

Correlation of Routine Histo-Pathology, Frozen Section and Squash Preparation in The Diagnosis of Space Occupying Lesions of Central Nervous System

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ABSTRACT

Intra-operative consultation is an important part of the management of patients with space occupying lesions (SOL) of central nervous system. The correlation between intra-operative frozen section diagnosis with final histopathological diagnosis is an integral part of quality assurance in surgical pathology. Aim of study-1) To study the correlation of routine histopathology, frozen section (FS) and squash preparation in the diagnosis of SOL of central nervous system (CNS). 2) To find out incidence of various types of lesions of CNS. 3) To study sensitivity of frozen section, squash cytology and routine histopathology for diagnosis of SOLs of CNS. Materials and Methods- Total 100 cases of SOLs of CNS were studied retrospectively which were diagnosed and reported with frozen section followed by routine histopathology. The diagnoses on frozen sections and squash cytology were compared with the final diagnosis on paraffin sections 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 88%, discordance rate was 12% in our institution. In cases where the FS and the routine histopathology diagnosis were discordant the final diagnosis was derived from the findings of routine histopathological examination. Astrocytoma (38%) was the most common diagnosis with highest incidence rate in frozen section as well as routine histology in the present study.

Key words: CNS, Frozen Section, SOL.

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 and squash preparation diagnosis is now a days 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 and squash preparation examination has been shown as an excellent diagnostic test. Internationally published studies have confirmed the overall accuracy of intra operative frozen section and squash preparation examination^{2,3,4}.



Materials and Methods

A retrospective study of 100 cases of frozen sections, squash and routine histopathology was done at BJ Medical College Ahmedabad for period of 1st January 2015 to 31 December 2015.

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From the received tissue for frozen section, a tiny portion (1–2 mm³) of tissue was squashed between two slides to prepare smears as described by Adams *et al*⁸. Squash smears were immediately immersed in methanol fixative for subsequent by the rapid Hematoxyline & Eosin (H & E) staining procedure. The residual tissue was submitted for FS. Five-micrometer sections were cut using the cryotome and sections were stained by the rapid H&E method. Subsequently, for the permanent section, the specimen was fixed overnight in 10% buffered formalin, grossed and adequate representative sections were taken according to the standardized guidelines. The permanent sections were initially evaluated on H&E stained sections. Special stains and immunohistochemical stains were performed for confirmation of diagnosis and typing of tumors.

Table: 1 No. of cases of various types of CNS lesions

Lesions	No of cases	
	Frozen Section	Routine Histopathology
Astrocytoma	38	38
Oligodendroglioma	6	6
Meningioma	12	8
Ependymoma	8	8
Medulloblastoma	6	4
Choroid plexus papilloma	2	2
Hemangioma	2	2
Hemangioblastoma	2	2
Sarcomatoid carcinoma	2	2
Koch's spine	2	2
Pnet	2	2
Neuro-enteric cyst	2	2
Metastatic sarcoma	2	0
Metastasis	2	2
Neurocytoma	2	0
Craniopharyngioma	2	4
Pituitary adenoma	2	4
Benign fibro-osseous lesion	2	2
Benign fibroconnective tissue	2	2
Schwannoma	0	2
Cavernoma	0	2
Brain abscess	0	2
Langerhans histiocytosis	0	2

Table 2 : Incidence (in percentage) of various types of CNS lesions

Lesions	Incidence rate (%)	
	Frozen Section	Routine Histopathology
Astrocytoma	38	38
Oligodendroglioma	6	6
Meningioma	12	8
Ependymoma	8	8
Medulloblastoma	6	4
Choroid plexus papilloma	2	2
Hemangioma	2	2
Hemangioblastoma	2	2
Sarcomatoid carcinoma	2	2
Koch's spine	2	2
Pnet	2	2
Neuro-enteric cyst	2	2
Metastatic sarcoma	2	0
Metastasis	2	2
Neurocytoma	2	0
Craniopharyngioma	2	4
Pituitary adenoma	2	4
Benign fibro-osseous lesion	2	2
Benign fibroconnective tissue	2	2
Schwannoma	0	2
Cavernoma	0	2
Brain abscess	0	2
Langerhans histiocytosis	0	2

Results

Out of total 100 cases in this study, 88 cases were concordant, giving a concordant diagnostic frequency of 88%. While remaining 12 cases were discordant with a discordant diagnostic frequency of 12%. The highest number of concordance frequency was observed for astrocytoma (38 cases, 38%) on frozen section and squash preparation as well as routine histopathology.

So, the highest number of cases received and reported on frozen section and squash preparation followed by confirmation on routine histopathology (highest incidence) were of Astrocytoma followed by meningioma and ependymoma.

Image 1 Astrocytoma (Squash Preparation)

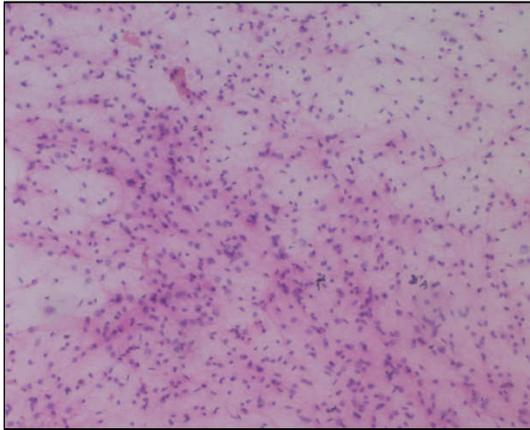


Image 2 Astrocytoma (Frozen Section)

