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RADIOLOGICAL EVALUATION OF PRIMARY BRAIN TUMOURS USING COMPUTED TOMOGRAPHY AND MAGNETIC RESONANCE IMAGING WITH HISTOPATHOLOGICAL CORRELATION

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ABSTRACT

BACKGROUND AND PURPOSE:
Brain tumours are among the common neoplasms of humans. Diagnosis of brain tumours may be delayed as the initial symptoms and signs are vague and non specific. Therefore clinicians rely mostly on imaging for an early and accurate diagnosis. Both CT and MRI provide excellent anatomic details and information regarding the presence, location and extent of brain tumours.

AIM AND OBJECTIVES:
To assess the role of CT& MRI in :
1. Detection & localization of primary brain tumours
2. Characterization of lesions
3. Giving specific diagnosis of the tumours using characteristics shown by CT and MRI

MATERIALS AND METHODS:
- Study comprised of 23 patients with clinical suspicion of primary brain tumour referred to the Department of Radiodiagnosis , ASRAMS , Eluru, Andrapradesh , during a period of 8 months (January 2023 to August 2023)
- The patients were subjected to CT brain using GE revolution ACT CT machine (32 slice) and MRI BRAIN using SIEMENS 1.5 Tesla MRI
- Various radiological findings were observed and percentage of different radiological findings were computed and compiled.

RESULTS :
In this study of 23 patients with primary brain tumours, 43% were gliomas (10 cases), 30% were meningiomas (7 cases), 30% were sellar and suprasellar lesions (7 cases), 8% schwannomas (5 cases) and 4% medulloblastoma (1 case) .

CONCLUSION:
CT and MRI are excellent modalities in diagnosis of primary brain tumours especially in tumour location and extent. In majority of cases, it is possible to arrive at a specific diagnosis based on CT & MRI characteristics .

Keywords: Brain tumours

INTRODUCTION

Brain tumours are among the common neoplasms of humans .The incidence of central nervous system tumours in india ranges from 5 to 10 per 1,00,000 population with an increasing trend and accounts for 2% of malignancies .

AIMS AND OBJECTIVES:

1. To assess the role of CT and MRI in detection and localization of primary brain tumours
2. Characterisation of lesions ,assessment of extent and secondary effects of lesions .
3. Giving specific diagnosis of the tumours using characteristics shown by CT and MRI

MATERIALS AND METHODOLOGY:

- **STUDY SITE** : Present study was carried out in department of radiodiagnosis ,Alluri Sitarama Raju Academy of Medical Sciences, Eluru, Andhra Pradesh .

- **STUDY DESIGN :** Prospective observational study
- **STUDY POPULATION** : All patients with clinical suspicion of primary brain tumour .
- **SAMPLE SIZE :** 23 cases were included
- **STUDY PERIOD :** during a period of 8 months (January 2023 to August 2023)

INCLUSION CRITERIA
• All age groups • Both males and females • Patients having clinical suspicion of brain tumour • Patients who gave consent

EXCLUSION CRITERIA
• Patients with a known primary tumour elsewhere in the body with features of metastases to brain • Patients who are contraindicated for MRI

OBSERVATION AND RESULTS

TABLE 1 : DISTRIBUTION OF PRIMARY BRAIN TUMORS

TUMOUR	FREQUENCY	PERCENT
GLIOMA	10	43.4%
MENINGIOMA	5	21.7%
PITUITARY TUMORS	5	21.7%
SCHWANNOMA	2	8.6%
MEDULLOBLASTOMA	1	4.3%
TOTAL	23	100%

