RESEARCH

CLINICAL STUDY ON THE DIAGNOSTIC ROLE OF COMPUTED TOMOGRAPHY ANGIOGRAPHY (CTA) AND NONCONTRAST MAGNETIC RESONANCE ANGIOGRAPHY (NC-MRA) IN EVALUATION OF CEREBROVASCULAR ACCIDENTS IN A TERTIARY CARE TEACHING HOSPITAL

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Abstract

Background: In the middle-aged and older age ranges, cerebral vascular accidents constitute a significant source of mortality and morbidity. It might be thrombotic or embolic, ischemic or hemorrhagic. Digital subtraction angiography is the industry-recognized test for assessing CVA patients. Computed tomography angiography has long been employed as the primary noninvasive imaging method to examine patients with CVA due to the invasive nature of DSA. Magnetic resonance imaging can also be used for angiography, both with and without contrast. Since approximately half of CVA patients do not have a treatable underlying cause, CTA is used as the primary noninvasive imaging tool in patient evaluation. Magnetic resonance angiography is becoming more popular due to growing knowledge of radiation exposure, contrast-induced nephrotoxicity, and iodine sensitivity. The 3D-time of flight sequence can be used to perform non-contrast MRA, which yields outcomes similar to those of CTA. So, we conducted a study to determine whether NC-MRA and CTA played similar roles. **Materials and Methods:** On the same day, 68 patients who had suffered cerebrovascular accidents underwent simultaneous CTA and NC-MRA evaluations. The gathered results were statistically analysed, and conclusions were made. **Result:** The distribution of detection of Aneurysm, Stenosis and Occlusion was compared between CTA and MRA using the Chi-square test. The detection of Aneurysm was significantly more with CTA in comparison to MRA. Among cases reported, 47.05% were diagnosed as normal on CTA & 58.8% on MRA; 26.5% were diagnosed as Aneurysm on CTA & 17.6% on MRA; 16.2% were diagnosed as Stenosis on CTA & 14.7% on MRA and 10.3% were diagnosed as Occlusion on CTA and 10.3% on MRA. **Conclusion:** The MRA and CTA data showed remarkable correlation. Patients with cerebrovascular illness make up more than half of the population. Males are more likely than females to suffer a stroke, and the fourth to sixth decade of life is the most prevalent age range.