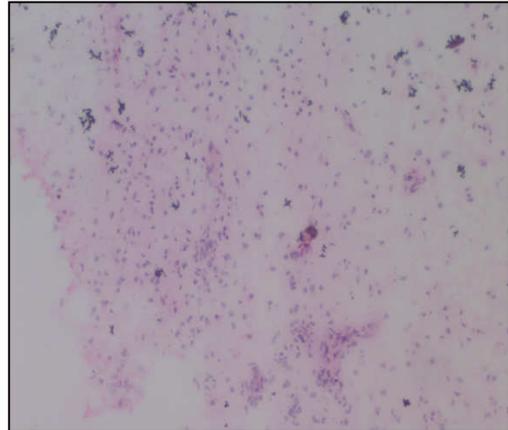


Image 3 Astrocytoma (Paraffin Section)

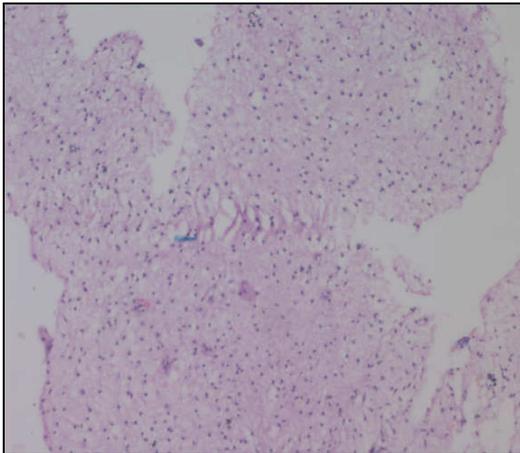


Image 4 Ependymoma (Squash Preparation)

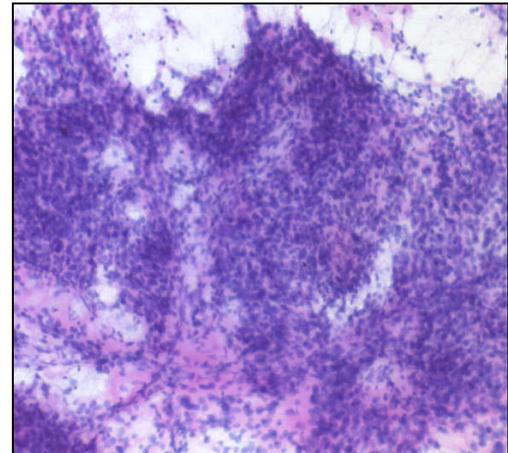


Image 5 Ependymoma (Frozen Section)

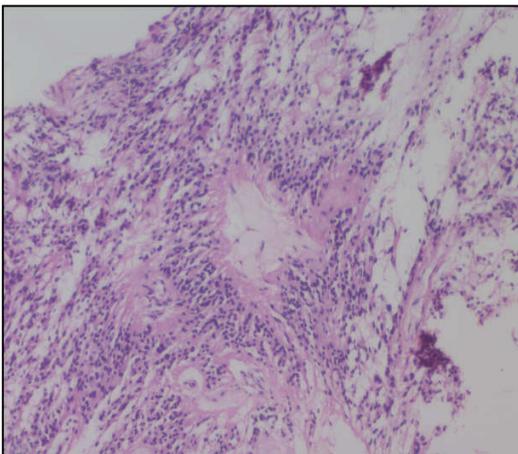
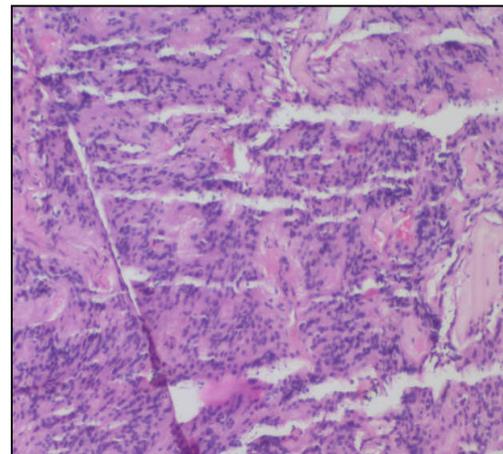


Image 6 Ependymoma (Paraffin Section)



Discussion

The accuracy of frozen section and squash preparation diagnosis at pathology department, civil hospital, Ahmedabad, can be interpreted as comparable with most

international quality control statistics for frozen section and squash preparation.

Table 3 : Comparison of Concordance and Discordance Rates With Results of Various Studies

	Present study	Roessler K. ¹	Zarbo RJ ⁵	Novis DA ⁶
Concordance rate	88%	95%	98.3%	98.2%
Discordance rate	12%	5%	1.7%	1.2%

In our study, the discordant diagnostic frequency was 12%, and the concordant diagnostic frequency was 88%. These findings are comparable with published CAP studies by Zarbo, et al. 1991⁵ and Novis, et al. 1996⁶ which showed concordance rate of 98.3% and 98.2%, and discordant rates of 1.7% and 1.8% respectively.

Causes of discrepancies

- Sampling errors
- Sectioning errors
- Improper Staining
- Diagnostic errors
- Errors in classifying the lesion
- Errors in differentiating the lesion
- Errors in grading of the tumors

Conclusion

The above study shows that around 90 % of the diagnosis given on frozen section are in concordance with paraffin section and hence surgical intervention done in about 90% cases are correct. The study brings into light that frozen section has achieved high diagnostic accuracy at least, as far as grading of tumors is concerned in maximum cases and hence not affecting management protocol. So Frozen section and squash preparation do influence the immediate interventions and surgical procedures. Hence this part of histopathology needs to be brought into routine practice, improved both in terms of diagnosis and turn around time, so that better intra-operative diagnosis and hence patient care can be given. In addition to the aforesaid, routine paraffin section report still maintains an upper edge over frozen section as far as diagnostic accuracy is concerned.

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