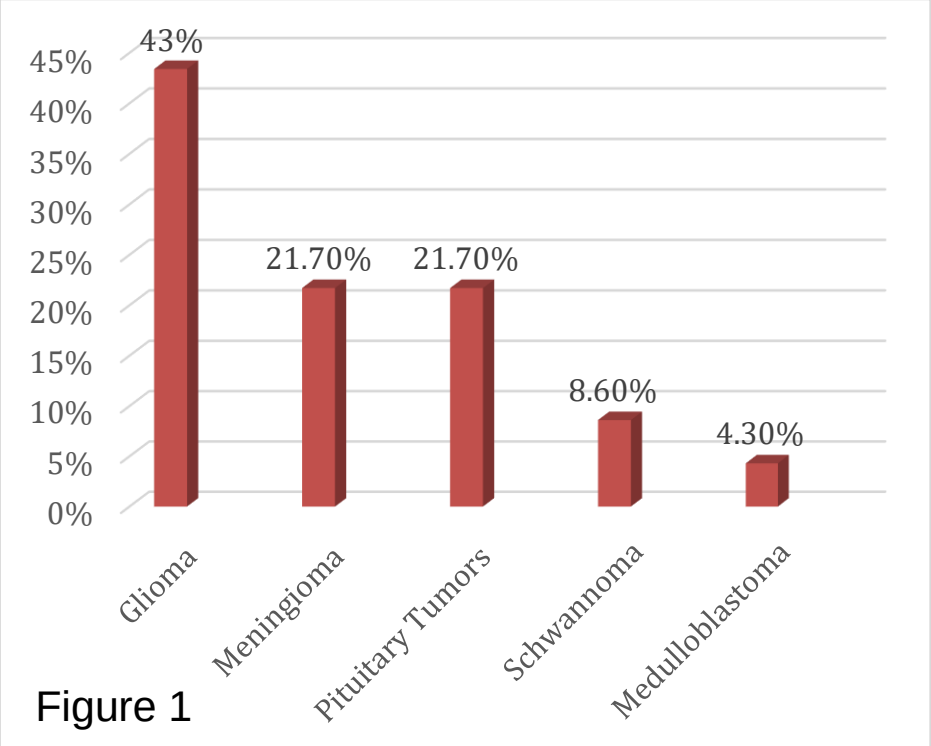


Figure 1

Out of 23 patients with primary brain tumours, 43% were gliomas (10 cases), 21% meningiomas (5 cases), 21% Pituitary tumors (5 cases), 8% schwannomas (2 cases) and 4% medulloblastoma (1 case) .

TABLE 2 : DISTRIBUTION OF CALCIFICATION AND HEMORRHAGE AMONG PRIMARY BRAIN TUMORS

	Calcification		Hemorrhage	
	No. of cases	**Percent**	**No. of cases**	**Percent**
Glioma	1	10%	2	20%
Meningioma	2	40%	_	_
Pituitary tumors	2	40%	_	_
Schwannoma	_	_	_	_
Medulloblastoma	_	_	_	_

Calcification was present in 10% of gliomas ,40% of meningiomas and pituitary tumors .
Haemorrhage was present in 20% of gliomas

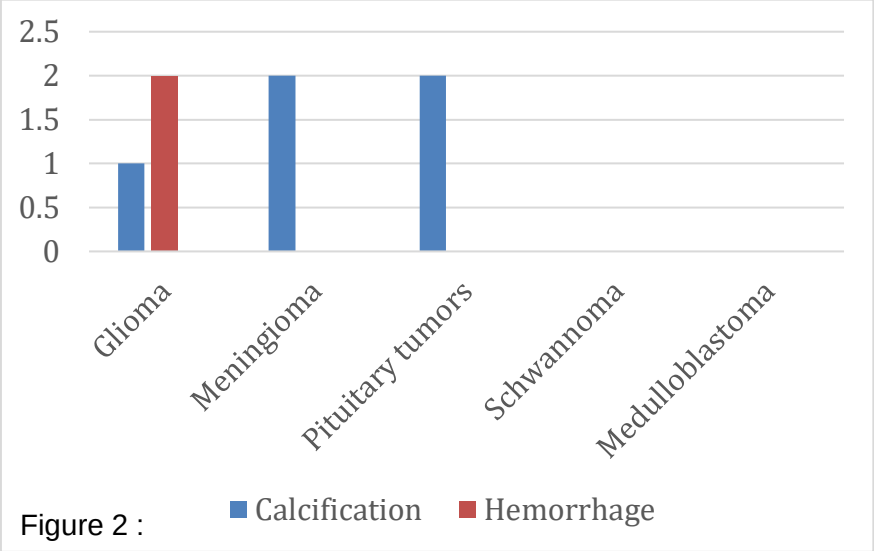


Figure 2 :

TABLE 3 : DISTURBUTION OF IMAGING MODALITY USED FOR BRAIN TUMOUR DETECTION

	CT		MRI	
	Frequency	**Percent**	**Frequency**	**Percent**
Done	10	43%	21	91%
Not done	13	57%	2	9%
Total	23	100%	23	100%

In this study , CT scan was done in 10 patients (43%) and MRI was done in 21 patients (91%)
Both CT and MRI were done in 6 patients

