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Original Article

Carotid Angiographic Study of Cerebrovascular Accidents with Clinical Correlation

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ABSTRACT:

Introduction: Early recognition of cerebrovascular accidents offer the possibility of stroke prevention. Simple clinical findings are helpful in distinguishing the type of stroke, but need for diagnostic imaging is an undeniable fact. Therefore, present study is taken into account to correlate the clinical features and carotid angiographic findings in cases of cerebrovascular accidents. **Material and Methods:** In the present study 35 patients above twenty years of age were taken up. There were twenty four males and eleven females. Mean age of the patients was 49.4 years. These patients had presented with neurological manifestations of sudden or gradual onset. All of them were subjected to percutaneaus carotid angiography. The help of other investigations was also taken. These patients were evaluated on the clinical proformas. **Results:** Percutaneous carotid angiography was successful in 82.86 % cases. It was observed that there was a correlation between the clinical diagnosis and carotid angiographic findings in 42.8% cases of cerebral vascular accidents. While only venous phases were available in 8.5 % cases. Occlusion or narrowing of vessels was observed in 37.14 % cases. Out of these in 22.84 % cases non filling of middle cerebral artery was demonstrated. It was observed that there was non filling of upper division 14.28 % and non filling of lower division in 5.71 % cases while complete occlusion was demonstrated in 2.8 %. In 8.5% cases partial or total occlusion or beaded appearance of internal carotid artery was found. **Conclusion:** Even though clinical characteristics are useful to differentiate stroke types during initial hospital visit, imaging remains a gold standard diagnostic method for cerebrovascular accidents. Nevertheless, in small district hospitals and centers, where imaging facilities are not available, these results can be applicable for patient management, treatment as well as timely referral to stroke center.

Keywords: Carotid angiography; Cerebrovascular accidents; Occlusion of vessels.

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INTRODUCTION

Cerebrovascular accidents are described as an acute loss of focal and at times global cerebral function, the symptoms lasting more than 24 hours or leading to death with no apparent cause others than of vascular origin.[1] In Indian hospitals, stroke accounts for 4.5% total medial admissions and about 30% of neurological admissions.[2]

Early recognition of symptomatic carotid artery stenosis offers the possibility of stroke prevention.[3] Simple clinical findings are helpful in distinguishing the type of stroke, but need for diagnostic imaging is an undeniable fact.[4] Stroke can be generally classified as ischemic or hemorrhagic. Hemorrhagic stroke, which is due to blood vessel rupture, accounts for 20% of CVAs. Ischemic stroke due to brain vessels occlusion and blockage includes 80%.[1] As the modality used to distinguish in two types of stroke, is not accessible in all hospitals and emergency departments, which may lead to loss of treatment golden time. Hence, clinical findings especially neurological signs and symptoms, negative or positive symptoms and sudden or gradual onset result in primary segregation of stroke types in emergency department that leads to early diagnosis and treatment.[4] Therefore, present study is taken into account to correlate the clinical features and carotid angiographic findings in cases of cerebrovascular accidents.

MATERIAL AND METHODS

In the present study 35 patients above twenty years of age were taken up. There were twenty four males and eleven females. Mean age of the patients was 49.4 years. These patients had presented with neurological manifestations of sudden or gradual onset. All of them were subjected to percutaneaus carotid angiography. The help of other investigations was also taken. These patients were evaluated on the clinical proformas.

Procedure of percutaneous carotid angiography: Cerebral angiography is the demonstration of cerebral vessels in X-ray films by injecting a contrast media in the common carotid artery. **Preparation of the Patient**: After the need for carotid angiography has been established clinically, the patient should be asked to submit a written consent. The sensitivity to the contrast media should be done by administering one drop of the dye in the patient's conjunctival sac of one eye. Both eyes are examined after a period of 30-45 minutes for evidence of redness. It is important not to read the eye in less than 30 minutes. If the eye does not become red, then the test is negative. If it becomes red, the test is positive and the dye is contraindicated. This is very rare. If the procedure is to be done under local anaesthesia, the patient's confidence is essential. It is wise to tell him what wil1 happen during the procêdure of injection e.g. pain at the site of injection, heaviness in the head and supraorbital region. He should also be told to keep himself to the sounds like ready, shoot, etc.

The Angiographer: For an inexperienced person, the major obstacle is the failure in getting the carotid artery by percutaneaus method.

The X-ray technician: Very close co-operation is required betweern the angiographer and the X-ray technician. At least twelve X-ray films of 10" x 12" duly arranged and numbered are required.