INTRODUCTION

Cerebrovascular disease is the second most frequent cause of death in the world, and stroke is a common cause of morbidity and mortality.[1] Although the prevalence of cerebrovascular illness in underdeveloped countries is getting more attention, its significance is still greatly understated.[2] Because intracranial atherosclerotic disease accounts for a significant portion of cerebrovascular disease globally, it is becoming more clinically prominent.[3,4] Stroke is a complex clinical condition that includes a number of distinct syndromes, each with a unique aetiology and pathophysiology. Although extracranial carotid artery stenosis frequently occurs alongside lacunar strokes, atherosclerosis of smaller cerebral arteries is the most common definite cause of lacunar stroke.[5] The middle cerebral artery (MCA), the biggest intracranial artery, is most frequently involved in strokes and transient ischemic episodes. MCA stenosis appears to be brought on by lacunar striatocapsular infarcts brought on by atheroemboli blocking tiny perforating arteries.[6] The presence of an atherosclerotic lesion within the MCA in the absence of a cardiogenic embolism is referred to as MCA disease when discussing intracranial atherosclerotic disease.[7,8] Loss of neurologic functions for movement, sensation, expression, cognition, and consciousness are common stroke symptoms. Therefore, any patient who may exhibit paresis, paralysis, dysphasia, confusion, drowsiness, or even coma should have a stroke or cerebral infarction suspected.[9] The management of acute stroke has seen an expansion in the number of diagnostic procedures and treatment plans due to the quick development of medical imaging technologies. Each clinical situation has its own special risks and benefits associated with testing and treatment. The management of patients and the diagnostic procedure must only use the proper instruments due to the growing evidence-based practise of clinical medicine.[10] The most popular first-line diagnostic technique for vascular imaging in the context of an acute stroke is computed tomography angiography (CTA).[11] After non-enhanced CT, CTA is not only widely available and well tolerated by the majority of stroke patients, but it may also be obtained fast (NECT).[12] The head NECT enables the doctor to ascertain the kind and extent of intracerebral bleeding present in the acute condition.[13] Numerous studies showed that CTA, when compared to NECT, increases the prediction of final infarct size and clinical outcome, particularly in patients who appear extremely early—90 minutes or less after the onset of stroke symptoms.[14] The most often used diagnostic technique for stroke imaging is NECT, which has 100% sensitivity for detecting intracerebral haemorrhage and ischemic stroke as its most crucial differential diagnosis.[15] A volumetric spiral CT examination is used in conjunction with CTA, which is a quick, thinly-collimated, time-optimized opacification of vasculature using bolus of iodinated contrast.[16] CTA can accurately identify cerebral proximal artery stenosis and occlusions in acute ischemic stroke,[17] aiding in the prediction of functional outcome, final infarct size, and response to intravenous thrombolysis, which simplifies the choice of various intra-arterial rescue treatments. Additionally, CTA defines the quality of collateral circulation, which enhances the ability to detect ischemia regions that are not visible on NECT.[18] Additionally, CTA is very effective at assessing the degree of atherosclerotic stenosis in the extracranial arteries, particularly the carotid arteries, making it easier to choose patients who will benefit from revascularization. Additionally, it aids in the diagnosis of an extracranial arterial dissection and distinguishes between near-occlusions and total occlusions. CTA is used as the initial investigation of choice in the diagnostic work up of patients with suspected aneurysms and subarachnoid haemorrhage because it exhibits higher sensitivity and specificity than digital subtraction angiography (DSA) in the assessment of intracranial aneurysms in patients with subarachnoid haemorrhage (SAH). In addition, because contrast extravasation may occur with compromised vessel integrity, CTA is now being used more frequently in the diagnostic work-up of an underlying cause of a spontaneous intracerebral haemorrhage, especially in young patients, as well as to identify the "spot" sign that can select patients at greater risk of hematoma expansion.[19] In cases of subarachnoid haemorrhage or intraparenchymal haemorrhage, noncontrast magnetic resonance angiography [NC-MRA] as well as CTA can be employed as a noninvasive imaging method to assess a vascular aetiology. With a scan period of less than 5 minutes, NC-MRA uses time of flight sequencing in 2D and 3D modes. High spatial resolution [voxel size1mm3], quick scanning, and high signal to noise (SNR) are the main benefits of 3D-TOF MRA, which are partially countered by a decreased sensitivity to sluggish flow.[20] Although NC-MRA is a non-invasive and trustworthy method to assess cerebral vascular disease, it has restrictions for patients with pacemakers and aneurysm clips and requires a cooperative patient. Although studies have demonstrated that adding NC-MRA to the imaging protocol improves both diagnostic and clinical management,[21] it is not a standard component of the routine imaging protocol for stroke imaging in all centres. The vascular lumen can be monitored with MRA as it changes over time.[22] No matter if a stroke is caused by thrombosis, embolism, or homodynamics, imaging of the vasculature can provide reliable answers to queries concerning the pathogenesis. By diagnosing the presence of occlusive artery disease, pinpointing the precise location of occlusion, and identifying the pathology underlying the stroke, such as atherosclerosis or dissection, it also evaluates the risk of subsequent episodes.[23] Other vascular abnormalities such malformation, aneurysms, and arterial compression can also be detected with MRA. Since TOF-MRA doesn't call for the injection of a contrast agent, it offers an alternative for patients in whom doing so might be harmful. Although TOF-MRA has good spatial resolution, the space covered is constrained by vascular saturation artefact, making this method more appropriate for assessing intracranial rather than extracranial vasculature. Comparing TOF-MRA to DSA and CTA, the sensitivity for depicting cerebral steno-occlusive lesions is satisfactory. Phase-contrast MRA (PC-MRA), a less popular technique that makes use of intravenous contrast delivery, may be able to reveal additional physiologic data such blood flow velocity and flow direction.[24] According to the body of existing research, MRA can accurately classify stenotic and occlusive lesions with a sensitivity of around 80%.[25] CTA can be completed in 60 seconds or less and offers a higher spatial resolution than MRA but a poorer one than DSA. Radiation exposure, time and skill required for image processing, interpolation errors, the phenomenon of contrast material entry, the need for optimised contrast gradient-injection timing, venous contamination in a region of interest, risks associated with contrast injection, and the requirement for repeat scans with contrast injection in cases of image degradation due to motion artefacts are some of the major limitations of CTA. Because CTA is a vessel cast technique, it doesn't offer much insight into flow. Our aim was to contrast the diagnostic value of non-contrast magnetic resonance angiography (NC-MRA) and computed tomography angiography (CTA) in the assessment of cerebrovascular accidents.

