

STUDY OF CAROTID ARTERIES WITH PERIPHERAL VASCULAR DISEASE BY THE USAGE OF COLOR DOPPLER IMAGING

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Received : 21/10/2023
Received in revised form : 06/12/2023
Accepted : 22/12/2023

Keywords:

Stenosis, Duplex Ultrasound, transitional ischemic attack, thromboanginitis attack (TAO), DM-Diabetic Mellitus.

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DOI: 10.47009/jamp.2023.5.6.240

Source of Support: Nil,

Conflict of Interest: None declared

Int J Acad Med Pharm

2023; 5 (6); 1169-1171



Abstract

Background: Carotid arteries (atherosclerosis) are always correlated with coronary artery diseases in many asymptomatic patients as well. Hence, the colour Doppler imaging study predicts various vascular fatalities. **Materials and Methods:** 200 patients aged between 30 to 75 years were subjected to exposure to BIRDEM, Duplex Colour Doppler (USG), and an angiogram if necessary. A high-frequency linear array transducer (5, 7, or 10 MHz) was used. Carotid artery walls and their velocities were studied in the neck on both sides in longitudinal and transverse planes. Different measurements were to be taken to grade the stenosis. **Result:** Clinical manifestations were – 23 (11.5%) had hemiparesis, 19 (9.5%) had diabetes mellitus, 13 (6.5%) had hemisensory disturbances, 24 (12%) had hypertension, 37 (18.5%) were hyperlipidemic, 30 (15%) had a transitional ischemic attack, and 12 (6%) had giddiness. The grades of stenosis were - 68 (34%) had 1st grade stenosis 0-29. 55 (27.5%) had 30-49 grades of stenosis, 41 (20.5%) had 50-59, 23 (11.5%) had 60-69 grades of stenosis, and 13 (6.5%) had 70-79 grades of stenosis. **Conclusion:** It was concluded that carotid artery disease can develop concurrently with coronary disease in a significant proportion of patients, even though they are completely asymptomatic. Hence, carotid artery evaluation can predict various cardiovascular or neurovascular diseases of the brain as well.

INTRODUCTION

Coronary artery disease (CAD) is often complicated by cerebrovascular accidents. Stroke and myocardial infarctions are clearly interrelated events and the association between carotid and coronary disease is a well-known factor.^[1] It is reported that the frequency of combined carotid artery and coronary artery lesions, even in asymptomatic patients, varies from 10 to 40% cases.^[2] The difference is due to the different methods, i.e., clinical autopsy angiography and echography, utilised in identifying the lesion and the different degrees of stenosis considered critical. Based on the significant stenosis of carotid arteries, non-invasive tests are being used to screen patients for co-existing carotid and coronary artery disease.^[3,4] Hence, an attempt was made to evaluate the various peripheral diseases and degrees of carotid artery disease by colour Doppler imaging.

MATERIALS AND METHODS

200 (two hundred) patients aged between 30 to 75 years visited the Radiology Department of Nimra

institute of medical sciences Nimra, Nagar, Ibrahim patnam, Jupudi Vijayawada NTR district-521456, Andhra Pradesh were studied.

Inclusive Criteria

Patients having peripheral vascular symptoms of cerebro-basilar insufficiency. A history of transient ischemic attacks with diabetes mellitus (TAO) was selected for the study.

Exclusive Criteria

Patients already under treatment for epilepsy, malignancy, psychosis, and HIV were excluded from the study.

Method: All of them were diagnosed as having peripheral vascular disease based on clinical history and examination, duplex colour Doppler ultrasonography, and angiography. An ultrasound machine and a GE voluson PS machine were used to perform the USG.

A high-frequency linear-array transducer (5, 7, or 10 MHz) was used. Carotid arterial walls and their velocities were studied in the neck on both sides in the longitudinal and transverse planes. Three measurements

Internal carotid artery peak systolic

Internal to common carotid artery peak systolic velocity ratio (ICA PSV/CCA PSV)

Internal carotid artery end-diastolic velocity (ICA EDV) was used to grade

The duration of the study was from May 2021 to June 2023.

Statistical analysis: The clinical manifestations and grades of stenosis in patients were classified by percentage. The statistical analysis was done in SPSS software. The ratio of males and females was 2:1.

RESULTS

[Table 1] Clinical manifestations of patients with peripheral vascular disease 23 (11.5%) had hemiparesis, 19 (9.5%) had DM, 13 (6.5%) had hemisensory disturbances, 24 (12%) had hypertension, 42 (21%) had smoked for more than 10 years, 37 (18.5%) had hyperlipidemia, 30 (15%) had transitional ischemia, and 12 (6%) had giddiness.

[Table 2] Grades of stenosis

- 68 (34%) patients had a 0–29% grade of stenosis.
- 55 (27.5%) had a 30–49% grade of stenosis.
- 41 (20.5%) patients had 50–59% grades.
- 23 patients had 60–69% grades.
- 13 (6.5%) had a 70–79% grade of stenosis.

