluated on H&E stained sections.

Agreement between frozen section and paraffin section diagnosis was classified in to four categories shown in table-II.

## RESULTS

Out of total 130 cases in this study, 72% cases were in group 1, and 9.5% cases are in group 2, giving a concordant diagnostic frequency of total 81.5%.While remaining cases were discordant and fall into group 3, with a discordant diagnostic frequency of 18.5%.The highest number of concordance frequency was observed for astrocytoma (58 cases, 44.6%) on frozen section and as well as routine histopathology. So, the highest numbers of cases received and reported on frozen section and followed by confirmation on routine histopathology (highest incidence) were of **Astrocytoma** followed by meningioma. In 2 cases the FS diagnosis were 'no tumor tissue', but later on, histopathogy findings were of high grade glioma.

## DISCUSSION

The accuracy of frozen section diagnosis at pathology department, tertiary care hospital, Ahmedabad, can be interpreted as comparable with most international quality control statistics for frozen section. Due to known interobserver variability in the histopathological diagnosis [6, 7, 8, 9], agreement between frozen section and routine histopathology diagnosis would be improved if both are given by same pathologist [2]. In this study not all but most of the diagnoses were given by same pathologist. Agreement varies between various histopathological entities. It is lower in low grade tumors than in high grade tumors. In our study, there is 100% agreement seen in pituitary adenoma cases. In present study the discordant diagnostic frequency was 18.5%, and the concordant diagnostic frequency was 81.5%.

These findings are quite comparable with published CAP (college of American pathologist) studies by Zarbo, *et al. 1991*[10] *and Novis, et al. 1996* [11]. *(Table III)*

### Causes of discrepancies in our study were mostly due to:

- Sampling errors
- Sectioning errors
- Improper Staining
- Errors in classifying the lesion
- Errors in differentiating the lesion

## CONCLUSION

The above study shows that surgical intervention done in about 81.5% cases are correct owing to 81.5% of the diagnosis given on frozen section being consistent with paraffin section. Frozen section do influence the immediate interventions and surgical procedures yet not affecting management protocol as a high diagnostic accuracy has been achieved as per the study at least as far as grading of tumors is concerned in maximum cases. Improvement in terms of diagnosis and turn around time is possible with inclusion of this part of histopathology in routine practice.

So that better intra-operative diagnosis and hence patient care can be given. To summarize, in terms of diagnostic accuracy routine paraffin section takes a lead over frozen section.

## ABBREVIATIONS

FS- Frozen section

SOL- Space occupying lesion

CNS- Central nervous system

H&E- Hematoxyline and eosin

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**Table I: No. of Cases of Various Types of CNS Tumors**

| Lesions | No. of Cases(130) | |
|---|---|---|
| | Frozen Section | Routine Histopathology |
| ASTROCYTOMA | 58(44.6%) | 55 |
| MENINGIOMA | 16(12.3%) | 15 |
| SCHWANNOMA | 12(9.2%) | 11 |
| MEDULLOBLASTOMA | 10 (7.6%) | 5 |
| PITUITARY ADENOMA | 8(6.1%) | 8 |
| EPENDYMOMA | 7(5.4%) | 5 |
| OLIGODENDROGLIOMA | 5(3.8%) | 2 |
| BENIGN CYSTIC LESION | 3 (2.3%) | 3 |
| HEMANGIOPERICYTOMA | 3 (2.3%) | 2 |
| CHOROID PLEXUS PAPILLOMA | 2 (1.5%) | 1 |
| CENTRAL NEUROCYTOMA | 2 (1.5%) | 1 |
| CRANIOPHARYNGIOMA | 2 (1.5%) | 1 |
| MALIGNANT ROUND CELL TUMOR | 2 (1.5%) | 1 |

**Table II: Definition of Agreement Between Frozen Section Diagnosis and Final Histopathological Diagnosis**

| | |
|---|---|
| Group 1- complete agreement | Intraoperative FS and final paraffin section match exactly |
| Group-2 partial agreement | Agreement between FS and final paraffin section but diagnosis of both is too wide to be classified as group-1. FS and final paraffin section does not match exactly but remain in the same WHO group. |
| Group 3- no agreement | No agreement between FS and final paraffin section |
| Group 4- not classifiable | FS diagnosis of uncertain neoplastic. |

**Table III: Comparision of Concordance and Discordance Rates with Results of Various Studies**

| | PRESENT STUDY | STUDY DONE BY (Zarbo, *et al. 1991*)[10] | STUDY DONE BY (*Novis, et al. 1996*)[11] |
|---|---|---|---|
| CONCORDANCE RATE | 81.5% | 98.3% | 98.2% |
| DISCORDANCE RATE | 18.5% | 1.7% | 1.2% |

