Section: Radiology

Original Research Article

NON-TRAUMATIC INTRACRANIAL BLEED MRI STUDY

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ABSTRACT

Background: Spontaneous intracranial hemorrhage is secondary to multiple cerebrovascular or neoplastic diseases. Different approaches or techniques of MRI can visualize the proper lesions of bleeding of non-traumatic patients. **Materials and Methods:** 180 (one hundred and eighty) adult patients with spontaneous ICH were studied with the help of a 1.5 T Philips Achieve MR scanner with acquisition of T1, T2 axial, FLAIR axial, DW axial, T2 coronal, T1 sagittal, and T2 GRE axial sequences. Apart from the MRI study, the clinical manifestation of every patient is recorded. **Result:** The highest number of ICH was 50 (27.7%) cortical venous thrombosis, followed by 46 (25.5%) arterial infarct, 45 (25%) venous infarcts, and the least was 11 (6.1%) aneurysms. The clinical manifest had a majority were 57 (31.6%) hypertensive, followed by 43 (23.8%) with type-II DM, and 4 (2.2%) were of unknown etiology. **Conclusion:** No baseline clinical or radiographic study predicts the lesion of spontaneous ICH, but an MRI study can locate the lesion of non-traumatic ICH.

INTRODUCTION

Brain MRI is often performed in patients with spontaneous intracranial hemorrhage (ICH) to evaluate for an underlying structural etiology such as neoplasm or vascular malformation.[1] Despite the routine use of MRI in spontaneous ICH, there remains knowledge regarding which patients are more likely to benefit from brain MRI as well as the optimal timing for obtaining imaging.[2]

The majority of these studies were limited by small sample sizes in present clinical practice.[3] but have led to the diagnosis of many vascular diseases, and spontaneous ICH is secondary to multiple clinical scenarios. Hence, accurate MRI imaging of the brain will be a helping hand to clinicians for diagnosing and management to avoid further alarming clinical emergencies.[4] Hence, an attempt is made to evaluate spontaneous Intracranial hemorrhages in adults of both sexes in different parts of the brain.

MATERIALS AND METHODS

180 (one hundred eighty) patients admitted at Surabhi Institute of Medical Sciences, Siddipet, Husnabad, Mundrai, Telangana-502375, were studied.

Inclusion Criteria: The patients having strong clinical suspicion of intracranial hemorrhage (ICH) and age > than 18 years. The patients who gave their consent for the study in writing were included in the study.

Exclusion Criteria: Patients below 18 years, patients with head injury, metallic implants, claustrophobia, and refusal to give their consent for the study were excluded.

Method: 180 adult patients of strong clinical suspicion were examined with the help of a 1.5T Philips Achieva MR scanner with acquisition of T1 axial, T2 axial, F1 air axial, DW axial, T2 coronal, T1 sagittal, and T2 GRE axial sequences. After a detailed study diagnosis of the type of ICH was done for proper management, MRI images were analyzed and categorized properly; moreover, the clinical manifestation of every patient of non-traumatic ICH was also noted.

The duration of the study was from April 2024 to May 2025.

Statistical Analysis: Details of non-traumatic ICH locations were classified with percentages, and clinical manifestations of ICH patients were also classified with percentages. The statistical analysis was carried out using SPSS software. The ratio of male and female was 2:1.

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Figure-1: Showing venous sinus thrombosis