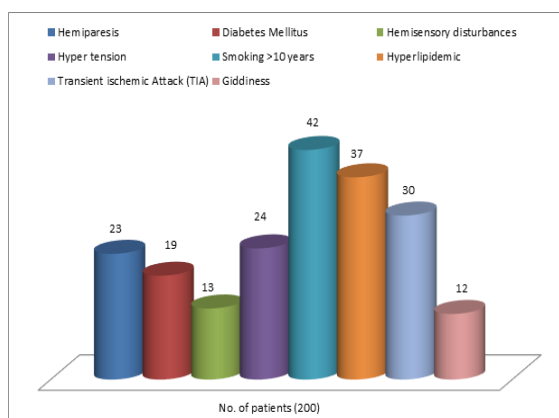


Figure 1: Clinical manifestation of patients

Table 1: Clinical manifestation of patients

Sl. No	Clinical manifestations	No. of patients (200)	Percentage (%)
1	Hemiparesis	23	11.5
2	Diabetes Mellitus	19	9.5
3	Hemi sensory disturbances	13	6.5
4	Hyper tension	24	12
5	Smoking >10 years	42	21
6	Hyperlipidemic	37	18.5
7	Transient ischemic Attack (TIA)	30	15
8	Giddiness	12	6

Table 2: Grades stenosis in Internal Carotid artery in the patients with peripheral vascular disease

Sl. No	Grades of stenosis	No. of patients (200)	Percentage (%)
1	0-29	68	34
2	30-49	55	27.5
3	50-59	41	20.5
4	60-69	23	11.5
5	70-79	13	6.5
6	80-95	00	--
7	96-99	00	--
8	100 (occluded)	00	--

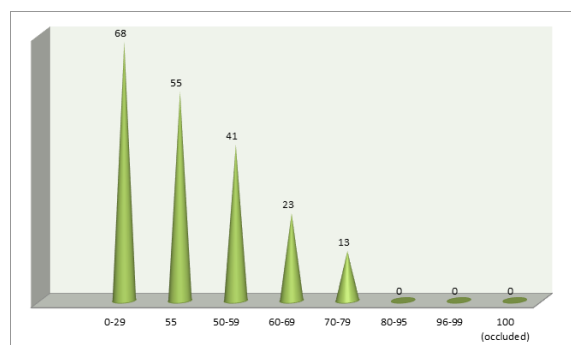


Figure 2: Grades stenosis in Internal Carotid artery in the patients with peripheral vascular disease

DISCUSSION

Present study of carotid arteries with peripheral vascular disease by using colour Doppler imaging. The clinical manifestations of patients were: 23

(11.5%) had hemiparesis, 19 (9.5%) had diabetes mellitus, 13 (6.5%) had hemisensory disturbances, 24 (12%) had hypertension, 21 (42.1%) had a smoking history lasting more than ten years, 37 (18.5%) had hyperlipidemia, 30 (15%) had TIA, and 12 (6%) had giddiness [Table 1]. The grades of stenosis were: 68 (34%) had a 0–29% grade of stenosis, 55 (27.5%) had a 30–49% grade of stenosis, 41 (20.5%) had a 50–59% grade of stenosis, 23 (11.5%) had a 60–69% grade of stenosis, and 13 (6.5%) had a 70–79% grade of stenosis [Table 2]. These findings are more or less in agreement with previous studies.^[5-7]

It is reported by the NASCET (North American Symptomatic Endarterectomy Trial) and the ECST (European carotid surgery Trial) that evaluation of degrees of carotid stenosis will help to reduce the surgical risk,^[8] hence, there was a significant reduction in stroke in the patients having carotid stenosis and a surgical perioperative morbidity and mortality was reduced to 2%.^[9]

It is an established fact that the benefit of carotid endarterectomy depends on optimal surgical expertise and a careful patient's selection.

PVD is a known risk factor for stroke. It has increased the 2–5-fold risk due to hypercholesterolemia and overweight in patients.^[10] Apart from this smoking, HTN and DM have a significant correlation to stroke due to elevation in the lipids (cholesterolemia), which mainly involves coronary artery diseases (CAD). In the present study, up to 70–79% of stenosis was observed, but previous studies have observed complete (100% occlusion (stenosis)) of ICA.^[11] In such cases, absence of pulsation, lumen-filled echogenic material, subnormal vessel size, and absence of Doppler flow signals or weak Doppler signals were observed.

CONCLUSION

The present study duplex of colour Doppler imaging carotid arteries in patients with PVD in the Andhra Pradesh Population has proved that there is a close relation between carotid artery disease and PVD. Duplex ultrasound is an accurate, safe, and economical imaging technique for screening high-risk patients who have already been investigated for primary disease. Such cheaper duplex ultrasound is most suitable for developing countries like India.

Limitation of study: Owing to the tertiary location of the research centre, the small number of patients, and the lack of the latest technologies, we have limited findings and results.

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