

Research Article

Retrospective analytical six months study of vascular abnormalities of brain

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ABSTRACT

Background: Vascular abnormalities of brain include vessel obstruction, vascular tumours, vascular malformations and congenital anomalies. In this study, vascular abnormalities reported in our institute are analysed retrospectively.

Methods: This is a retrospective analytical study of six months period from May 2015 to October 2015. The study was done in the radiodiagnosis department of Tirunelveli Medical College Hospital. 702 cases of MRI brain scans have been taken in above period for various conditions. In which Patients with vascular abnormalities in the scan were selected for the study i.e sample selection. No of patients selected for analysis are 60. Those findings were analysed and hereby are presented, in which age varied as low as 1 year and as high as 75 years.

Results: From this study, it is noted that most of vascular abnormalities become symptomatic between the ages of 21-40. Out of that most of patients lie in age group of 21-30. There is no significant difference seen in the gender distribution of the total vascular abnormalities. Vascular abnormalities of brain are common imaging findings. Radiology plays major role in diagnosing these conditions. Rare cases like Vein of galen ectasia, aplasia of right internal carotid artery are diagnosed in above patients.

Conclusions: On analysis it is noted that CT scan was able to pick up forty percentage of vascular abnormality cases. MRI is able to pick up even congenital anatomical variations and subtle pathologies. Radiology plays major role in diagnosing vascular abnormalities of brain. CT and MRI complement each other in diagnosis. Parenchymal AVM should be ruled out when there is ectasia of vein of galen. CT of base of skull gives information regarding carotid canal in absent carotid artery cases. Pituitary gland changes should be noted in cases of absent carotid artery.

Keywords: Computerised tomography, Magnetic resonance imaging, Vascular abnormalities, Ectasia, Aplasia, Pituitary

INTRODUCTION

Vascular abnormalities of brain include vessel obstruction, vascular tumours, vascular malformations and congenital anomalies. Vascular anomalies of brain are common imaging findings. The patients may be asymptomatic and the lesions detected are incidental. The other forms of presentation include seizure, headache, and haemorrhage causing altered sensorium. Most of the cavernous malformations remain asymptomatic throughout life, but

some of them give rise to symptoms like slowly evolving focal nervous deficits or epileptic seizures with or without haemorrhage that appearing in adult age.¹ The assessment of the natural history of intracranial vascular malformations is very difficult because they are varied in nature and also they are frequently clinically silent.² Brain arteriovenous malformations (AVM) may clinically present as chronic headache. There is migraine like headaches appear if the AVM is in the occipital location.³ Radiology plays major role in diagnosing these conditions.

METHODS

This is a retrospective analytical study of six months period from May 2015 to October 2015. The study was done in the radiodiagnosis department of Tirunelveli Medical College Hospital. 702 cases of MRI brain scans have been taken in above period for various conditions. In which patients with vascular abnormalities in the scan were selected for the study i.e. sample selection. No of patients selected for analysis are 60.

Inclusion criteria

Patients with vascular abnormalities in MRI Brain study upto the age of 80.

Exclusion criteria

Patients who have not taken CT scan for comparison, post-operative patients on follow up, patients with history of head injury.

CT scan was done by TOSHIBA Asteon single slice helical scanner. MRI was done by 1.5 Tesla Siemens symphony equipment. Contrast was given to all cases. Those findings were analysed and hereby are presented, in which age varied as low as 1 year and as high as 75 years. Contrast CT and MR angiogram give detailed information regarding feeding, draining vessels.

RESULTS

Vascular abnormalities of brain are common imaging findings. Radiology plays major role in diagnosing these conditions. CT scan is useful in detecting areas of haemorrhage. MRI is very much useful for delineating parenchymal pathologies and to highlight the feeding and draining vessels. Both CT and MRI have been taken in above 60 cases. The results are analysed as follows.

Most of vascular abnormality cases belong to age group 21-40 i.e. (46.66%) out of that most of patients lie in age group of 21-30 i.e. about 28.33%.

Table 1: Age wise distribution.

No.	Age group	No. of cases	Percentage %
1	0-10	4	6.66
2	11-20	5	8.33
3	21-30	17	28.33
4	31-40	11	18.33
5	41-50	8	13.33
6	51-60	7	11.66
7	61-70	5	8.33
8	71-80	3	5
	Total	60	100

Table 2: Imaging findings wise cases distribution.

No.	Diagnosis	No. of cases
1	Dural sinus thrombosis	11
2	Hypoplasia of left transverse sinus	20
3	MCA stenosis/obstruction	8
4	Foetal origin of PCA	6
5	ICA agenesis	1
6	Arteriovenous malformation	6
7	Cavernoma	5
8	Venous angioma	2
9	Ectasia of vein of galen	1
	Total	60

Table 3: Imaging findings wise cases distribution.