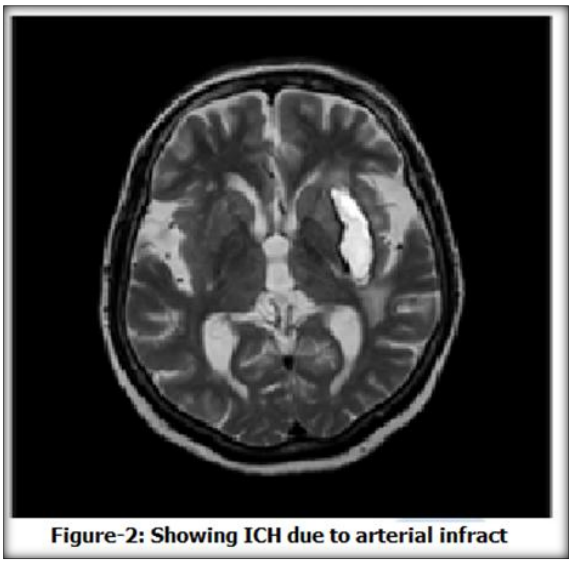

Figure-2: Showing ICH due to arterial infract

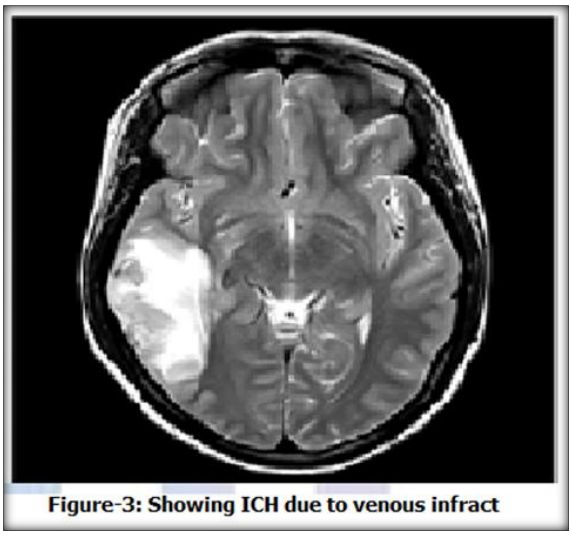

Figure-3: Showing ICH due to venous infract

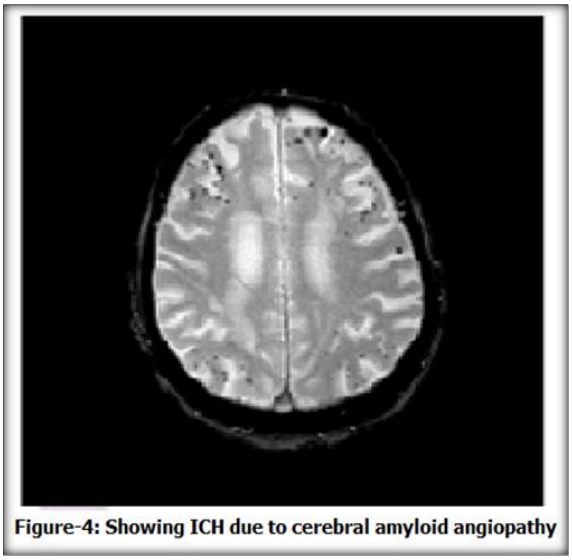

Figure-4: Showing ICH due to cerebral amyloid angiopathy

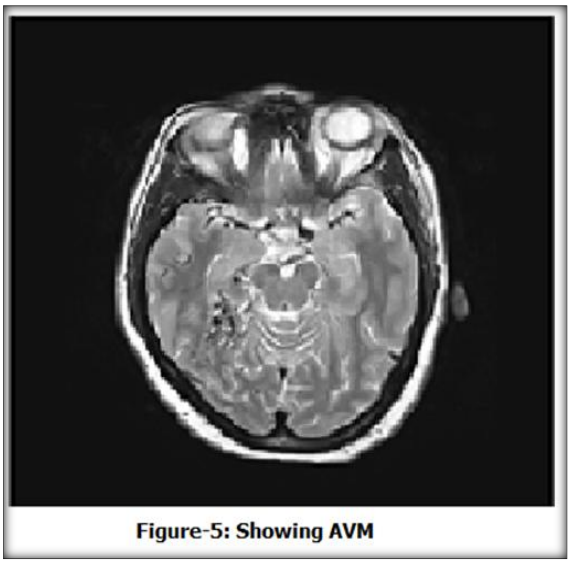

Figure-5: Showing AVM

RESULTS

Table 1: Study of non-traumatic intra cranial hemorrhage: 50 (27.7%) cortical venous thrombosis, 46 (25.5%) Arterial infarct, 45 (25%) venous infarct, 15 (8.3%) cerebral amyloid angiopathy, 13 (7.2%) arterio-venous malformation, 11 (6.1%) Aneurysm

Table 2: Clinical manifestations of patients having non-traumatic ICH: 57 (31.6%) Hypertensive, 43 (23.8%) type-II DM, 12 (6.6%) hematological disorder, 5 (2.7%) history of malignancy, 6 (3.3%) previous stroke patients, 15 (8.3%) antihypertensive drugs taking patients, 11 (6.1%) anti platelt drugs taking patients, 27 (15%) cirrhosis of liver patients, 4 (2.2%) unknown etiology.

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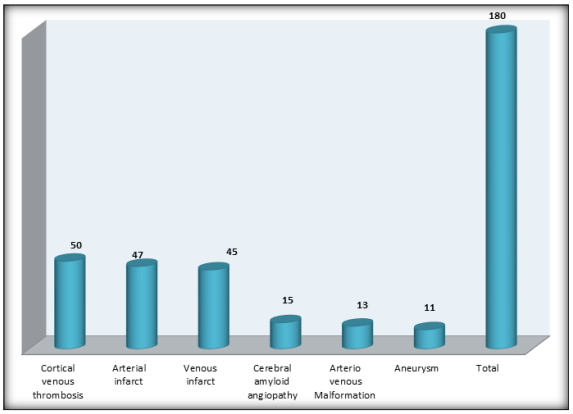

