

# Histopathological Study of CNS Lesions - A Retrospective Study for 5 Years

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**Abstract:** ***Introduction:** The human nervous system performs greatly varied and highly complex functions. CNS lesions consist of inflammatory, infectious, benign and malignant tumours. CNS tumours are not as frequent as tumours of other sites. Histologically malignant brain tumours carry a poor prognosis. **Aims and objectives:** histopathological study of various CNS lesions in to benign, malignant and infectious conditions. **Methods** – 5 yrs. retrospective study of CNS lesions, over the period march 2011 March 2015, in Narayana medical college, Nellore. A total 146 cases included in which 136 cases are neoplastic, 10 cases are inflammatory. **Results:** 5 yrs. under review (2011-2015) a total of 146 cases of CNS lesions were done histopathologically. 136 (93.16%) neoplastic cases, 10(6.84%) inflammatory cases. Among 10 CNS infections cases, fungal infections were of 5 (50%) cases, 4 cases (40%) were of granulomatous (Koch's) aetiology. 1 (10%) case of Toxoplasmosis. Of the 136 cases of CNS neoplasms, 96 (70.58%) cases were of benign aetiology, and remaining 40 (28.42%) cases were malignant tumours, in which 30 cases of primary CNS malignant tumours were noted, Remaining 10 were metastatic tumours. **Conclusion:** Central Nervous System lesions include benign and malignant neoplasms and infections. Glial tumours are the most common lesions. Most of the lesions are of Grade I neoplasms.*

**Keywords:** Histopathology, CNS (central nervous system), malignant

## 1. Introduction

The human nervous system performs greatly varied and highly complex functions. <sup>(1)</sup> CNS lesions consist of inflammatory, infectious, benign and malignant tumours.

Infections of the CNS are important because of the many pathogens, the emerging and re-emerging of new infections, and the heavy burden they impose on health care system. The infections are caused by wide variety of organisms including bacteria, mycobacteria, (tuberculosis), fungi (mucor, aspergillus) and toxoplasmosis <sup>(2)</sup>

CNS tumours are not as frequent as tumours of other sites. The incidence rate has increased over time. Most Common tumours of CNS are Meningioma's, Astrocytomas, Glioblastomas and Metastatic tumours. <sup>(3)</sup> CNS tumours affects people of all ages. <sup>(4)</sup> Like malignant neoplasm anywhere else in the body, histologically malignant brain tumours carry a poor prognosis <sup>(5)</sup>

The present Study was done from march 2011- march 2015 in the Department of Pathology, at Narayana Medical College, Nellore, for a period of 5 year. The study was both prospective and retrospective.

## 2. Aims and Objectives

1. To classify the CNS lesions into inflammatory and neoplastic conditions.
2. To classify the inflammatory conditions according to the causative organisms.
3. To study the CNS neoplasms and its subtypes with reference to age and sex distribution.

## 3. Materials and Methods

The present study includes a retrospective and prospective analysis of various central nervous system lesions which were diagnosed in the department of pathology at Narayana medical college, during march 2011 to march 2015 (five years). During this period 146 biopsies of various central nervous system lesions were obtained from the department of neurosurgery. Out of 146 cases there were benign, malignant neoplasms and infections were taken into account.

Biopsy specimens received in pathology department were examined after the formalin fixation. After paraffin embedding all sections obtained were stained by haematoxylin and eosin stain. The sections were analysed to know the histological type of the lesion.

Further studies were done on the sections of infectious diseases using PAS stain and AFB stain, to evaluate both fungal and mycobacterial infections respectively

## 4. Results

From 2011 to 2015, 146 cases with CNS disease were grouped into infectious and neoplastic CNS lesions according to 2007 WHO classification system. Among 146 cases total no of males were 75 and females were 71, with slight male predominance. (Male: female = 1.05:1)

Among 146 cases, majority were neoplasms accounting for 136 (93.16%) cases, and remaining 10(6.84%) cases were of infectious aetiology.

Among 10 CNS infections cases, fungal infections were of 5 (50%) cases, 4 cases (40%) were of granulomatous (Koch's) aetiology. 1 (10%) case of Toxoplasmosis was encountered.

