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RESEARCH ARTICLE

COMPARISON BETWEEN THE CT & MRI FOR MENINGIOMA IN THE BRAIN IN KING KHALID UNIVERSITY HOSPITAL RIYADH K.S.A.

Hisham Al-nutayfi¹, Farah Masaad², Abdullah Hamdan³, Nasraldeen Alnaeem Alkhidir³ and Sajna Ashraf⁴.

1. X-ray department, Al-Aflaj General Hospital M.O.H, Kingdom of Saudi Arabia.
2. Department of Oral &Maxillofacial Radiology, Al-Farabi College of Dentistry and Nursing, Riyadh, Kingdom of Saudi Arabia.
3. College of Applied Medical Science, Department of Radiologic Technology Qassim University, Buraydah ., Kingdom of Saudi Arabia.
4. Department of oral &Maxillofacial Radiology Al-Farabi College of Dentistry and Nursing, Riyadh, Kingdom of Saudi Arabia.

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Abstract

Purpose: To determine the diagnostic accuracy values of CT. Scan in the detection of meningioma in the brain. Correlated the accuracy of MRI with meningioma volume in (cc).

Methods: Prospective study of Saudi both males & females patients of different age—randomly of 35 patients using CT. Scan axial, sagittal and coronal scans while in MRI Scan using standard protocol of examinations T1 weighted image and T2 weighted image in all cases were examined. The results are classified in tables and using Chi-Square analysis.

Results: Both CT. Scan and MRI exam's can find meningioma lesion more than zero (cc). The table -7 Chi-Square test showing the P. Value =0.410 > 0.05 showing No. significant between the CT. Scan and MRI in finding the meningioma.

Moreover, the table-10: Shows Chi-Square the P.value =0.008 > 0.05 showing significant in assessment of meningioma volume in (cc).

Conclusion: Meningioma CT. Scan is useful examination in emergency patients. While MRI should always be considered as an indispensable imaging modality in the assessment of meningioma volume (cc). Both CT. Scan and MRI are used to support the diagnosis and evaluation of meningioma. But MRI is better in accurate diagnosis meningioma volume (cc).

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Introduction:-

The brain is an important organ that controls thought, memory, emotion, touch, motor skills, vision, respiration, body temperature, hunger, and many other processes that regulate our body. The brain has three main parts: Cerebrum, cerebellum and brainstem. There are two types of primary brain tumors: Benign tumor and malignant tumor. While meningioma is the kind of tumor(usually benign)starts in the outer linings of the brain (meninges). It is more common in adults. Many meningiomas can be removed with surgery, but some may grow back. ^(2, 4,8). With

Corresponding Author:-Hisham Al-nutayfi.

Address:-X-ray department, Al-Aflaj General Hospital M.O.H, Kingdom of Saudi Arabia.