No.	Diagnosis	Male number	Female number	No. of cases
1	Dural sinus thrombosis	4	7	11
2	Hypoplasia of left transverse sinus	11	9	20
3	MCA stenosis/obstruction	5	3	8
4	Fetal origin of PCA	3	3	6
5	ICA agenesis	1	0	1
6	Arteriovenous malformation	3	3	6
7	Cavernoma	3	2	5
8	Venous angioma	1	1	2
9	Ectasia of vein of galen	0	1	1
	Total	31	29	60

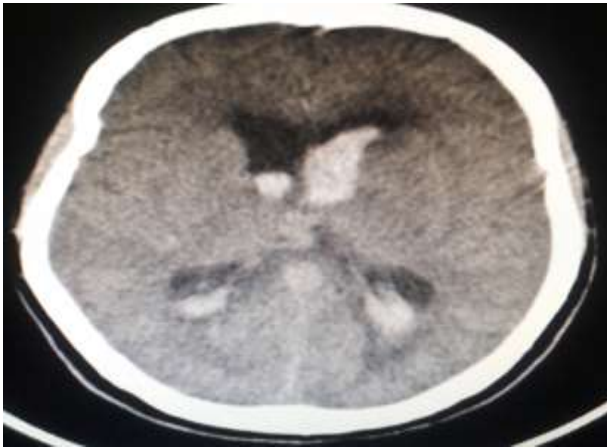
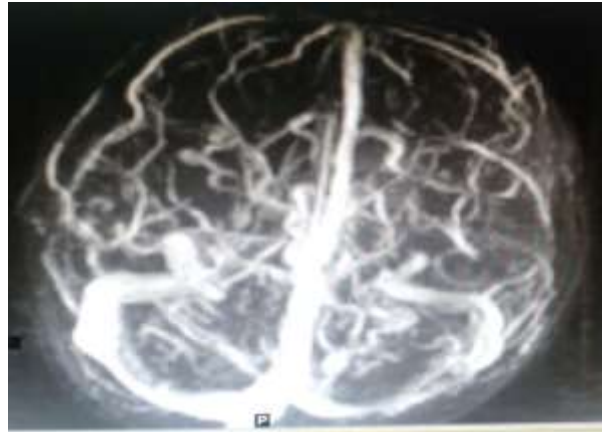
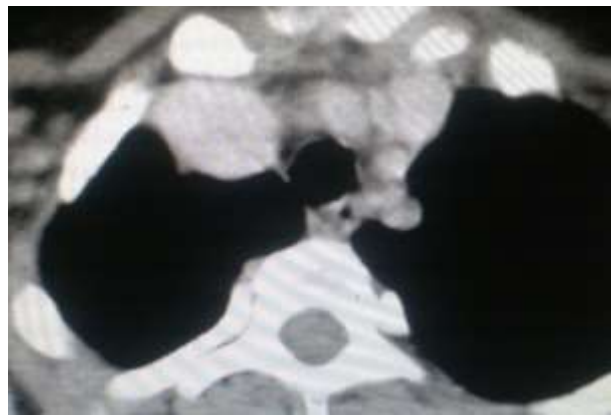
There is no significant difference seen in the gender distribution of the total vascular abnormalities as seen in the above Table 3.

The cases are analysed as detectability by CT, MRI as follows in Table 4. On analysis it is noted that CT scan was able to pick up forty percentage of vascular abnormality cases. MRI is able to pick up even congenital anatomical variations and subtle pathologies. Rare cases like vein of galen ectasia, aplasia of right internal carotid artery are diagnosed in above study. Radiologically one patient has venous anomalies including developmental venous malformation in cerebellum, prominent internal cerebral veins, vein of galen ectasia, multiple abnormal parenchymal vessels and left gangliocapsular haemorrhage.

Table 4: Detectability using CT, MRI.

No	Diagnosis	CT	MRI
1	Dural sinus thrombosis	7	11
2	Hypoplasia of left transverse sinus	6	20
3	MCA stenosis/obstruction	3	8
4	Fetal origin of PCA	0	6
5	ICA agenesis	1	1
6	Arteriovenous malformation	4	6
7	Cavernoma	2	5
8	Venous angioma	0	2
9	Ectasia of vein of galen	1	1
	Total	24	60

The haemorrhage may be due to hidden venous malformation. The patient also has dilated superior and inferior vena cava (Figures 1- 4). The patient has systemic and cerebral venous anomalies.

**Figure 1: Plain CT- dense internal cerebral veins and vein of galen.****Figure 2: T2W MRI- prominent internal cerebral veins and ectasia of vein of galen.****Figure 3: MR VENO - multiple abnormal venous channels in cerebral, cerebellar parenchyma.****Figure 4: CT chest- dilated superior vena cava.**

Radiologically another patient had aplasia of right internal carotid artery with flat sella and short pituitary stalk (Figures 5 - 8). This case is presented because of rarity and the associated pituitary abnormality.