Of the 136 cases of CNS neoplasms, 96 (70.58%) cases were of benign aetiology, and remaining 40 (28.42%) cases were malignant tumours.

Out of 40 cases, 30 cases of primary CNS malignant tumours were noted, in which 18 (45%) cases were astrocytomas, 4 (10%) cases were ependymoma, 2 (5%) cases were of oligodendrogliomas and mixed gliomas each. Other tumours like PNET, gliosarcoma, choroid plexus carcinoma, and neuroblastoma were of 1 (2.5%) case each. Remaining 10 were metastatic tumours.

**Table 1: Malignant CNS tumours**

Malignant CNS tumours	No of cases	Percentage (%)
Astrocytomas	18	45
Metastasis	10	25
Ependymoma	04	10
Oligodendroglioma	02	5
Others	06	15
Total	40	100

Out of 96 cases of benign CNS lesions, 19 (19.80%) cases were of meningiomas and schwannomas each. 9 (9.40%) cases were Astrocytomas. 4 (4.16%) cases were meningocele, 3 (3.12%) cases were pituitary adenoma, haemangioblastoma, keratin and colloid cysts each and 15 (15.64%) cases were hematomas. Other benign lesions consist of 18 (18.75%) cases including interesting cases like chondroid chordoma, paraganglioma, meningioangiomatosis to name a few.

**Table 2: Benign CNS lesions**

Benign lesions of CNS	No of cases	Percentage (%)
Meningiomas	19	19.80
Schwannomas	19	19.80
Astrocytoma	09	9.37
Meningocele	04	4.16
Others	49	46.87
Total	96	100

In total of 146 cases 75 (51.36%) cases were encountered in males and 71(48.64%) cases were encountered in females, with slightly male predominance. Male: female ratio is 1.05: 1

Out of the total 146 cases, maximum no of cases were seen in the age group of 31-40 years (33 cases), followed by 32 cases in the age group of 41–50 yrs. Least no of cases were seen in the age group of 71-80 yrs. (5 cases).

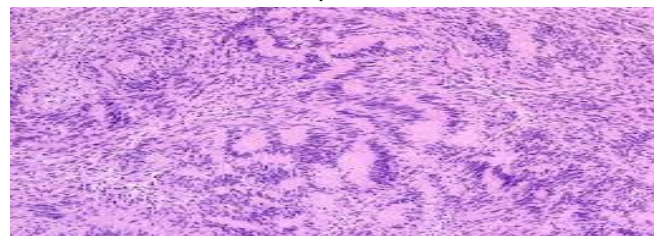
Male predominance is more in the age groups of 41-50 yrs., and 21-30 yrs. with 20 cases and 19 cases respectively. Female predominance is higher in the age groups of 31-40 yrs. with 25 cases.

There were 55 cases of grade 1 neoplasms in which, 19 cases were of meningioma and schwannoma each, 4 cases were meningocele, 3 cases were pituitary adenoma and pilocytic astrocytoma each, oligodendroglioma, craniopharyngioma and neurofibroma were of 2 case each and 1 case of neuroblastoma was noted.

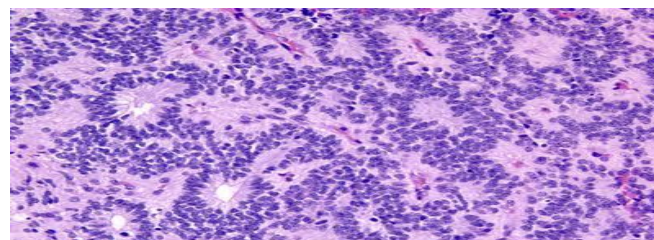
There were 2 cases of diffuse astrocytomas included in grade 2 lesions.

There were 10 cases of grade 3 lesions of which, 5 cases were anaplastic astrocytoma, 4 cases were anaplastic ependymoma and 1 case was choroid plexus carcinoma.