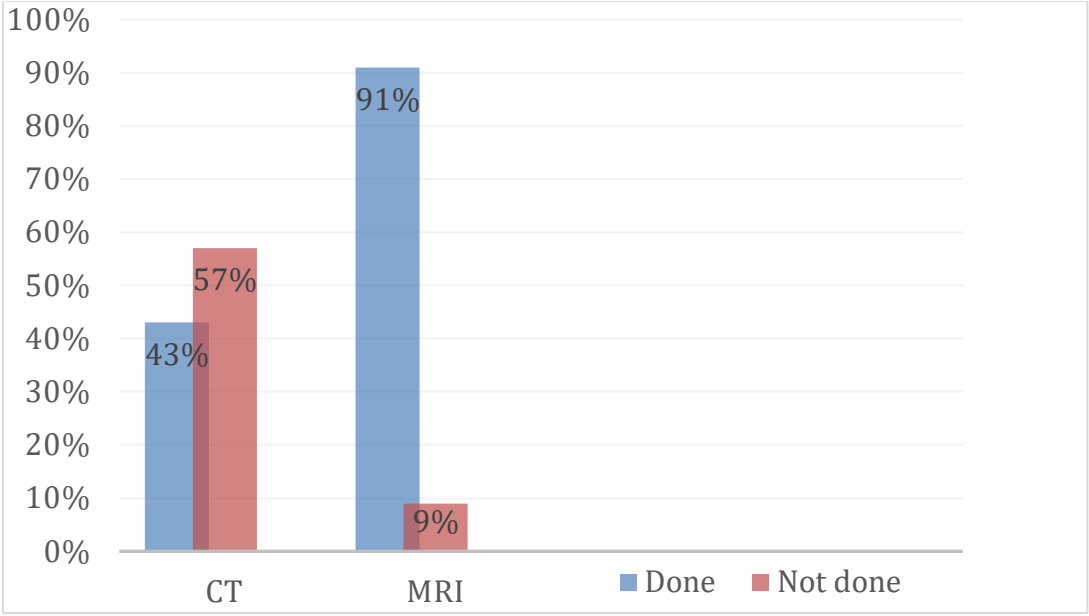


FIGURE 3:

TABLE 4 : MRI SIGNAL CHARACTERISTICS OF PRIMARY BRAIN TUMORS

MRI Sequence	Hypo intense	Hyper intense	Iso intense	Hetero intense
T1WI	15	1	1	6
T2WI	1	11	2	9

In this study, most of the tumors were hypointense on T1 WI and hyperintense on T2 WI

