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Research Article

**COMPARISON OF THE VALUES OF COMPUTED  
TOMOGRAPHY AND MAGNETIC RESONANCE IMAGING IN  
IDENTIFICATION OF LACUNAR INFARCTION IN EARLY  
STAGE**<sup>1</sup>Dr Amna Zahir, <sup>2</sup>Dr. Summaya Fakhar, <sup>3</sup>Dr Eman Yasir<sup>1</sup>BVH, <sup>2</sup>THQ Khushab, <sup>3</sup>Sir Gangaram Hospital Lahore.**Article Received:** October 2019    **Accepted:** November 2019    **Published:** December 2019**Abstract:**

**Objective:** This research work aimed to compare and evaluate the findings of CT (Computed Tomography) scan & MRI (Magnetic Resonance Imaging) in the identification of the LI (Lacunar Infarction) in initial stage.

**Methodology:** Total 88 patients suffering with early LI who got admission in the hospital were designated as the subjects of research, and all of the patients underwent computed tomography & magnetic resonance imaging. This research work carried out in our institute from March 2017 to September 2018.

**Results:** Total 400 & 401 abrasions got detection by MRI, and one hundred and forty five lesions got detection by computed tomography. Majority of the abrasions were present at the parietal lobe, frontal lobe and thalamus. The rate of detection of the small abrasions having diameter shorter than 5.0 centimeter utilizing MRI was expressively greater than computed tomography and there was significant difference among both. Total 49 patients who visited hospital within 6 hours were scanned in which there was no observed image by computed tomography, whereas we observed the spotted images in forty seven patients by magnetic resonance imaging. The effectiveness of MRI in presenting the early abrasions as well as micro-lesions was much better as compared to the CT.

**Conclusion:** In the identification of the early LI, the rate of detection of the abrasions with the MRI is effectively greater than that of computed tomography. MRI is able to obviously display the particular abrasions conditions which are worth clinical.

**Keywords:** MRI, CT, scan, LI, identification, detection, centimeter, lesions, abrasions, occurrence, prevalence.

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**INTRODUCTION:**

LI (Lacunar Infarction) is very frequent cerebrovascular complication [1, 2]. The most common pathogenesis for LI contains HTN, DM and arteriosclerosis. With the developments in the standards of living, the rate of prevalence of these described complications is very high and it has also increased the incidence of LI. LI endangers the quality of living and health of human beings. But as abrasions of the LI are of very small size, there is no visible manifestations clinically. This is necessary to determine the procedures to find out the site of early LI & size of blood vessels with occlusion. With the development in equipment and modernity of the technologies, CT scan and MRI which have a rapid development are commonly used as methods of diagnosis. These both methods have their own different effectiveness in the diagnosis of the complications [3].

Luo XH stated that CT was more effective for the diagnosis of the abrasions present with large size [4]. MRI is important when it is required to know about the type of the abrasion if it is benign or malignant. The rate of diagnosis of necrotic abrasions with the MRI was much high as compared to CT. Enas A discovered that diagnostic effectiveness of MRI was much high as compared to CT in the identification of the cerebral infarction [5]. One research work found that there are some deficiency in MRI like low spatial resolution & no ability to examine the patients who were present with the cardiac pacemaker [6]. There are few research works present to examine the effectiveness of CT scan and MRI in the identification of the lacunar infarction at early stage. This research work carried out to examine the methods of CT scan & MRI in the diagnosis of Lacunar infarction.

**METHODOLOGY:**

In this research work, we recruited total 88 patients suffering from early stage of lacunar infarction who got admission to hospital from March 2017 to September 2018. We carried out the diagnosis of the patients in accordance with the standard of early LI [7]. All of the patients underwent MRI & CT scan. The

range of the age of the patients was from 39 to 78 years with an average age of  $63.23 \pm 6.75$  years. Total forty two males and forty six females were the part of this research work. There were total twenty seven patients with self-reported sensory abnormality, 8 patients of emesis, nineteen patients with speech disorder, forty two patients of facial paralysis, forty patients with drowsiness and 5 patients of severe headache & dizziness. The Ethical committee of our institute gave the permission to conduct this research work. We took the written consent from all the patients of this research work.

Patients who were present with the malignant tumor, blood diseases, cardiac complications, cerebral infarction of large scale and metal diseases were not the part of this research work. We included the patients in their early stage of LI and with no other serious complications. In this research work, we performed a 16-layer spiral CT scan (thickness of layer: five mm; 0.50 T). We used the MRI device (Ningbo-Xingaoyi; OPER-0.50) which were present with thickness of layer of ten millimeters and applied eight ring head coil for the brain scanning. More than two specialists examined the reports after the examination. We observed the amount, size and abrasions morphology and analyzed them. SPSS V.21 was in use for the statistical analysis of the collected information. Chi square method was in use for the comparison of the categorical data between 2 groups.