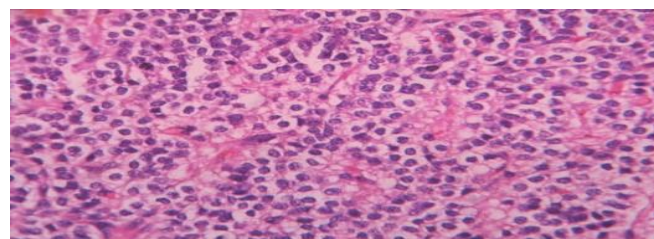
There were 16 cases of grade 4 neoplasms of which, 13 cases were glioblastoma multiformae, 2 cases were mixed gliomas and 1 case was gliosarcoma



**Figure 1: SCHWANNOMA** (H&E stain 10x showing both a cellular Antoni A area and a loose paucicellular Antoni B area. Verocay bodies with palisading arrangement of tumour nuclei in cellular areas)



**Figure 2: EPENDYMOMA** (H&E stain 10x showing the tumour cells resemble normal ependymal cells and are arranged in perivascular pseudorosettes)



**Figure 3: OLIGODENDROGLIOMA** (H&E stain 20x showing the characteristic branching, small, chicken wire-like blood vessels and fried egg like cells with clear cytoplasm and well defined cell borders)

**5. Discussion**

The present study was done to analyse the central nervous system lesions presented to the department. The study was done for a period of five years from 2011 to 2015. All the central nervous system lesions presented during this period were assessed for clinicopathological correlation.

A total number of 146 cases had presented to the department during the study period. Of these 146 lesions majority 98 cases (67.12%) of them were neoplastic lesions. Remaining 48 cases (32.88%) of the total lesions were non-neoplastic. The spectrum of non-neoplastic lesions includes infections (fungal, tuberculosis, toxoplasmosis), colloid cysts, keratin cysts, epidermoid

cysts, arachnoid cysts, hematomas, meningoceles and paragangliomas.

There were 98 patients with neoplastic lesions in the present study. Out of these 98 cases, 88 cases (89.7%) were primary central nervous system tumours and 10 (10.2%) were cases of metastasis in central nervous system with primary lesion located elsewhere in the body.

Of the neoplastic lesions glial tumours were the most common type. There were total of 60 (61.2%) cases with glial lesions. This is in accordance with many multiple studies done worldwide which show that the glial tumours are the most common central nervous system tumours.

Dutta et al analysed the frequency of central nervous system tumours and in their study, the incidence of glial origin tumours were for 48.6%<sup>(6)</sup> In the studies done by the United States central brain tumour registry (CBTRUS)<sup>(7)</sup>, Nomura et al<sup>(8)</sup> the glial tumours were the most common primary central nervous system lesions. However the incidence of glial tumours in these studies varied from 24.2% to 37.5%. According to the cancer research UK gliomas constitute around 50% of all CNS tumours.<sup>(9)</sup>

The relatively higher incidence of glial tumours in the present study and the study done by Dutta et al may be due to the regional differences in the incidence of tumours or may be because of the sample size of the two studies when compared to that of the other studies.

Of the glial tumours Astrocytoma was the most common type. They accounted for 27 (45%) cases out of sixty cases of glial tumours. Gliomas affect about 40% more males than females (Surawicz et al., 1999)<sup>(12)</sup>. Astrocytoma and glioblastoma peak in incidence at age 65 to 74 years, and oligodendroglioma at age 35 to 44 years<sup>(11)</sup>.

Incidence of glial tumours in various studies

Different studies	Incidence (in percentage)
Nomura et al (2000)	37.5%
CBTRUS (2006)	24.2%
Dutta et al (2008)	48.6%
Khaleed R Zalata <sup>(10)</sup> (2011)	35.2%
Present study	68.2%

### CNS Infections

Infectious diseases of the central nervous system (CNS) are particularly important because of their increasing incidence and high fatality. Major predisposing factors to infections are diseases and therapies associated with immunosuppression. A great variety of pathogens can infect the nervous system are Tuberculosis, toxoplasmosis, aspergillus and mucor.

### 6. Conclusion

The following conclusions were made from the present study "Histopathological study of CNS lesions - a retrospective study for 5 years".

Central Nervous System lesions include benign and malignant neoplasms and infections. Among Central Nervous System neoplasms, glial tumours are the most common lesions. Among the glial tumours, astrocytomas are the most common type.

Majority of the patients in the present study had Grade 1 neoplasms

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