the increasing availability and use of modern brain diagnostic imaging modalities, has become fairly common. Although meningiomas are considered a type of primary brain tumor, they do not grow from brain tissue itself, but instead arise from the meninges, three thin layers of tissue covering the brain and spinal cord ⁽⁵⁾. These tumors most commonly grow inward causing pressure on the brain or spinal cord, but they may also grow outward toward the skull, causing it to thicken. Most meningiomas are benign, slow-growing tumors. Some contain cysts (sacs of fluid), calcifications (mineral deposits), or tightly packed bunches of blood vessels ⁽⁶⁾. There are several systems used to name, or group, these tumors. One system names meningioma by the type of cells in the tumor ⁽⁹⁾. Syncytial (or meningothelial) meningiomas are the most common and feature unusually plump cells. Fibroblastic meningioma feature long, thin shaped cells ⁽¹⁰⁾. Transitional meningiomas contain both types of cells. Another system uses the terms benign, atypical and malignant (or anaplastic) to describe the overall grade of meningioma ⁽¹⁶⁾. In this system, benign meningioma contain easily recognized, well-differentiated (resembling normal) cell types which tend to grow slowly ⁽¹¹⁾. Atypical tumors represent 10–15% of meningioma. They contain proliferating cells that maybe faster growing and more likely to grow back after treatment, even after seemingly complete resection (surgical removal) ⁽¹⁵⁾. Therefore, these tumors must be followed carefully for early signs of recurrence. Malignant or “anaplastic” tumors are poorly differentiated forms that often recur rapidly. Although they are quite rare (1–3%), malignant meningioma can be highly aggressive and difficult to treat. Another common practice is to attach the location of the tumor to its name. For example, a parasagittal meningioma is located near the sagittal sinus, a major blood vessel at the top of the cerebral hemispheres ⁽¹²⁾. A sphenoid ridge meningioma is found along the ridge of bone behind the eyes and nose. Some meningioma scans cause problems despite their benign nature, because they are difficult to remove when they are located in functionally sensitive or hard to reach areas. Depending on the situation, stereotactic radiotherapy or radiosurgery may be particularly helpful in some of these cases. ⁽¹⁸⁾ Although MRI is the imaging study of choice for evaluation of suspected meningioma or in the context of known or highly suspected pathology, computed tomography (CT) is more widely available, is better suited for rapid screening in urgent settings, and can be used when patients have MRI exclusions (such as pacemakers). As such, many meningiomas are first encountered on CT scans obtained for different reasons ⁽¹³⁾. CT has a place in the diagnosis of meningioma because it is superior in demonstrating the effects of this neoplasm on adjacent bone, specifically osseous destruction in atypical or malignant meningiomas or hyperostosis associated with the benign meningiomas, and is more sensitive in detecting psammomatous calcifications in the tumor. ⁽⁷⁾ The image contrast was assessed as good or excellent in plain CT and in plain MRI, but in the contrast-enhanced CT and MRI studies respectively. Adequate tumour delineation was achieved in plain CT, in plain MRI of the contrast-enhanced CT and MRI examinations. The contrast-enhanced studies proved to be superior to the plain CT and MRI studies as regards image contrast and tumor delineation. Because of the methodological advantages of the MRI technique, contrast-enhanced MRI was judged to be slightly superior to contrast-enhanced CT. ⁽²⁾ Magnetic resonance imaging (MRI) with gadolinium contrast enhancement in defining the histologic margins of brain tumors ⁽¹⁴⁾. compared to conventional computed tomography (CT) using iodinated contrast enhancement. All tumors were visualized with contrast-enhanced MRI which proved most sensitive ⁽¹⁷⁾. Gadolinium bright enhancement of tumors in a distribution that consistently corresponded to areas of pathologically proved tumor infiltration. MRI is more accurate than unenhanced MRI, unenhanced CT, or enhanced CT in defining the histologic margins of tumors. ⁽¹⁾

Materials and Methods:-

Prospective experimental field research practical study of Saudi patients of different age were examined at King Khalid University Hospital Riyadh K.S.A—randomly of 35 patients at period of 9/2018- 11/2018, most patients complain of brain meningioma complaints of low back pain and leg weakness since brain tumors can mimic other diagnoses and present in conjunction with other musculoskeletal disorders. We selected patients whom have MRI request from their consultant physician with previous history of CT. Scan examination to confirm or for better evaluation or or have CT. Scan request we follow up whom confirmed by MRI exam. Patient preparation for brain CT scan, we should need to know the following: If the patient has allergies to iodine, medications, or food. Any previous reactions to contrast media. If the patient has asthma. The last LMP for female whether there is any possibility of pregnancy. If the patient has diabetes for scheduling him early in the morning. We explain the procedure to the patient. If the procedure involves the use of contrast dye, consent should be signed form the patient need fasting and. Patient to have the MRI exam and whether the exam needs to be modified for your particular condition. Pacemaker, Pregnancy, Claustrophobia, Implanted drug infusion device (i.e., insulin pump). Metallic implants and allergy to iodine, or gadolinium. Patient generally, there is no fasting requirement prior to a CT or MRI scan skull, unless a contrast dye is to be used. may be asked not to eat or drink anything for up to 4 hours before the scan and should arrive at least 30 minutes prior to your exam and check in with the receptionist. MRI contrast is indicated for the exam; an IV catheter will be inserted in your arm by a nurse. The duration of the procedure will

vary but the average is 45 minutes to one hour per body part. The basic types of sequences used in brain MRI create either T1-weighted or T2-weighted images. While in C.T. Scan procedure was positioning patient in supine where head first arms be side with basic projections of axial and sagittal had been be taken with CT slice thickness 3-5 mm. The results classified in tables and using Chi-Square analysis.

