Original Research Article

A comparative study of CT, MRI-Head for the detection of acute cerebral haemorrhage

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Abstract

Background: Magnetic resonance imaging (MRI) is generally considered better than computed tomography (CT) for the diagnosis of Cerebral lesions but this belief has never been substantiated for the full range of patients in whom this diagnosis is suspected **Aims and Objectives:** To study of CT and MRI-Head for the Detection Acute Cerebral Haemorrhage. **Methodology:** After approval of institutional ethical committee this cross-sectional study carried out in the patients with suspected of intracranial bleeding at tertiary health center during the two year period i.e. January 2015 to January 2017 referred to the Radiology department of the tertiary health care centre. The details of information clinical history age was noted. All the patients gone through the investigations like MRI and CT consequently. Analyzed by Chi-square test calculated by SPSS 19 version software. **Result:** The majority of the patients were in the age group of >60 i.e. 57.5% followed by 50-60 were 22.5%, 40-50-13%, 30-40-6%, 20-30 -1%. The majority of the patients were Males i.e. 70.50% and Females were 29.50. For any Haemorrhage MRI positive in 71 (35.50%) and CT in 32 (16.00%) this difference is significant ($P<0.0001, X^2=47.73$, df=1), For Acute haemorrhage MRI positive in 47 (23.50%) and CT in 9 (4.50%) but the difference is not significant ($P>0.75$, $X^2=0.09$, df=1), For Chronic haemorrhage CT positive in 28(14.00%) cases and in MRI 23 (11.50%) the difference is statistically significant ($P<0.0001, X^2=121.8$, df=1). **Conclusions:** It can be concluded from our study that MRI was superior to CT in the diagnosis of all types and equal in acute but less superior CT in the diagnosis of chronic haemorrhage.

Key Words: CT, MRI-Head, Acute Cerebral Haemorrhage, Ischemic stroke.

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INTRODUCTION

Magnetic resonance imaging (MRI) is generally considered better than computed tomography (CT) for the diagnosis of Cerebral lesions but this belief has never been substantiated for the full range of patients in whom this diagnosis is suspected. Patients who present to the emergency room with stroke-like symptoms might have cerebrovascular disease (ischemic or hemorrhagic) or various other nonvascular disorders. The ideal imaging modality for assessment of patients with acute stroke should accurately detect both cerebral ischaemia and intracranial haemorrhage, and discriminate cerebro vascular causes from other causes. CT is the most common imaging modality used to assess patients with suspected stroke. This method is widely available, fast, easy, and less expensive than MRI. However, although CT is sensitive to acute intracranial haemorrhage, it is not sensitive to acute ischaemic stroke. Studies suggest that CT is insufficiently sensitive for the diagnosis of acute ischaemia, is subject to substantial inter-rater variability in interpretation, and might not be better than MRI for detection of acute intracranial haemorrhage.[1–4] MRI off ers advantages for the assessment of acute stroke. Changes of acute ischaemic injury are detectable sooner with MRI than with CT, especially with diffusion weighted imaging, and ischaemic stroke diagnosis with MRI has greater interobserver and intraobserver

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reliability than CT, even in readers with little experience.[5–8]

MATERIAL AND METHODS

After approval of institutional ethical committee this cross-sectional study carried out in the patients with suspected of intracranial bleeding at tertiary health center during the two year period i.e. January 2015 to January 2017 referred to the Radiology department of the tertiary health care centre. The details of information clinical history age was noted. All the patients gone through the investigations like MRI and CT consequently. The initial diagnosis in each case by two different radiologists separately and at the end all diagnosis by Panel of four radiologist at the same time. The detection of All, Acute, Chronic haemorrhage by CT and MRI; was analyzed by Chi-square test calculated by SPSS 19 version software.

RESULT

Table 1: Age wise distribution of the Patients

Age	No.	Percentage
20-30	2	1
30-40	12	6
40-50	26	13
50-60	45	22.5
>60	115	57.5
Total	**200**	**100**

The majority of the patients were in the age group of >60 i.e. 57.5% followed by 50-60 were 22.5%, 40-50-13%, 30-40-6%, 20-30 -1%.

Table 2: Sex wise distribution of the patients

Sex	No.	Percentage
Male	141	70.50
Female	59	29.50
Total	**200**	**100**

The majority of the patients were Males i.e. 70.50% and Females were 29.50.

Table 3: Paired proportion analysis of CT versus MRI for the diagnosis of cerebral Haemorrhage

MRI	CT		P-value
Any Haemorrhage	**Positive**	**Negative**	
Positive	29	42	$P<0.0001, X^2=47.73, df=1$
Negative	3	126	
Acute Haemorrhage			
Positive	2	45	$P>0.75, X^2=0.09, df=1$
Negative	7	146	
Chronic Haemorrhage			
Positive	21	2	$P<0.0001, X^2=121.8, df=1$
Negative	7	170	

For any Haemorrhage MRI positive in 71 (35.50%) and CT in 32 (16.00%) this difference is significant ($P<0.0001, X^2=47.73, df=1$), For Acute haemorrhage MRI positive in 47 (23.50%) and CT in 9 (4.50%) but the difference is not significant ($P>0.75$, $X^2=0.09, df=1$), For Chronic haemorrhage CT positive in 28(14.00%) cases and in MRI 23(11.50%) the difference is statistically significant ($P<0.0001, X^2=121.8, df=1$).