MATERIALS AND METHODS

This present study was carried out in the Department of Radio-diagnosis at Kanti Devi Medical College and Research Centre, Mathura, India during the period from July, 2021 to February, 2022. The institutional ethical committee evaluated and approved the study protocol, and each patient gave their informed consent. This prospective, double-blind, randomized comparative study was carried out among 68 patients on following inclusion and exclusion criteria:

Inclusion Criteria

- All patients seeking NECT/CTA in our department with symptoms suggestive of cerebrovascular accidents will be included.

Exclusion Criteria

- Patients with clinical histories and NECT heads that clearly show trauma, Expectant mothers, Patients who have previously experienced a significant contrast reaction and Patients with certain medical conditions, such as pacemakers, cochlear implants, steel implants, etc., who cannot have an MRI.

Patients who visited the emergency and outpatient departments of the Kanti Devi Medical College and Research Centre in Mathura and were referred for computed tomography/CT angiography were included in the study. To contrast the two diagnostic imaging modalities, the patient received both CTA and NC-MRA simultaneously. By injecting 70ml of non-ionic contrast media intravenously at a rate of 4.5 ml/s for 15 seconds and then 1.0 ml/minute for additional 25 seconds to make the blood vessels more visible, 3D-CTA was acquired. After receiving informed consent from patients and giving them a thorough explanation of the potential side effects of intravenous contrast injection, the bolus tracking approach is employed to acquire images as efficiently as feasible. A 60-section slab was used to obtain MRA images at 0.8 to 1.0 mm thickness using a 3D-TOF process. The results of the CTA and MRA were compared statistically. A p-value of 0.05 or less is recognized as statistically significant.

RESULTS

The intimate relations distribution of cases in table-1. Our investigation showed that male patients were the majority. In the current study, the study population consisted of 26 women (38.23%) and 32 men (47.05%). the age-based distribution of cases. Males were 46.2±9.42 years old, females were 46.4±9.45 years old, and the overall study population was 46.6±9.5 years old.

Table 1: Distribution of cases by age and gender.

Gender	Age in yrs (Mean±S.D.)	No. of Cases (%)
Male	46.2±9.42	32(47.05%)
Female	46.4±9.45	26(38.23%)
Overall	46.6±9.5	68(100.0%)

[Table 2] shows the comparison of detection of Aneurysm, Stenosis and Occlusion with CTA & MRA. The distribution of detection of Aneurysm, Stenosis and Occlusion was compared between CTA and MRA using the Chi-square test. The detection of Aneurysm was significantly more with CTA in comparison to MRA. Among cases reported, 47.05% were diagnosed as normal on CTA & 58.8% on MRA; 26.5% were diagnosed as Aneurysm on CTA & 17.6% on MRA; 16.2% were diagnosed as Stenosis on CTA & 14.7% on MRA and 10.3% were diagnosed as Occlusion on CTA and 10.3% on MRA.

Table 2: Comparison of CTA and MRA for the identification of aneurysm, stenosis, and occlusion.