Results:-

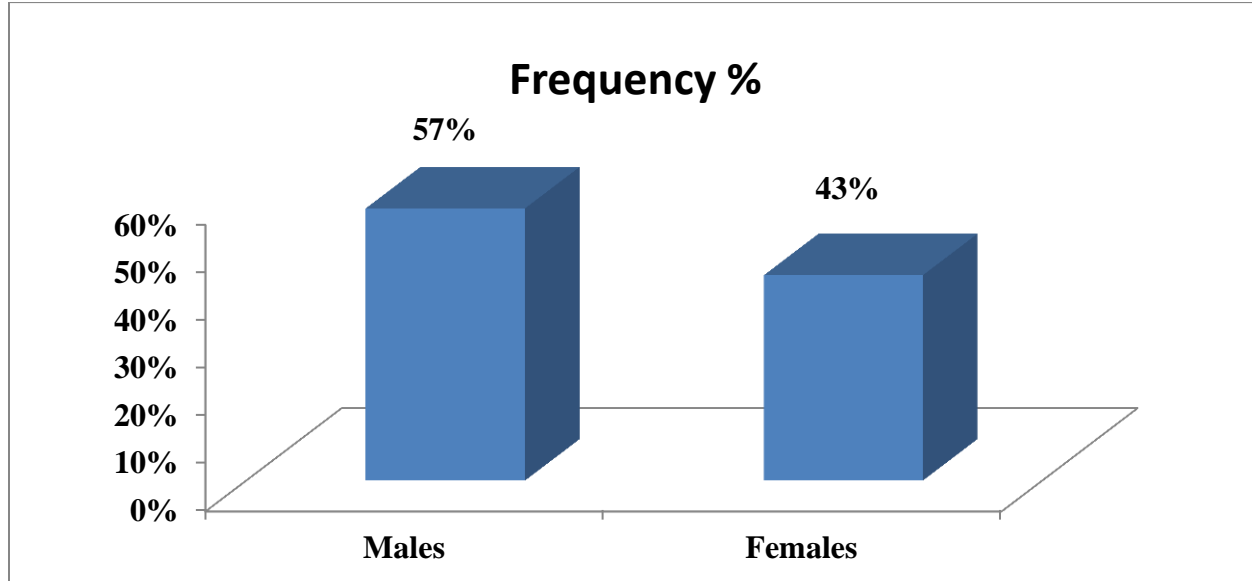


Fig 1:-Shows the sex distribution of patients (n= 35)

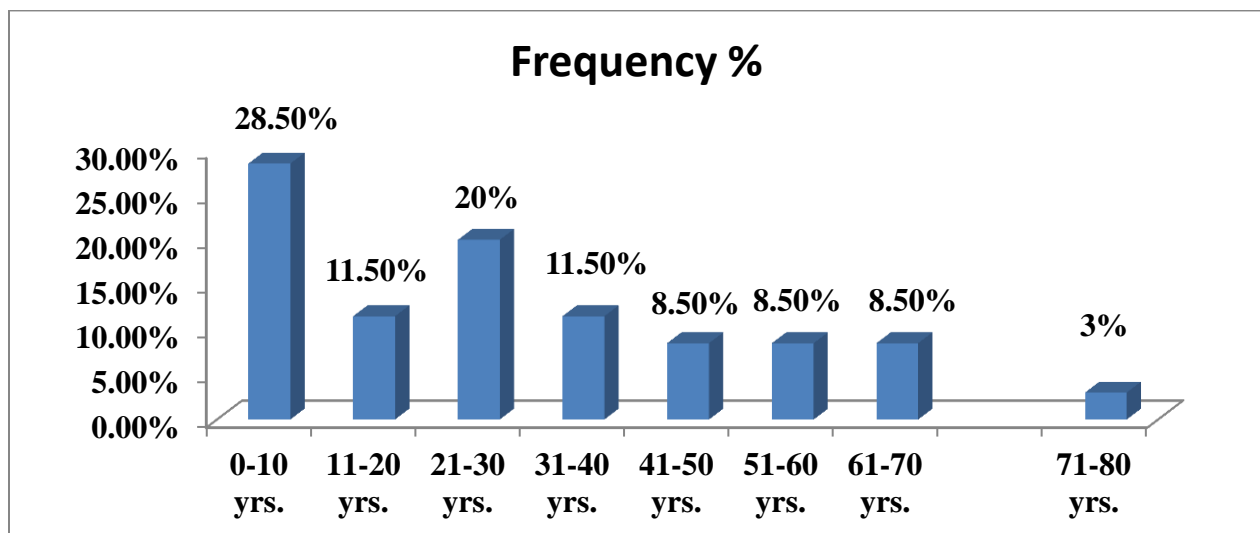


Fig 2:-Shows the distribution of patients according to age groups (n= 35)