Positioning of the patient: The patient is placed in supine position. The head is extended and placed over a very thin pad of foam. An inflator rubber bag is placed under the patients shoulder, this bag can be elevated at will and the desired extension of the neck can be obtained. Excessive extension of the neck should be avoided as it may lead to poor feeling of the carotid pulsations The knees are put in a flexed position and a strap is tied over them. Both the hands are also tied by straps. This prevents umecessary movements of the body.

Insertion of the needle: The skin is first prepared by local antiseptics. Taking all antiseptic precautions, the local anaesthesia (Procaine, Xylocaine) is infiltrated in the intradermal area and later on in the deeper structures making sure that none goes in the blood stream. A total of 4-6 cc of anaesthesia is sufficient. The injection of excessive amount of anaesthesia is discouraged as this would lead to edema of the tissues and palpation of arteries would become more difficult. The artery is palpated and the area is massaged to keep the spread the local anaesthesia. The artery is then palpated and fixed with the second and third fingers of the left hand. With one finger the Sternomastoid is displaced laterally. The Jugular vein should also be displaced laterally so that the anterior part of the artery is uncovered. A small incision is then given to the area where the pulsations are felt best. The incision should not be deep and should not damage the artery. The needle is then inserted gradually. While inserting the needle, one must not forget that the artery is surrounded by many important structures like superior margin of the thyroid cartilage. At this level, the bifurcation of the common carotid artery usually takes place. Therefore, to inject the common carotid artery the puncture should be made as low as possible. By doing this any obstruction at the level of internal carotid artery can be made out. The region of the bifurcation of the internal carotid artery is the most common site for atheromatous plagues.

The Needle:
Cournand Greenough needle is most ideal for this purpose. The needle is placed directly into the artery and once this has been confirmed by the sudden ingush of blood it is connected to a syringe containing normal physiological saline. During the puncture, the artery should be fixed firmly. The finger should be placed 1 cm above the site of the puncture. It is always better to go vertical till the anterior wall of the artery is pierced and then obliquely to keep the needle in the artery. This avoids trauma to the posterior arterial wall.

Injecting and filming- The Contrast media: In our series of patients the contrast media used is conray 280. Once the needle is in the artery and is securely in place, it is connected to a long saline filled tube. In order to get rid of any air bubbles some of the blood may be used to gush in the tube before connecting the syringe. It is important to inject enough saline so that all the blood is displaced from the needle. The injection time should be very short because undue dilution of the dye has to be avoided. About 8 cc of contrast media should be injected in 1 sec. The films should be taken in AP and lateral views. Before giving the next injection of the dye, there should be a gap of atleast 10 minutes. When the procedure is completed, firm pressure should be applied for 10-15 minutes over the area of insertion of the needle so that local haematona may not be formed. The patient should be watched for any complication for the next 2-4 hours.

RESULTS

The present study analyses the angiographic findings of cerebrovascular accidents and correlates them with clinical diagnosis. Percutaneous carotid angiography was successful in 82.86 % cases (table 1). While only venous phases were available in 8.5 % cases. In the present study occlusion or narrowing of vessels was observed in 37.14 % cases (table 2). Out of these in 22.84 % cases non filling of middle cerebral artery was demonstrated. It was observed that there was non filling of upper division 14.28 % and non filling of lower division in 5.71 % cases while complete occlusion was demonstrated in 2.8 %. In 8.5% cases partial or total occlusion or beaded appearance of internal carotid artery was found. Combination of lesions involving middle cerebral artery and internal carotid artery were demonstrated in 5.7 % cases. In 14.28% cases angiograms showed mass effect wile intra cranial aneurysus were found in 5.7% cases. Normal carotid angiograms were observed in 25.71 % cases. Table 3 shows incidence of carotid bruit in cerebrovascular accidents.

It was observed that there was a correlation between the clinical diagnosis and carotid angiographic findings in 42.8% cases of cerebral vascular accidents (table 4).