Variables	CTA (%)	MRA (%)
Normal	32 (47.05%)	40 (58.8%)
Aneurysm	18 (26.5%)	12 (17.6%)
Stenosis	11 (16.2%)	10 (14.7%)
Occlusion	07 (10.3%)	07 (10.3%)

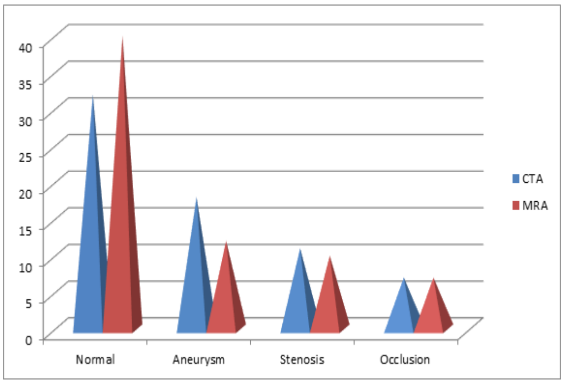

Figure 1: Comparison of CTA and MRA for the identification of aneurysm, stenosis, and occlusion.

Table 3: Comparison of different artery-specific CTA and MRA methods for detecting occlusion.

Occlusion	CTA(%)	MRA(%)
Middle cerebral artery artery (MCA)	03 (42.9%)	03 (42.9%)
Circle of Willis	03 (42.9%)	03 (42.9%)
Posterior cerebral artery Cerebcerebral artery (PCA)	01 (14.3%)	01 (14.3%)

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Comparison of the identification of occlusion using different arteries using CTA and MRA is shown in [Table 3]. The detection of aneurysms in various arteries using CTA and MRA did not differ significantly.

Table 4: Comparison of CTA and MRA for aneurysm detection.

Aneurysm	CTA(%)	MRA(%)
Anterior Cerebral Artery (ACA)	11 (61.1%)	06 (50.0%)
Vertebral artery	01 (5.6%)	02(16.7%)
Middle cerebral artery (MCA)	04 (22.2%)	02(16.7%)
Posterior communicating Artery artery (PCOM)	01 (5.6%)	00(00.0%)
Anterior inferior cerebellar Artery artery (AICA)	01 (5.6%)	02(16.7%)

CTA and MRA are compared in [Table 4] for aneurysm detection. Five aneurysms were not detected on MRA because two of them were difficult to diagnose because of motion blur brought on by the patient's altered sensorium, and three of them were small (less than 3mm) at the site of the ACA.

Table 5: CTA and MRA comparison for the identification of stenosis.

STENOSIS	CTA(%)	MRA(%)
Posterior inferior cerebellar artery (PICA)	07(63.6%)	06(60.0%)
Internal carotid artery (ICA)	04(36.4%)	04(40.0%)

[Table 5] compares the effectiveness of CTA and MRA in identifying stenosis in the various study-related arteries. On MRA, one ICA stenosis instance with little stenosis was detected.