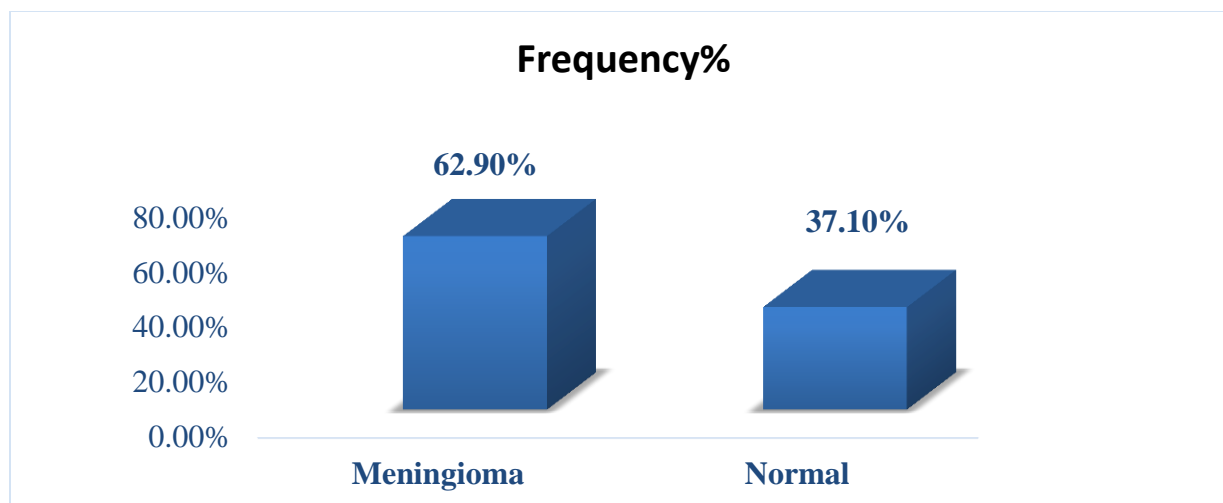


Fig 3:-show distribution of patients according to result.

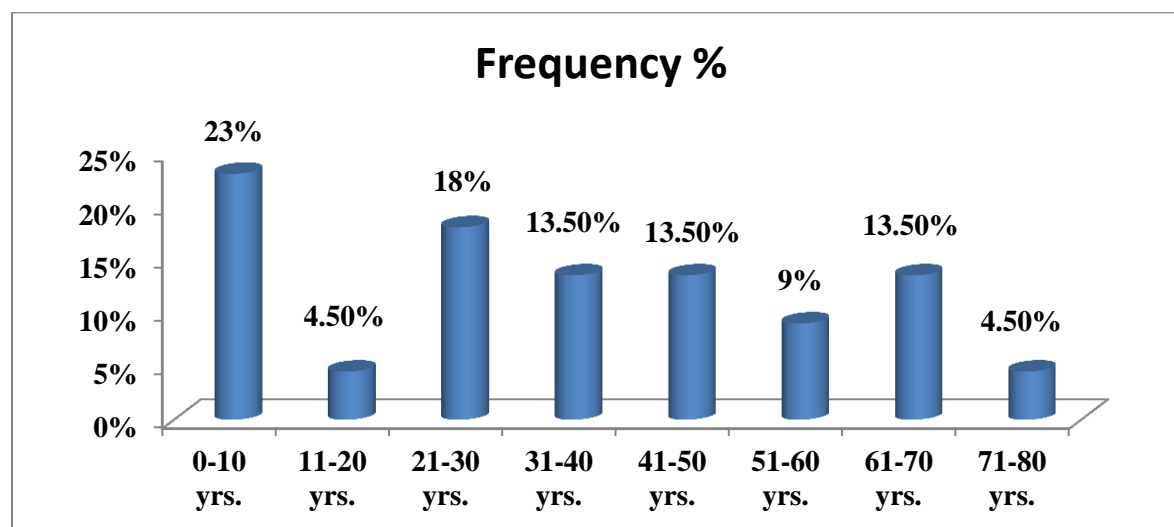


Fig 4:-Shows the distribution of patients according the positive findings (n= 22)