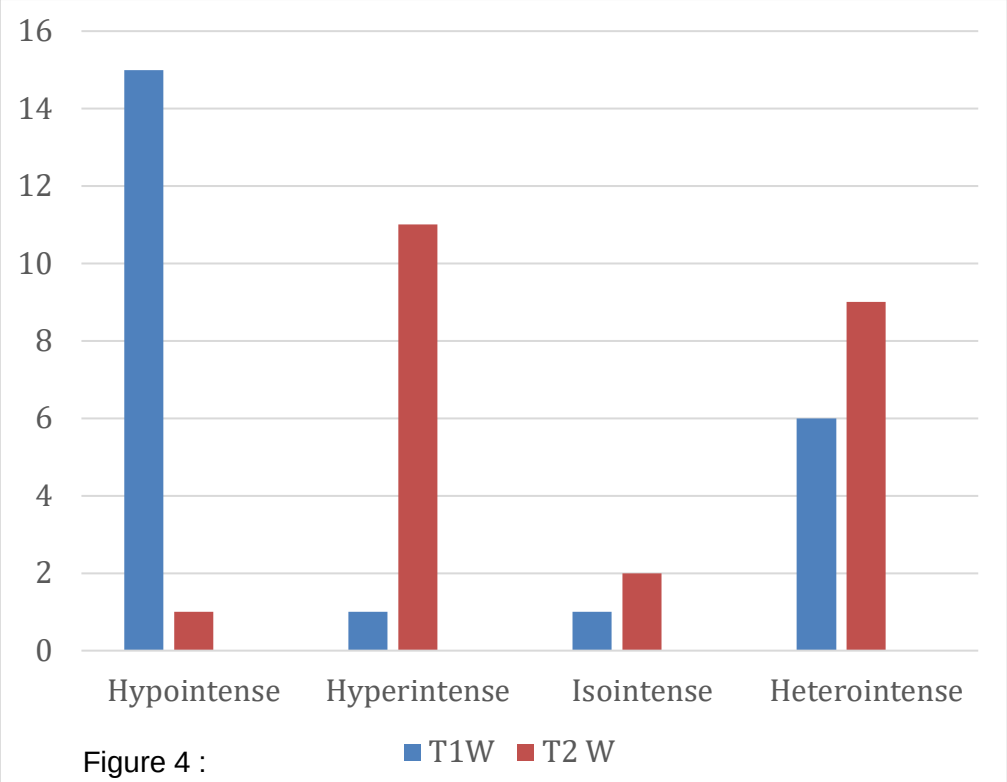


Figure 4 :

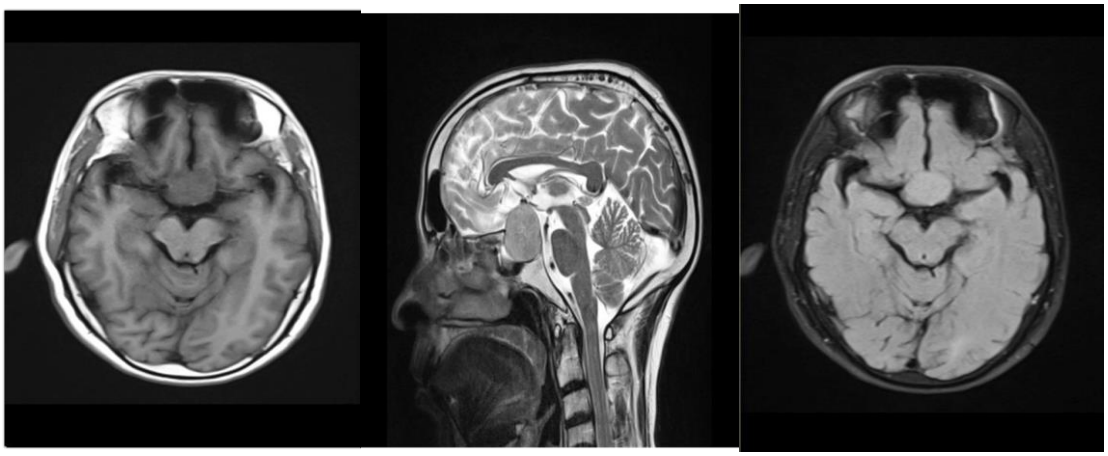
TABLE 5 : CT VS HISTOPATHOLOGY

		HISTOPATHOLOGY					
		Glioma	**Meningioma**	**Pituitary tumors**	**Schwannoma**	**Medulloblastoma**	**Total**
CT	Glioma	4					4
	Meningioma		3				3
	Pituitary tumors			2			2
	Schwannoma				1		1
	Medulloblastoma					_	_
	Total	4	3	2	1	_	10

TABLE 6 : MRI VS HISTOPATHOLOGY

		HISTOPATHOLOGY					
		Glioma	**Meningioma**	**Pituitary tumors**	**Schwannoma**	**Medulloblastoma**	**Total**
MRI	Glioma	10					10
	Meningioma		4				4
	Pituitary tumors			4			4
	Schwannoma				2		2
	Medulloblastoma					1	1
	Total	10	4	4	2	1	21