Chart 1: Study of non-traumatic intracranial haemorrhage in adults

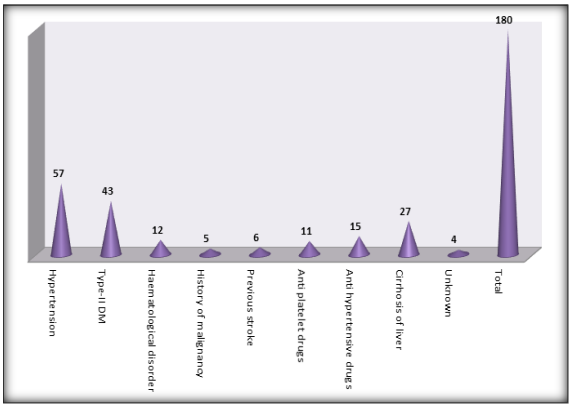

Chart 2: Clinical manifestation of the patients having non-traumatic intra cronial haemorrhage

Table 1: Study of non-traumatic intracranial haemorrhage in adults

Total No. of patients: 180

Sl. No.	Details of ICH	Number of patients (180)	Percentage (%)
1	Cortical venous thrombosis	50	27.7%
2	Arterial infarct	47	25.5%
3	Venous infarct	45	25%
4	Cerebral amyloid angiopathy	15	8.3%
5	Arterio venous Malformation	13	7.2%
6	Aneurysm	11	6.1%
	Total	180	100

Table 2: Clinical manifestation of the patients having non-traumatic intra cronial haemorrhage

Total No. of patients: 180

Clinical manifestations	No. of patients (180)	Percentage (%)
Hypertension	57	31.6
Type-II DM	43	23.8
Haematological disorder	12	6.6
History of malignancy	5	2.7
Previous stroke	6	3.3
Anti platelet drugs	11	6.1
Anti hypertensive drugs	15	8.3
Cirrhosis of liver	27	15
Unknown	4	2.2
Total	180	100

DISCUSSION

Present non-traumatic intracranial hemorrhage (ICH): 50 (27.7%) patients had cortical venous thrombosis, 46 (25.5%) arterial infarct, 45 (25%) venous infarct, 15 (8.3%) cerebral amyloid angiopathy, 13 (7.2%) arteriovenous malformation, and 11 (6.1%) aneurysm (Table 1). The clinical manifestations were 57 (31.6%) were hypertensive, 43 (23.8%) were diabetic, 12 (6.6%) had hematological disorders, 5 (2.7%) had a history of malignancy, 6 (3.3%) had a history of previous stroke, 11 (6.1%) were taking antiplatelet drugs, 15 (8.3%) were taking antihypertensive drugs, 27 (15%) had cirrhosis of the liver, and 4 (2.2%) had unknown etiology (Table 2) (Figure 1, 2, 3, 4 and 5). These findings are more or less in agreement with previous studies.[5,6,7]

Blood is the most plastic flowing connective tissue but ICH is less common than ischemic stroke and is associated with morbidity and mortality. Intracerebral hemorrhage frequently affects the basal ganglia, thalamus, cerebral lobes, pons, and cerebellum. It is reported that hypertension, cerebral amyloid angiopathy, and anticoagulation are major causes of intracranial hemorrhage (ICH).[8]

The appearance of ICH on MR is significantly affected by the age of the hematoma and also by the type of MR contrast used. The MR signal characteristics in turn are mainly dependent on the chemical state of the iron molecule in hemoglobin and the state of the red blood cell membrane.[9] Deoxyhemoglobin is a blood degradation product with paramagnetic properties; because of its unpaired electrons, it is the main substrate responsible for early hemorrhage identification on MR scans. On GE images, a few areas of hypersensitivity can be detected in the lesion core, and of these, most are usually surrounded by hypointense boundaries. Hyperintense signals are usually found bordering the central lesion of T2-weighted GE images, whereas hypointense signals are commonly observed on T1-weighted images, there by indicating perifocal vasogenic edema.[10]

Within hours of the bleeding event, deoxygenation of hemoglobin starts from the periphery to the center of

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the lesion, which is paramagnetic (darker) on T2; however, this structure of hemoglobin does not affect T1 images.[11]

After a week to a month of ICH, the resolution process results in patients (hemoglobin) breakdown, which reduced hypersensitivity on both T1 and T2 images. Hematomas do not follow vascular territories, but infarcts do and the occlusion often viewed on MR angiography. MRI shows minor and hard-to-appreciate changes in the hyperacute and early acute phases of ICH. GHE (gradient recalled echo) detects the hematoma in both acute and chronic stages of ICH.[12]

CONCLUSION

Present MRI assessment in non-traumatic hemorrhage has certain limitations in visualizing the size, shape, density, and exact location of the lesion; hence, co-morbidities or pathogenesis provide more accurate information about clinical outcome. Moreover, MRI baseline studies cannot predict the non-traumatic hemorrhage; hence, more vascular study is required to differentiate physiological and pathological vascular patterns to predict spontaneous bleeding radiologically.

Limitation of study: Owing to remote location of research centre, small number of patients, lack of latest techniques we have limited finding and results.

- This research work was approved by the ethical committee of Surabhi Institute of Medical Sciences Siddipeth, Husnabad Mundrai Telangana-502375
- No Conflict of Interest
- Self-Funding

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