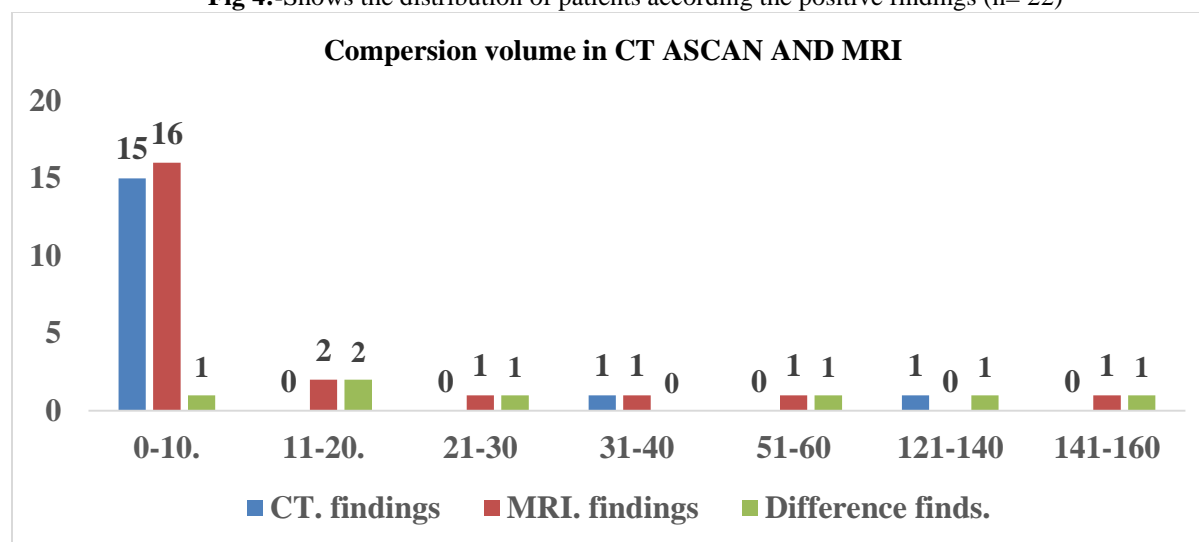


Fig 6:-Show volume in CT scan, MRI examination and difference

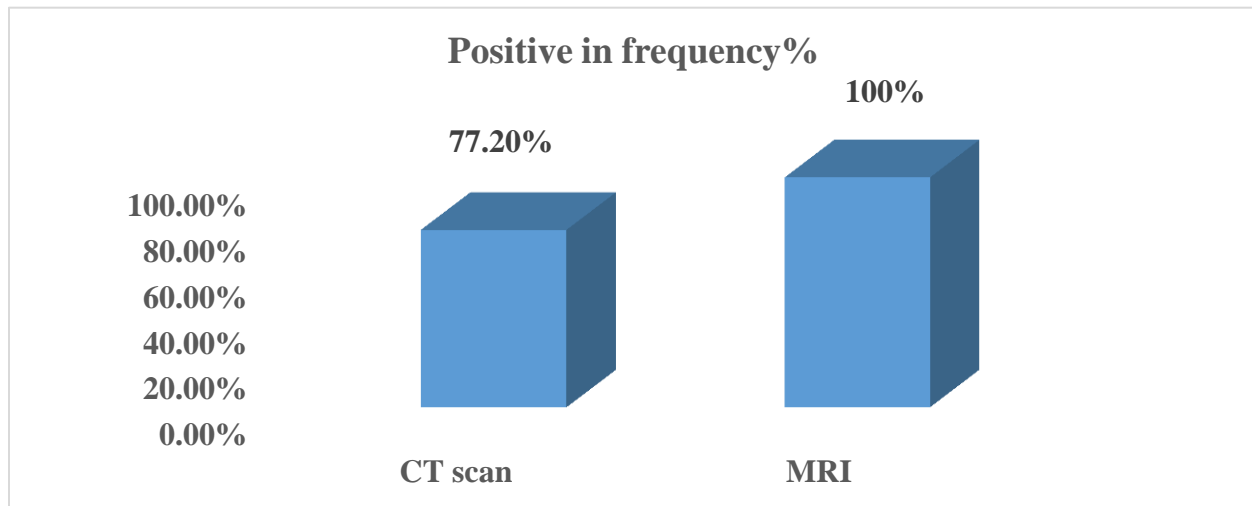


Fig 6:-shows distribution of positive findings according to each modality of investigation.