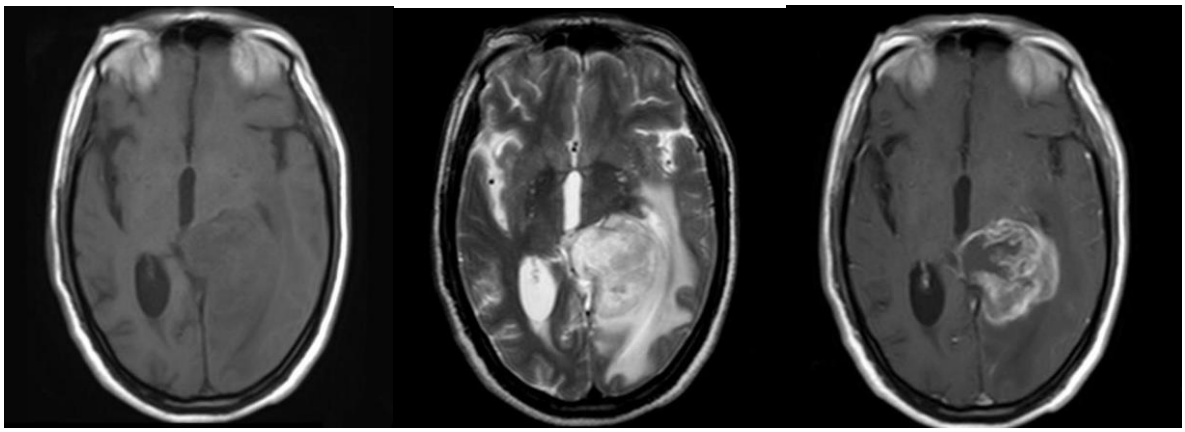
CASE 1



a)T1 axial b)T2 saggital c) T2 flair axial

There is well defined lobulated lesion which is isointense on T1, heterogeneously iso to hyperintense on T2/FLAIR noted in sellar and suprasellar regions – Pituitary macroadenoma

CASE 2

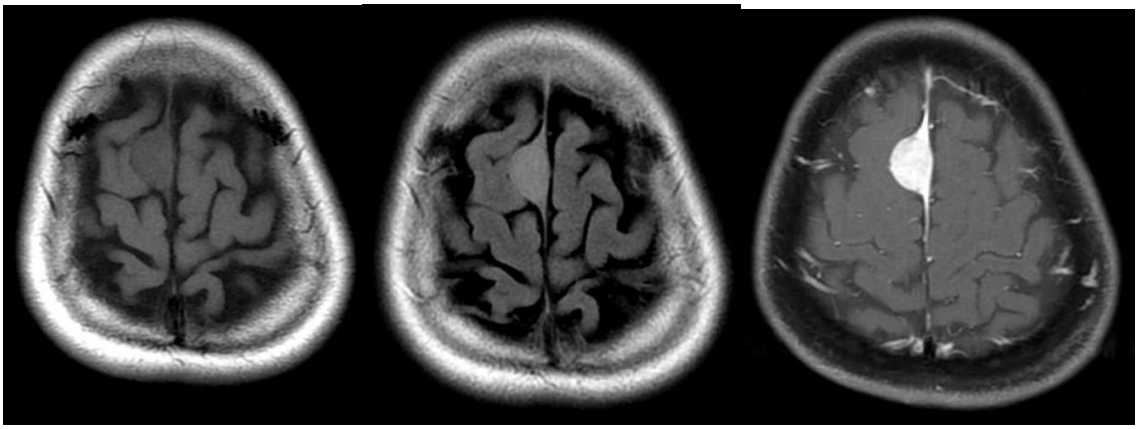


T1 Axial T2 Axial T1 Post contrast

Ill- defined intra-axial space occupying lesion with cystic / necrotic components, involving the inferior aspect of left temporooccipital region, exhibits heterogeneous enhancement on post contrast study . This appears to be ventricular in

origin invading adjacent parenchyma, with extensive surrounding vasogenic oedema and mass effect upon the temporal horn of left lateral ventricle , features consistent with glioma

CASE 3



(a) T1 axial (b) T2 Flair axial (c) T1 post contrast

Well defined broad based extra axial lesion with a dural tail which is isointense to grey matter on both T1 and T2 FLAIR WI and vividly enhancing on post contrast T1 WI which are typical features of parafalcine meningioma

DISCUSSION AND CONCLUSION

- Imaging is an extremely important part of the treatment process for people who have brain tumors .
- Both CT and MRI have undergone significant technological advancements in recent years , which has led to the creation of novel imaging techniques that have significantly increased the ability to detect and characterize brain neoplasms .
- CT is an essential tool for initial workup on tumors, in preoperative evaluation, and during post operative care, it is usually first line imaging modality due to its short acquisition time and low cost .
- The function of CT is primarily limited to the detection of hemorrhage, herniation, calcification and hydrocephalus
- MRI is the primary imaging modality of choice .
- When it comes to evaluation of brain tumors, MRI has several advantages over CT scan, including its multiplanar capabilities, the absence ionizing radiation in its imaging, improved tumour visualization and characterization.
- Advanced aspects of MRI, including spectroscopy, perfusion and diffusion, provide vibrant details related to brain tumour reaction and development .
- CT and MRI stay as the main diagnostic modalities for detection and localization of suspected primary brain tumors and help in giving specific diagnosis of the tumors based on their characteristics shown on imaging .

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