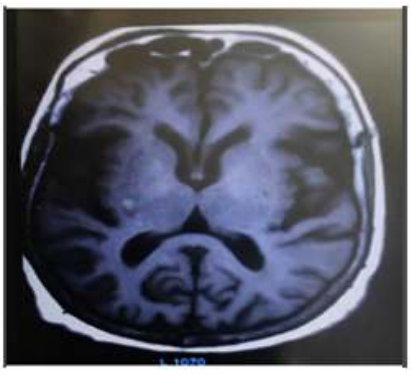

Figure 1

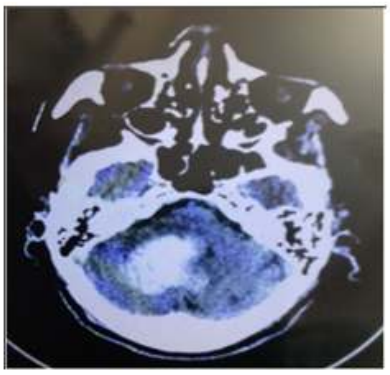

Figure 2

DISCUSSION

Intracranial haemorrhage (ICH) is a significant medical event that accounts for up to 15% of strokes[9]. The incidence of ICH is approximately 25 per 100,000 person-years, and it has a mortality of 40% within one month of presentation[9].Trauma is the most common cause of ICH, and CT of the head is the initial workup performed to evaluate the extent of acute traumatic brain injury[10]. MRI is increasingly being performed in the emergency department for the evaluation of traumatic brain injury, and MRI has been shown to be more sensitive than CT in the detection of small foci of intracranial haemorrhage or axonal injury[10-13].MRI is less commonly performed acutely for the evaluation of traumatic SAH, which is typically evaluated by CT. However, MRI has an excellent sensitivity for the

detection of acute ICH, and traumatic SAH may be identified as hyperintense signal abnormality overlying the cerebral sulci on Fluid Inversion Attenuation Recovery (FLAIR) sequences or hypointense susceptibility blooming on Gradient-Echo (GRE) or susceptibility-weighted imaging (SWI) sequences[14-15]. In our study we have found that For any Haemorrhage MRI positive in 71 (35.50%) and CT in 32 (16.00%) this difference is significant ($P<0.0001, X^2=47.73, df=1$), For Acute haemorrhage MRI positive in 47 (23.50%) and CT in 9 (4.50%) but the difference is not significant ($P>0.75$, $X^2=0.09, df=1$), For Chronic haemorrhage CT positive in 28(14.00%) cases and in MRI 23(11.50%) the difference is statistically significant ($P<0.0001, X^2=121.8, df=1$). These findings are similar to Julio A Chalela[16] they found in 356 patients, 217 of whom had a final clinical diagnosis of acute stroke, were assessed. MRI detected acute stroke (ischaemic or haemorrhagic), acute ischaemic stroke, and chronic haemorrhage more frequently than did CT (p for all comparisons). MRI was similar to CT for the detection of acute intracranial haemorrhage. MRI detected acute ischaemic stroke in 164 of 356 patients (46%; 95% CI 41–51%), compared with CT in 35 of 356 patients (10%; 7–14%). In the subset of patients scanned within 3 h of symptom onset, MRI detected acute ischaemic stroke in 41 of 90 patients (46%; 35–56%); CT in 6 of 90 (7%; 3–14%). Relative to the final clinical diagnosis, MRI had a sensitivity of 83% (181 of 217; 78–88%) and CT of 26% (56 of 217; 20–32%) for the diagnosis of any acute stroke. Also with Chelsea S. Kidwell[17] they found the diagnosis of any haemorrhage, MRI was positive in 71 patients with CT positive in 29 ($P<.001$). For the diagnosis of acute haemorrhage, MRI and CT were equivalent (96% concordance). Acute haemorrhage was diagnosed in 25 patients on both MRI and CT. In 4 other patients, acute haemorrhage was present on MRI but not on the corresponding CT—each of these 4 cases was interpreted as hemorrhagic transformation of an ischemic infarct. In 3 patients, regions interpreted as acute haemorrhage on CT were interpreted as chronic haemorrhage on MRI. In 1 patient, subarachnoid haemorrhage was diagnosed on CT but not on MRI. In 49 patients, chronic haemorrhage, most often microbleeds, was visualized on MRI but not on CT. But in our study the superiority of MRI was less as compared to CT for the diagnosis of Chronic haemorrhage this could be difference in the experts, skill and ease of detections of haemorrhage and also difference in the quality of images produced by different machines in other settings.

CONCLUSIONS

It can be concluded from our study that MRI was superior to CT in the diagnosis of all types and equal in acute but less superior CT in the diagnosis of chronic haemorrhage.

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