Table 1:-Shows the paired Samples Chi-Square-Test for meningioma volume (cc)

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	CT. findings -MRI. findings	- 2.57529	12.56099	3.04649	-9.03356	3.88297	- .845	16	.410

P.value= 0.410 > 0.05

Not significant

Table 2:-Shows the differences meningioma volume (cc)

Patient. No.	CT. Volume(CC)	MRI Volume(CC)	Difference (CC)
1	137.20	148.20	11.00
2	0.13	1.00	0.87
3	1.87	3.04	1.17
4	0.12	0.13	0.01
5	0.90	1.00	0.10
6	8.00	15.00	7.00
7	0.00	1.17	0.17
8	0.00	0.13	0.13
9	4.32	31.42	27.10
10	0.03	0.12	0.09
11	1.00	8.00	7.00
12	1.00	3.38	2.38
13	0.13	1.00	0.87
14	0.00	0.12	0.12
15	0.12	1.73	1.61
16	0.12	21.60	21.48
17	1.33	1.73	0.40
18	0.00	1.00	1.00
19	5.60	10.76	5.16

20	0.12	1.00	0.88
21	0.00	1.00	1.00
22	33.00	58.50	25.50

Table 3:-Comparison between CT. Scan& MRI in meningioma exam's

Type of comparison	CT. Scan exam's	MRI exam's
Ionizing radiation exposure	More	None
Duration l time	Various	Real
Cost of service	Expensive	Most expensive
Accuracy	Acceptable	Most acceptable
Examination appointment time	Short period time	Long period time

Discussion:-

Meningioma is most common in female than in males and more common on age from 1 year up to 30 years old and usually they are convexity meningioma in the brain. MRI scanning is currently the best diagnostic modality. This study was performed in 35 patients. A total of 35 patient's basis ranging age 2-74years (mean age = 38 years) in Saudi population 20 (57%) male and 15(43%) female (Figure.1). Distribution of patients according to age group (1-10years) 10 patients (28%) are most examined while the group aage (71-80years) one patient (3%) (Figure.2). Is the least examined were out of total 35 patients, 13(37.1%) patients are normal findings and other 22(62.9%) patients are meningioma findings (Figure.3). Positive findings most effected the group age (1-10years) account 5 (23%) and (21-30years) account 4(18%) while the least age group is (71-80 years) =1(4.5%) show meningioma (Figure.4). In our examination 22patients whom positive. in the CT. Scan exam 17 (77%) patients showing meningioma volume (cc) while 22patients whom positive, in MRI exam (100%) showing meningioma volume(cc) (Figure.5&6). Chi-Square test showing the P.value =0.410 > 0.05 showing No, significant between the CT. Scan and MRI in finding the meningioma (Table.1). The CT. Scan Showing the volume (cc) in (17/22) = (77%) positive meningioma patients while the MRI showing the volume (cc) in (22/22) =(100) positive meningioma. Moreover, table-10: Shows Chi-Square the P.value =0.008 > 0.05 showing significant(Table.2). However, MRI is reliable for meningioma volume(cc) than CT. Scan according to our study this is matching the pervious study done by, Prabhakar et al 2007 they found , The mean and median volume of the tumor as measured from MR scans was 19.67 cc +/- 13.73 and 16.13 cc (range: 3.25 cc. The mean and median CM shift between CT and MR was 5.47 mm and 5.21 mm respectively⁽¹⁹⁾

Conclusion:-

Meningioma CT. Scan is useful examination. Fast aid emergency patients. While MRI should always be considered as an indispensable (trust) imaging modality in the assessment of meningioma volume (cc). Both CT. Scan and MRI are used to support the diagnosis and evaluation of meningioma. But MRI is better in accurate diagnosis meningioma volume than CT. Scan. Sultan Alshoabi et al 2015⁽²⁰⁾ they found in their study, Meningioma is most common in female than in males and more common after 40 years old age and usually they are convexity meningioma in the brain. MRI scanning is currently the best diagnostic modality for detecting the brain and spine meningiomas it provides excellent detail regarding to the site, size, shape, intensity and enhancement after contrast administration.

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