## FIGURES SHOWING HISTOLOGY PICTURE OF FROZEN SECTION AND PARAFFIN SECTION.

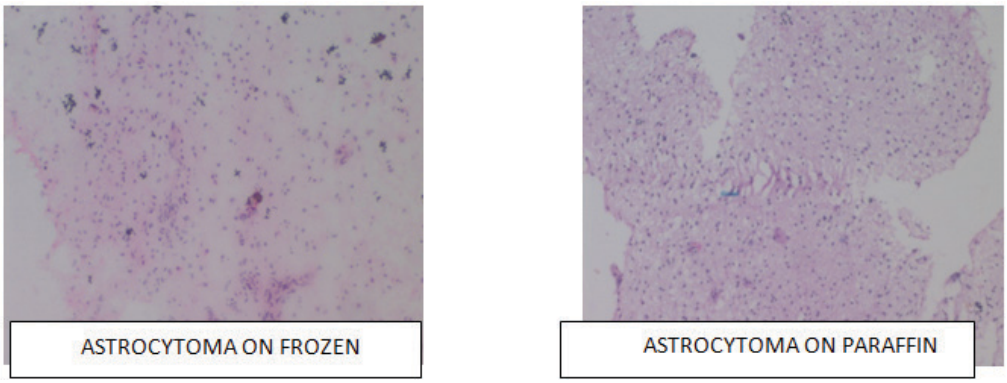


**Figure I:** Frozen section and paraffin section in Astrocytoma.

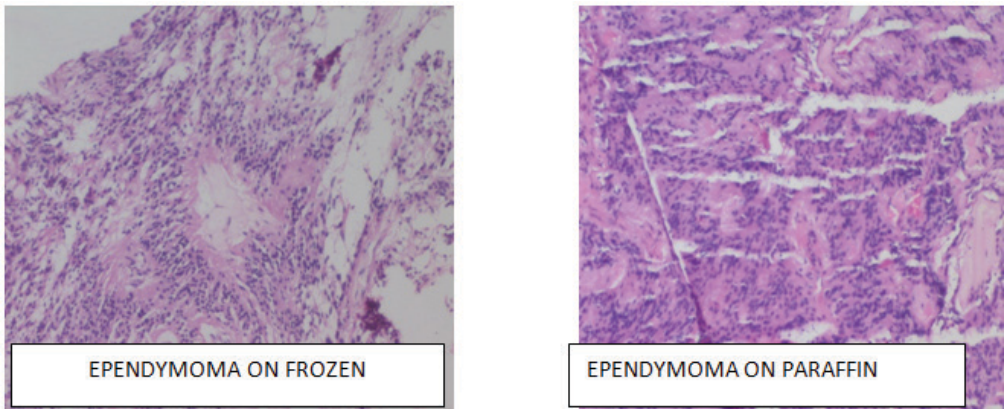


**Figure II:** Frozen section and paraffin section in Ependymoma.

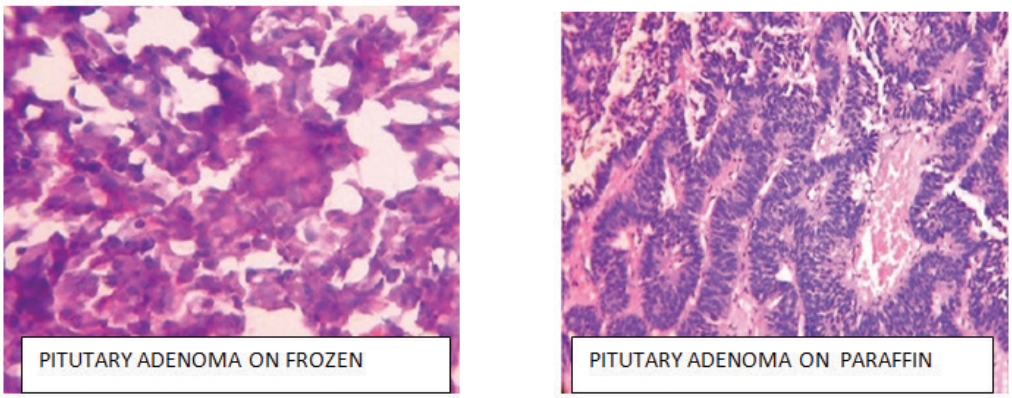


**Figure III:** Frozen section and paraffin section in Pitutary adenoma.