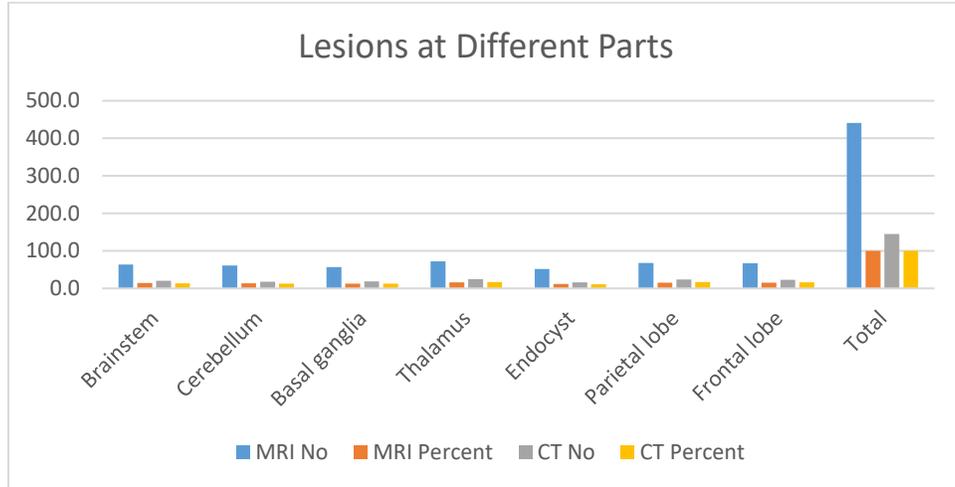
**RESULTS:**

In this research work, we detected the 441 abrasions with the help of MRI, whereas we detected one hundred and forty five abrasions with the help of CT scan. If the rate of detection of the abrasions utilizing MRI was set as hundred percent, then the rate of detection of abrasions with the use of CT scan was 32.90%. We suggested that effectiveness of diagnosis of MRI was much better as compared to the CT scan and the disparity was significant statistically. Majority of the abrasions were present at thalamus, parietal lobe & frontal lobe. The abrasions present at different locations detected by using MRI were greater as compared to those detected by CT scan (Table-1).

**Table-I: Detection results of the lesions in different parts**

Examination method	MRI		CT	
	No	Percent	No	Percent
Brainstem	64.0	14.50	20.0	13.80
Cerebellum	61.0	13.80	18.0	12.40
Basal ganglia	57.0	12.90	19.0	13.10
Thalamus	72.0	16.30	25.0	17.20

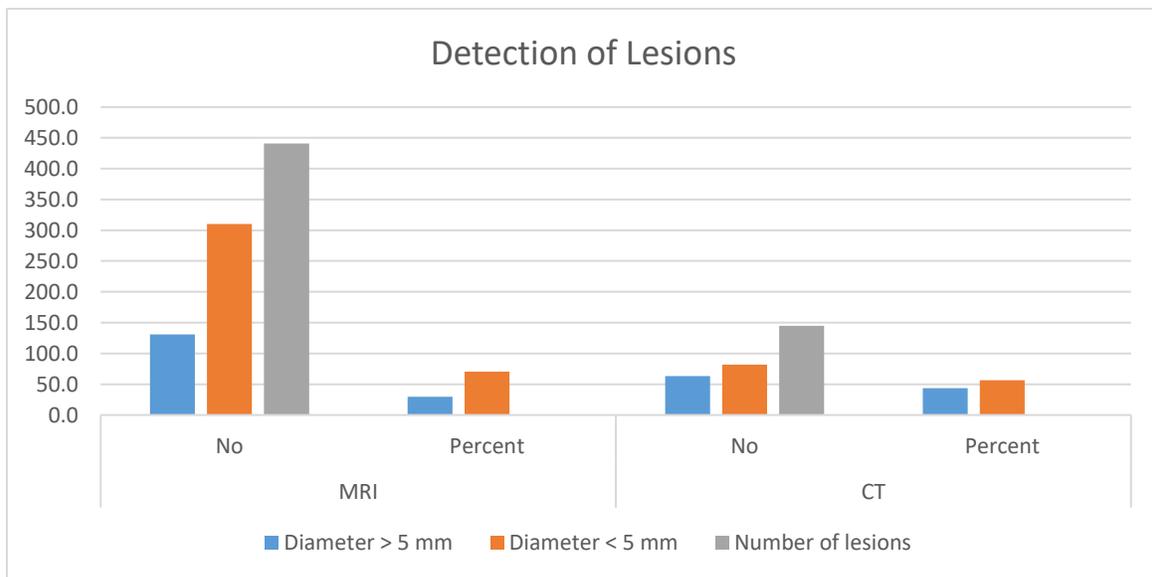
Endocyst	52.0	11.80	16.0	11.00
Parietal lobe	68.0	15.40	24.0	16.60
Frontal lobe	67.0	15.20	23.0	15.90
Total	441.0	100.00	145.0	100.00



Comparison of the rate of detection of abrasions having diameter of greater than five millimeters and less than five millimeters suggested a significant disparity statistically as presented in Table-2.