**Figure 5: CT skull- hypoplastic right internal carotid artery canal.**



Figure 6: MR ANGIO- absent signal in right internal carotid artery.

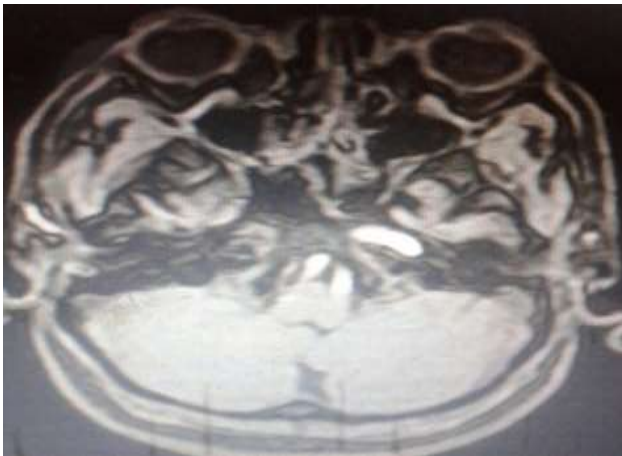


Figure 7: MR angio source- absent signal in the right carotid canal.



Figure 8: T1W MRI- short pituitary stalk with flat sellar cavity.

DISCUSSION

Vascular abnormalities of brain are common imaging findings. Radiology plays major role in diagnosing these conditions. Vascular abnormalities of brain include vessel obstruction, vascular tumours, vascular malformations and congenital anomalies. Vascular malformations of the central nervous system can be divided, as they can elsewhere, into high and low flow malformations.

High flow malformations are arteriovenous malformation (AVM), cerebral AVM (pial / parenchymal AVM), cerebral proliferative angiopathy, dural arteriovenous fistula (DAVF) and pial arteriovenous fistula (PAVF).

Low flow malformations are capillary telangiectasia, cavernous haemangioma, venous malformations, developmental venous anomaly (DVA) (formerly called venous angiomas), vein of Galen malformation (can be high flow as well), venous varix and sinus pericranii (in skull vault).

Mixed vascular malformation is cavernous haemangioma with a DVA. Another type of classification is as follows;

Cerebral vascular malformations with A-V shunting-arteriovenous malformation, dural A-V fistula and vein of galen malformation.

Cerebral vascular malformations without A-V shunting-developmental venous anomaly, sinus pericranii, cavernous malformation and capillary telangiectasia.

Rare cases like vein of galen ectasia, aplasia of right internal carotid artery are diagnosed in above study. Vein of galen ectasia is rare finding. The clinical presentations of patients with vein of Galen dilatation vary. Even psychiatric complaints are known in milder forms.

Three anatomic types have been individualized: the vein of Galen arterio-venous malformation (AVM), the cerebral AVM with vein of Galen ectasia, the varix of the vein of Galen without AV shunt.⁴ Vein of galen malformation is the most common intracranial vascular malformation antenatally diagnosed. There is an increased male predilection.⁵ Angiography remains the gold standard in full characterisation of the malformation. There should not be drainage to other components of the deep venous system by definition.⁶

Developmental venous anomalies are recognised as the most common cerebral vascular malformation, accounting for ~55% of all such lesions. The most common locations are frontoparietal region, usually draining towards the frontal horn of the lateral ventricle and cerebellar hemisphere draining towards the fourth ventricle.⁷ An association with venous malformations of the head and neck also exists.⁸

Congenital absence of the internal carotid artery (ICA) occurs in less than 0.01% of the population. It is rare and encompasses agenesis, aplasia, and hypoplasia.⁹ Agenesis is defined as complete failure of an organ to develop, aplasia as lack of development (but its precursor did exist at one time), and hypoplasia is defined as incomplete development of the organ.¹⁰ Congenital absence may be unilateral or bilateral. But the unilateral variety is more common.¹¹ Most patients are asymptomatic as there is sufficient cerebral circulation supplied to the defective area by the communicating arteries of the circle of Willis.¹² CT of the skull base in agenesis cases demonstrate an absence of the carotid canal.¹³ Internal carotid artery development anomaly and associated pituitary abnormality is a rare entity.

CONCLUSIONS

From this study, it is noted that most of vascular abnormalities become symptomatic between the ages of 21-40. Out of that most of patients lie in age group of 21-30. There is no significant difference seen in the gender distribution of the total vascular abnormalities. On analysis it is noted that CT scan was able to pick up forty percentage of vascular abnormality cases. MRI is able to pick up even congenital anatomical variations and subtle pathologies. Radiology plays major role in diagnosing vascular abnormalities of brain. CT and MRI complement each other in diagnosis. Parenchymal AVM should be ruled out when there is ectasia of vein of galen. CT of base of skull gives information regarding carotid canal in absent carotid artery cases. Pituitary gland changes should be noted in cases of absent carotid artery.

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Ethical approval: Not required

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