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Research Article

**ANALYSIS OF CAROTID ARTERY ELASTICITY IN PATIENTS
WITH SVD BY ULTRASOUND DATA TECHNIQUES****Dr. Asad Ullah Ansari¹, Dr Raabia Tayyab², Dr Madiha Ghulam³**¹Ex-House Officer Allied Hospital Faisalabad, ²Rural Health Centre Tanda Gujrat, ³Quaid e
Azam Medical College, Bahawalpur.**Article Received:** November 2020 **Accepted:** December 2020 **Published:** January 2021**Abstract:**

Introduction: Literature has it that carotid artery is a window of arteriosclerosis in the whole body and closely related to the occurrence of cardiovascular and cerebrovascular diseases. A research shows that the changes in the morphology and function of the carotid artery are not totally equal.

Aims and objectives: The basic aim of the study is to analyze the carotid artery elasticity in patients with SVD by ultrasound data technique.

Materials and Methods: This study was conducted in Allied Hospital Faisalabad during July 2019 to December 2019. There were altogether 50 cases, 21 males and 29 females, aging from 38 to 80. The average age was (56.56±8.46). All the patients went through head MRI examination, and the selected cases accorded with neuroimaging diagnostic standards of SVD. The time for ultrasound examination was within one week from the attack.

Results: In SVD group, values of SBP, DBP, PP and BMI were higher than the control group, and the difference had statistical significance (P<0.05). There was no significant difference between the two groups in age, FBG, TG, TC, HDL-C and LDL-C (P<0.05). IMT, α , β , and PWV of bilateral carotid artery in SVD group were higher than those in control group; CC was lower than that in control group. Those differences were significant in statistics (p<0.05).

Conclusion: It is concluded that there are differences in carotid structural and elastic function in SVD patients. The IMT increased, vascular stiffness increased, PWV increased and blood vessel compliance decreased.

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INTRODUCTION

Literature has it that carotid artery is a window of arteriosclerosis in the whole body and closely related to the occurrence of cardiovascular and cerebrovascular diseases. A research shows that the changes in the morphology and function of the carotid artery are not totally equal. So it is important to consider changes both in morphology and in function to fully understand pathological changes in blood vessels [1]. Several scholars applied ultrasound to evaluate the elasticity of blood vessel wall. They regarded the elasticity of carotid artery as an independent indicator of artery diseases as it can reflect functional changes of elastic arteries. Based on a large quantity of researches, radio frequency can be an effective way to investigate into structural and functional changes of carotid artery at an early stage [2]. Radio frequency can act as a reliable and convenient way to monitor and assess clinically of early-stage arteriosclerosis, because it is real-time, noninvasive, repeatable and convenient [3]. This research applies radio frequency to quantitatively analyze the characteristics of intima-media thickness and vascular elasticity parameter of carotid artery in SVD patients [4]. The purpose of this research is to evaluate the values of radio frequency to assess the structure and function of carotid artery in SVD patients, so that to provide evidence to prevent SVD and monitor disease process [5].

Aims and objectives:

The basic aim of the study is to analyze the carotid artery elasticity in patients with SVD by ultrasound data technique

MATERIAL AND METHODS:

This study was conducted in Allied Hospital Faisalabad during July 2019 to December 2019. There were altogether 50 cases, 21 males and 29 females, aging from 38 to 80. The average age was (56.56 ± 8.46) . All the patients went through head MRI examination, and the selected cases accorded with neuroimaging diagnostic standards of SVD. The time for ultrasound examination was within one week from the attack. Exclusion criteria were patients with cerebral hemorrhage or brain tumor; had carotid intima-media excision; with stenosis or obstruction of carotid artery examined by the ultrasound; and with severe heart, liver or kidney diseases. IMT of bilateral carotid artery can be read from the map directly. Results of stiffness indicator (α), stiffness parameter (β), compliance coefficient (CC) and pulse wave velocity (PWV) can be shown through Report+Preview interface automatically.

Statistical analysis:

Data was presented by average value \pm standard deviation. Comparison between groups was evaluated first by normality and homogeneity test for variance. Those passed the test would be evaluated by t-test. $P < 0.05$ was regarded significant of the differences in statistics.