DISCUSSION

In the current study, the study population consisted of 26 women (38.23%) and 32 men (47.05%). This was comparable to the study by Lell et al,[26] which comprised 50 patients (34 males and 16 women). 38.5% of the participants in a research by Nguyen-Huynhet al,[27] were female, whereas 61.5% were male. 49 males and 35 females participated in the study by Radwan et al. All of the aforementioned studies had a patient sex distribution that was identical to our investigation. The study by Hirari et al,[28] contained 18 patients in total, which was different from our study (8 males and 10 women). Males in our study had a mean age of 46.2 ± 9.42 years, females 46.4 ± 9.45 years, and the overall study group had a mean age of 46.6 ± 9.5 years. This was comparable to the study by Nguyen-Huynh et al., in which patients' ages ranged from 30 to 85 years old, with a mean age of 60. The age range of the study population in another study by Hirari et al,[29] was 43-78 years, with a mean age of 68 years, which was comparable to our study. In our study, 47.05 percent of patients had normal CTA diagnoses compared to 58.8 percent who had normal MRA diagnoses; 26.5 percent had aneurysm diagnoses compared to 17.6 percent on MRA; 16.2 percent had stenosis diagnoses compared to 14.7% on MRA; and 10.3 percent had occlusion diagnoses on both CTA and MRA. Aneurysms were most frequently recorded in the anterior cerebral artery (ACA), middle cerebral artery (MCA), and posterior inferior cerebellar artery in the current investigation (PICA). In our investigation, CTA significantly outperformed MRA in terms of aneurysm detection. Two of the four aneurysms missed by MRA were less than 3mm, while the other two were missed because the patient's changed sensorium caused motion blurring. A non-significant stenosis was present in one example of ICA stenosis that was overlooked on MRA. In their work, Nam K. Yoon et al,[30] found that modern multi-detector scanners have a spatial resolution that can accurately identify aneurysms larger than 4 mm with over 100% sensitivity. Contrast-enhanced MRA (CE-MRA) and TOF have comparable sensitivity for aneurysm detection, according to a meta-analysis of MRA studies for evaluating aneurysms. The CE-MRA is superior than TOF sequences because it can get rid of flow-related artefacts and spin saturation. Small branch vascular detection on 3T MRA is superior than CTA because to higher spatial resolution and a lack of venous contrast contamination. Despite these findings, the diagnostic test of choice for assessing cerebral aneurysms in acute circumstances is typically not MRA. The detection of smaller aneurysms more effectively on 3T versus 1.5T scanners was found to be significant in many studies examining the sensitivity of MRA for the diagnosis of cerebral aneurysms. Although the aforementioned study revealed that aneurysms smaller than 5 mm in size were overlooked in 92% of cases, aneurysms smaller than 3 mm had a pooled sensitivity of 88%.[31] According to Kim et alstudy.[32] MCA stenosis is the most prevalent kind of atherosclerotic lesion in about one-third of stroke patients. The branch of the ICA that experiences embolism the most frequently is MCA because it is the largest and most direct branch of the ICA. CTA can accurately identify intracranial proximal artery occlusions and stenosis in cases of acute ischemic stroke.[16] Decision-making for intra-artery rescue techniques is made easier because the existence of a proximal arterial blockage on CTA predicts functional outcome, final infarct size, and responseto intravenous thrombolysis.[17] Additionally, CTA can offer details on the quality of collateral circulation and may increase the sensitivity to spot ischemia regions that non-enhanced CT cannot.[18] Not only MRI, but also all other imaging modalities, are unable to predict which patients' vessels would remain blocked and which patients' vessels will reopen following a stroke. Recanalization, patients who would benefit from it, and areas where there is no tissue at risk of ischemic illness at all but simply a high risk of haemorrhage as a result of thrombolytic therapy can all be identified using