Table 1: Results of carotid angiography

	Number	Percentage
Total patients underwent angiography	35	
Successful cases	29	82.86%
Non-contributory (venous phases only)	3	8.57%
Failures	3	8.57%

Table 2: Incidence of positive angiograms

Total no. of cases			35	
Normal			9	25.71%
Positive			20	57.14%
Angiographic findings				
I	Vascular involvemnt		13	37.14%
Ia	Middle cerebral artery (8) (22.84%)	Q	5	14.28%
		Inferior division	2	5.71%
		Complete	1	2.85%
Ib	Internal Carotid artery		3	8.57%
Ic	Both middle cerebral artery and Internal Carotid artery		2	5.71%
II	Aneurysms		2	5.71%
III	Mass effect (space occupying lesions)		5	14.28%

Table 3: Incidence of carotid bruit in cerebrovascular accidents

Total cases	Bruit presentation	Side of Bruit	Case No.	Angiography findings	
		Right (%)	Left (%)		
35	4 (11.5%)	2 (50%)	2 (50%)	9	Left internal carotid stenosis (partial)
				11	Right internal carotid artery occlusion (partial) with non-filling of upper division of middle cerebral artery
				13	Beaded appearance of right internal carotid artery in extra cranial course with non filling of upper division of middle cerebral artery.
				30	Partial stenosis of Left internal carotid artery in extra cranial course

Table 4: Correlation of clinical diagnosis with angiographic findings in cerebrovascular accidents

Case No.	Clinical Diagnosis	Angiographic findings
2	Left middle cerebral artery occlusion	Non filling of superior division of left middle cerebral artery
5	Left middle cerebral artery occlusion	Non filling of superior division of left middle cerebral artery
7	Right middle cerebral artery occlusion	Non filling of inferior division of right middle cerebral artery
8	Left middle cerebral artery occlusion	Non filling of inferior division of left middle cerebral artery
9	Left internal carotid artery occlusion	Beaded appearance of internal carotid artery (left) in extracranial course
11	Right internal carotid artery occlusion	Partial stenosis of internal carotid artery (right) in intra cranial course with non filling of superior division of right middle cerebral artery.
25	subarachnoid hemorrhage due to ruptured berry aneurysm	one saccular aneurysm at the junction of C1 and M1 (terminal segment of internal carotid artery and proximal segment of middle cerebral artery).
30	Left internal carotid artery occlusion	Partial stenosis of left internal carotid artery in extra cranial course.
32	Left middle cerebral artery occlusion	Total occlusion of left middle cerebral artery occlusion
34	Left middle cerebral artery occlusion	Non filling of superior division of left middle cerebral artery.

DISCUSSION

The present study analyses the angiographic findings of cerebrovascular accidents and correlates them with clinical diagnosis. Percutaneous carotid angiography was successful in 82.86 % cases and occlusion or narrowing of vessels was observed in 37.14 % cases. It was observed that there was a correlation between the clinical diagnosis and carotid angiographic findings in 42.8% cases of cerebral vascular accidents. In a study carried out by Altemus LR et al,[5] 14 examples of arteriographically visualized divisional occlusion were analyzed, and a good correlation is demonstrated between the roentgenologic and clinical findings. Pessin MS et al[3] carried study to determine the prevalence of radiologically evident carotid stenosis in patients with transient cerebral ischemic attacks, analyzed 95 consecutive hospitalized patients who during a two-year period had appropriate symptoms and also underwent angiography and revealed that on the basis of the angiographic findings, the study indicates there are several distinct groups of patients with carotid transient ischemic attacks.

In the present study, 11.5% incidence of carotid bruit in cerebrovascular accidents were found. Heiserman JE et al[6] examined the incidence of neurologic complications associated with modern cerebral angiography and reported that cerebral angiography was associated with a 1% overall incidence of neurologic deficit and a 0.5% incidence of persistent deficit. All complications occurred in patients presenting with a history of stroke/transient ischemic accident or carotid bruit, which may reflect the difficulty of performing angiography in this population at risk for atherosclerotic changes.

Cerebrovascular accidents accounts for a significant quota of healthcare budgets and causes excessive healthcare expenses as well. Mortality during hospital admission is 15% and up to 20%–25% during the next 30 days. Although, 50%–70% of the patients recover from the neurological dysfunctions, 15%–30% of stroke victims suffer permanent disabilities.[7-9]

Currently India is facing double burden of communicable and non-communicable diseases, and now a day's cases of non-communicable diseases have started increasing, following iceberg phenomenon. So, diagnosing these conditions in its initial stage and halting the disease progress will be the priority.[1,]

CONCLUSION

Even though clinical characteristics are useful to differentiate stroke types during initial hospital visit, imaging remains a gold standard diagnostic method for cerebrovascular accidents. Nevertheless, in small district hospitals and centers, where imaging facilities are not available, these results can be applicable for patient management, treatment as well as timely referral to stroke center.

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