**Table-II: Detection results of the size of lesions**

Examination methods	MRI		CT		X2	P value
	No	Percent	No	Percent		
Diameter > 5 mm	131.0	29.70	63.0	43.40	7.968	<0.050
Diameter < 5 mm	310.0	70.30	82.0	56.60	9.164	<0.050
Number of lesions	441.0	-	145.0	-	-	-



Total 49 patients who came to our institute within 6 hours underwent scanning. We were unable to observe images by CT scan, whereas forty seven patients were present having the small images with spots using MRI. We observed the spot-like, long circular & dotted abrasions with the use of CT scan & MRI. In those images, most of the abrasions were present with not

clear edge and with no visible occupying effect. In the evaluation with the help of CT, we distributed lacunar infarction abrasions in a low density; in the evaluation with the help of MRI, we observed the isometric T-1 signals, long T-2 signals and high T-2FLAR & DWI as presented in Figure-1.

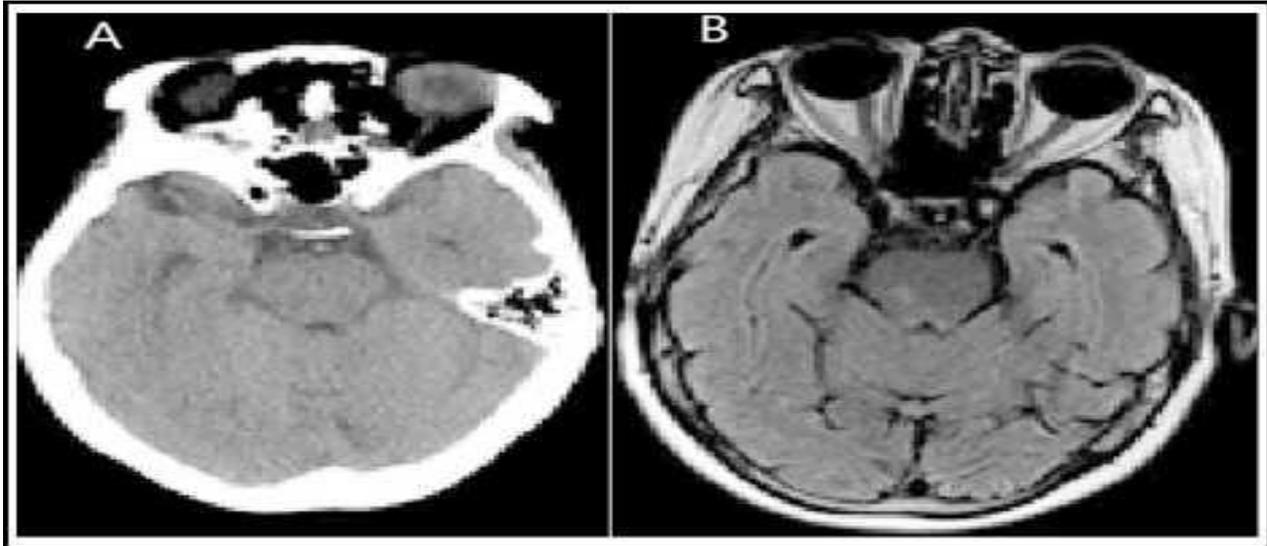


Figure 1

#### DISCUSSION:

The delay in the treatment of LI can induce the various complications. There is a need of valid measures of treatment to overcome this issue. The correct treatment depends upon the precise diagnosis [8]. With the attack of LI, abrasions with high volume are not much common; ischemia will affect the metabolism of the cells present in brain which will hinder different functions of sodium & potassium ion pump [9]. A research work proposed that abrasions of LI were normally small [10], which identified as micro infarction & the highest diameter of the abrasions due to infarction was shorter than fifteen millimeter. We can observe the low density of abrasions of LI with the conventional images of CT. There was an obvious disparity at diagnostic time before & after the onset and the alterations of lesions in the cerebral cells are very small, it is very difficult to determine the development of the anomaly in the images of CT scan, which can have impact on the early methods for treatment and it can lead to the wrong diagnosis.

MRI has very high level of sensitivity and it can clearly display the alterations of the [11]. Some research works have elaborated that there was clear display of the abrasions after twenty four hours of onset. MRI present with high resolution can show

these lesions at very early stage [12-15]. Sun Z stated in his research work that the detection rate of MRI was high as compared to CT [16]. while examining the lesions of small size, it was discovered that rate of identification of abrasions with the use of MRI was much high as compared to the CT scan; in particular, the amount of the infarcted abrasions diagnosed by MRI and had a diameter of less than five millimeters was 70.30% (n: 310) and the amount of the infarcted abrasions which diagnosed by the CT scan and had a diameter of less than five millimeters was 56.60% (n: 82), which were also similar to the finding of Liu Feng in his research work [17]. It showed that the resolution of MRI is much high. The reason of the density between abrasions with very small diameter, tissues surrounding abrasions and the impact of the body structure [18, 19]. The rate of detection of the micro infarction abrasions with the use of MRI was much high as compared to the use of CT scan.

#### CONCLUSION:

The rate of detection of early LI utilizing MRI is importantly greater than that of utilizing computed tomography. The performance of MRI is very outclass in the presentation of the size, site and morphology of the abrasion. Hence, MRI can be considered as the

favored option for the identification of the early LI and it has an optimistic diagnostic effectiveness.

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