MRI.[33] In the current investigation, there was 86% agreement in the detection of stenosis with MRA when compared to CTA and 100% agreement in the detection of occlusion with MRA & CTA. Even though MRA has the potential to overestimate the stenosis, numerous investigations have demonstrated good agreement between MR angiography and conventional angiography in portraying steno-occlusive disease of the proximal cerebral arteries.[25,34] According to the research mentioned above, MRA can identify diseased vessels in the proximal intracranial arteries with a sensitivity of 80–100% and a specificity of 80–99%. The following factors make MRA a desirable method for detecting intracranial stenosis: In patients at risk for stroke, MRA can be obtained relatively fast and used in conjunction with brain MR imaging to aid in making quick decisions about treatment, such as whether to begin aggressive medication therapy for stroke prevention. Measurements can be taken in the same areas and projections by simulating pictures acquired with traditional angiography using maximum intensity projection (MIP) images from MRA. When evaluating intracranial stenosis, MRA has sensitivity and specificity that are comparable to traditional angiography (89% to 95% and 80% to 100%, respectively).[29,35] When evaluating CTA of the head, it might be difficult to distinguish a high-density contrast-enhanced lumen from nearby calcification and bone. Risks like contrast-induced nephropathy, allergic reactions, etc. are avoided because TOF MRA does not require a contrast injection. The need for a contrast injection prevents repeating a CTA if it is unsatisfactory due to venous contamination, motion, or bone artefacts. NC-MRA, however, is simple to repeat. The severity of atherosclerotic stenoses in the extracranial arteries, particularly the carotid arteries, can also be accurately assessed by CTA, assisting in the selection of individuals who will benefit from revascularization.[17] Additionally, it aids in the diagnosis of an extracranial arterial dissection and distinguishes between near-occlusions and total occlusions.[18] In order to detect carotid artery stenosis at 1.5T, Anzalone et al,[36] and Scarabino et al,[37] found no appreciable difference in sensitivity and specificity between TOF and CEMRA. Fellner et al. discovered 3DTOF to be more accurate than CEMRA, in comparison.[38] However, Townsend et al. found that when compared to 3DTOF at 1.5T, CEMRA tends to overstate the severity of carotid stenosis.[39] In one study, which included 22 patients who had acute strokes in the posterior circulation, it was discovered that while digital subtraction angiography (DSA) was more precise at detecting stenosis in the posterior circulation, CT angiography (CTA) had trouble identifying stenosis in the vertebral system.[40] Recent investigations have shown that CTA has a high sensitivity and specificity for detecting atherosclerotic narrowing of the lumen of the extracranial carotid artery bifurcation.[41] Contrarily, compared to extracranial carotid artery studies, the clinical use of CT angiography in cerebral vasculatures has been more constrained.[42] CTA is quite sensitive in detecting artery anatomies in the Willis circle, according to Katz et alfindings.[43] According to Knauth et alstudy,[44] CTA can successfully detect basilar, internal carotid, and middle cerebral artery trunk occlusions. Recent research by Skutta et al,[45] found that, with the exception of the petrous portion of the carotid artery, CTA is a reliable approach for evaluating cerebral stenoocclusive lesions. 28 participants were used in a study by Bash et al,[16] to evaluate the efficacy of CTA for identifying and measuring intracranial stenosis to MRA and DSA. According to the authors, using DSA as the gold standard, CTA was more sensitive and had a larger positive predictive value than MRA. In a separate analysis comparing CTA and DSA pictures, the scientists discovered that CTA was more effective than DSA at identifying vascular patency in cases with potential sluggish flow in the posterior circulation. In a study by Nederkoorn et al. [46] comparing TOFMRA with gold-standard DSA, the former had a sensitivity of 92.2% and a specificity of 75.7% for diagnosing severe stenosis. According to U-King-Im et al., CE-MRA tended to exaggerate stenosis when compared to DSA by a mean bias of 2.4-3.8%.[47] It is challenging to compare the outcomes of various MRA techniques since performance of MRA depends on a variety of criteria, including spatial resolution, type of sequence, interpolation algorithms, and implementation details.[48] The following list of MRA's probable dangers might be summarised,[21,49] Due to diminished blood flow distal to stenosis—a technique that depends on moving blood to generate contrast—a false-positive diagnosis of occlusion or vascular irregularity may result. Due to the significant susceptibility gradient found in this region, vessels close to the sphenoid sinus are susceptible to false narrowing or non-visualization.[50] However, no instance was misjudged in our investigation as a result of this phenomenon. Additionally, according to Skutta et al,[51] this issue was only sometimes seen, favouring MRA over CTA in this region. Signal loss in the C2 and C3 segments of the internal carotid artery makes it challenging to assess the narrowing of this section of the vessel. This signal loss is also a result of accelerated flow in the carotid syphon with lack of laminar flow and subsequent intravoxel dephasing.[52] MR angiograms of highly stenotic arteries may reveal an apparent vascular discontinuity. Intravoxel spin dephasing and spin acceleration via the stenosis area cause the flow void.