RESULTS:

In SVD group, values of SBP, DBP, PP and BMI were higher than the control group, and the difference had statistical significance ($P < 0.05$). There was no significant difference between the two groups in age, FBG, TG, TC, HDL-C and LDL-C ($P < 0.05$) (Table 1).

Table 1: SVD Group and Control Group in General Materials

	SVD Group (n=50)	Control Group (n=53)	t Value	p Value
Age (Year)	56.56 \pm 8.46	53.64 \pm 8.36	1.716	0.081
BMI (kg/m ²)	24.31 \pm 2.26	23.37 \pm 2.09	2.195	0.031
SBP (mmHg)	140.36 \pm 15.70	116.53 \pm 13.46	8.248	0.000
DBP (mmHg)	87.94 \pm 10.69	75.81 \pm 9.94	5.967	0.000
PP (mmHg)	52.42 \pm 12.87	40.72 \pm 8.74	5.426	0.000
FBG (mmol/L)	5.12 \pm 0.65	5.06 \pm 0.49	1.764	0.081
TG (mmol/L)	1.74 \pm 0.75	1.69 \pm 0.86	1.838	0.071
TC (mmol/L)	4.95 \pm 0.76	4.88 \pm 0.82	1.712	0.090
HDL-C (mmol/L)	1.30 \pm 0.43	1.31 \pm 0.56	1.717	0.089
LDL-C (mmol/L)	3.46 \pm 0.58	3.38 \pm 0.66	1.139	0.266

IMT, α , β , and PWV of bilateral carotid artery in SVD group were higher than those in control group; CC was lower than that in control group. Those differences were significant in statistics ($p < 0.05$) (Table 2).

Table 02: Comparison between SVD Group and Control Group in structural and functional parameters of the left arteria carotis communis.

Group	IMT(μm)	CC (mm^2/KPa)	α	β	PWV(m/s)
SVD Group	694.88 \pm 77.63	0.89 \pm 0.13	5.68 \pm 1.23	11.25 \pm 1.01	9.49 \pm 1.09
Control Group	586.87 \pm 62.12	0.96 \pm 0.08	4.77 \pm 0.62	9.24 \pm 1.24	7.22 \pm 1.11
T value	7.818	-3.115	4.712	9.004	10.482
P value	0.000	0.002	0.000	0.000	0.000

DISCUSSION:

Arteriosclerosis is a long pathogenic progress. More and more attentions are put on how to predict arteriosclerosis before morphological changes in vascular walls. Researches in recent years show that functional disorder of endothelial cells is an early sign of arteriosclerosis [6]. Although IMT can detect some early stage arteriosclerosis, it can only reflect the structural characteristics of arterial walls but not functional disorder of endothelial cells [7]. Researches show that elastic changes in arteries are earlier than structural changes. Decreased elastic function is a specificity and sensitive indicator of early vasculopathy and is one of the important signs of cardiovascular diseases [8]. QAS is a more comprehensive way of diagnosing blood vessel elasticity. It can present two-dimensional structure of blood vessels and quantitatively detect dilatancy of carotid artery in 6 cardiac cycles in real-time by receiving complete radio frequency signal, so that to provide possibility to prevent and diagnose SVD at an early stage [9]. The study shows that α , β , PWV in SVD group are higher than those in normal control group, and CC in SVD group is lower than that in normal control group.

SVD is a series of diseases which affects encephalic small vessels, manifested as loss of smooth muscle cells in vascular walls, deposition of fibrous transparent materials, thickness of vascular walls and stenosis of lumen. SVD is one of the reasons of ischemic stroke. At present, the pathogenesis for SVD is still unclear. It is assumed that SVD is induced by the combined actions of various cerebrovascular disease risks and genetic factors and then give rise to all kinds of clinical symptoms [10].

CONCLUSION:

It is concluded that there are differences in carotid structural and elastic function in SVD patients. The IMT increased, vascular stiffness increased, PWV increased and blood vessel compliance decreased.

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