[53] The study by Hirari et al,[29] also noted these artefacts, which led to an overestimation of stenosis based solely on MR angiography. On CTA, this was not visible. In the imaging of stenosis patients, the MIP method introduces certain artefacts. As a result, the vessel diameter appears to be decreasing, and the stenotic section artificially lengthens.[54] When determining the degree of intracranial stenosis, combined analysis of MIP pictures and source images is more accurate than MIP image analysis alone.[25] Concordance is influenced by image quality, but less so than by the technique used. CTA offers better overall image quality than TOF-MRA and contrast enhanced MRA (CEMRA). Due to the slow volume coverage and lengthy acquisition times, 3D-TOF-MRA has seen a higher prevalence of motion artefacts. MIP images may show tapering vessel walls towards the scan volume's edge due to a decrease in signal strength brought on by higher spin saturation. The proper timing of the contrast bolus and imaging parameters are crucial for obtaining high-quality images in CE-MRA.[26] The results of the research by Hirari et al,[29] demonstrated that the use of combined MRA and CTA enables the detection of steno-occlusive disease in all major cerebral arteries with a high degree of accuracy. The extra use of CTA improves the specificity for detecting stenosis of 50% or more and decreases the tendency of overestimating stenosis at MRA. Out of 35 arterial segments in their investigation with suspected stenoocclusive disorders identified by MRA, 33 segments (95%) were correctly interpreted with the help of supplementary CTA. The accuracy of combined MRA and CTA for measuring stenosis and showing blockage of the major intracranial arteries was comparable to that of DSA. With calcification on the circumferential wall, the CTA has trouble defining the arterial lumen. Analysis in conjunction with the axial source pictures may be helpful to decrease. On MPR pictures of CTA, dense circumferential calcification of the arterial wall interferes with the assessment of the arterial lumen. However, when volume-rendered pictures of the extracranial carotid artery are generated, advanced algorithms can be utilised to eliminate mural calcifications. In the study by Hirari et al., MRA was found to be more beneficial than CTA for the evaluation of the lumens of arteries with circumferential calcification because it more accurately detected calcified stenotic lumens than did CTA. Due to the cavernous sinuses being opaque from contrast, CTA frequently fails to represent the internal carotid artery lumen within them. Only when the arterial lumen was hyperattenuating to the sinus could this section of the internal carotid artery be distinguished from the cavernous sinus. On the other hand, MRA frequently shows this internal carotid artery segment accurately. In order to assess intracranial steno-occlusive disorders, MRA and CTA work in tandem.[29] With the drawbacks of using ionising radiation and iodinated contrast media with potential nephrotoxic consequences, CTA quickly produces a cerebral vascular map. Patients who have risk factors such renal insufficiency, congestive heart failure, and contrast material hypersensitivity should utilise the iodinated contrast agents cautiously. On the other hand, ionising radiation and contrast medium are not used in 3D TOF-MRA. Only a few investigations have shown that TOF-MRA is more sensitive than CTA at displaying intracerebral arteries on MR equipment with a strong magnetic field.[22] The MRA's relative lengthier scanning duration, susceptibility to motion artefacts, and MRI examination contraindications are all potential drawbacks.[55] In the work-up of patients with acute stroke, researchers have recently suggested utilising MRA and MR imaging combined with hemodynamic and diffusion-weighted pulse sequences.[56] The combination of MRA angiography's extensive vascular information and diffusion and perfusion imaging can detect early infarction with great sensitivity. The main drawback of this is longer scanning times, which favour CT and CTA in the acute environment and reduce the chance of motion artefacts from patients. In comparison to CT, the availability of MR in acute settings is noticeably lower in most institutions. Additionally, CT scanning does not require any specialised life-support or monitoring equipment, and patients can easily be seen when inside the bigger CT gantry.

CONCLUSION

In conclusion, the MRA and CTA data showed remarkable correlation. Patients with cerebrovascular illness make up more than half of the population. Males are more likely than females to suffer a stroke, and the fourth to sixth decade of life is the most prevalent age range. The anterior cerebral artery is most frequently affected by aneurysm, followed by the middle cerebral artery and the posterior inferior cerebellar artery. Even though MRA has a slightly greater false-negative rate than CTA, additional testing may only be required in cases where there is a strong clinical suspicion of an underlying disease. Although MRA can be utilised in emergency situations when CTA may be contraindicated because aneurysms less than 3mm do not affect urgent care, CTA is still better at finding contemporaneous, clinically non-suspected, tiny aneurysms. When it comes to identifying clinically severe internal carotid artery stenosis, MRA and CTA are equally accurate. MRA is just as reliable as CTA at identifying intracranial artery occlusive disease. MRA and CTA together offer significantly more diagnostic data than MRA and CTA separately.

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