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Research Article

**DIAGNOSTIC VALUES OF TRANSESOPHAGEAL
ECHOCARDIOGRAPHY AND TRANSTHORACIC
ECHOCARDIOGRAPHY IN CARDIOGENIC EMBOLIC
CEREBRAL INFARCTION**¹Muhammad Arsalan Ali, ²Muzafar Ali Surhio, ³Dr Abdullah Sarwar¹MBBS Rawalpindi Medical University and Allied Hospitals, Rawalpindi²Al Kindi Specialized Hospital Manama Bahrain³Hameed Latif Hospital Lahore

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Abstract:

Objective: This research work carried out to assess the diagnostic values of TEE (Transesophageal Echocardiography) and TTE (Transthoracic Echocardiography) in CECI (Cardiogenic Embolic Cerebral Infarction).

Methodology: Total 50 patients suffering from cerebral infarction who got admission in Allied Hospitals, Rawalpindi from May 2018 to May 2019 were the part of this research work. The diagnosis of the patients carried out by TEE & TTE. We compared the diagnostic information to evaluate the values of both methods used for diagnosis.

Results: We diagnosed 16 patients out of 50 patients as CECI by TEE method (32.0%), including 2 patients suffering from aortic plaques, 6 patients had atrial septal defect, 2 patients of atrial septal aneurysm, 2 patients of patent foramen ovale, only one patient of left atrial spontaneous echo-contrast, single patient of mitral prolapse and 2 patients suffering from mitral stenosis. We diagnosed 4 patients of CECI by TTE (8%), including one patient present with patent foramen ovale, 1 patient present with left atrial spontaneous echo-contrast, 1 patient mitral prolapse & one patient was present with mitral stenosis. The disparity was much significant statistically ($P < 0.050$). The most important disparity of TTE and TEE was the identification of aorta atheromatous plaques & atrial septal abrasions. The diagnosis by TTE missed the aortic atheromatous plaques of 2 patients and atrial septal abrasions of 8 patients.

Conclusion: Diagnosis and identification of CECI with the TEE is very precise and beneficial. So, TEE is present with the worth promotion.

KEYWORDS: Cardiogenic Embolic Cerebral Infarction, Mitral Stenosis, Transesophageal Echocardiography, Transthoracic Echocardiography, Prolapse, Echo-Contrast.

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INTRODUCTION:

In these current years, there is an increase in the patients suffering from CI (Cerebral Infarction) year by year. Because of this increase, it has become very common disease [1]. Through a close investigation, Liu RF discovered symptoms like malacia & ischemic necrosis in tissues of brain of the patients suffering from CI [2]. If there is appearance of arteriosclerosis in the cerebral tissues, there will be a disorder in the circulation of blood and there were slow blood flow when there will be an abnormal increase in the blood's viscosity. Once there is reduction in the blood pressure, platelets in blood & fibrin in the vascular tissues will deposit and be observed to vascular walls to create thrombus, which results in ischemia & anoxia in tissues of brain and finally tempts to CI [3, 4]. In clinics, there can be different categories of CI and CCI (Cardiogenic Cerebral Infarction) is most important and frequent CI, with a high rate of morbidity as well as mortality [5, 6].

One research work discovered that there could not be easily diagnosis of about one third patients of CI [7]. There is great importance of timely therapy for the improvement of the diagnostic precision of CCI. One research work proposed that the diagnosis and severity of the CECI is easily possible with the help of echocardiography [8]. Heart problems are the cause of the majority of the patients of occult cerebral infarction. The purpose of this research work was to investigate the practical values of TEE and TTE in the detection of CECI by diagnosing fifty patients with these two methods.

MATERIAL AND METHODS:

Total 50 patients of Cerebral Infarction who got admission in Allied Hospital Rawalpindi from May 2018 to May 2019 were the part of this research work. All the patients fulfilled the diagnostic standard of occult cerebral infarction and we used the MRI for the confirmation of the acute Cerebral Infarction. There were 29 males and 21 females in this research work. The average age of the patients was 38.30 ± 3.40 years from a range of age from 22 to 56 years. All the patients who were suffering from

other serious complications as diseases of heart were not the part of this research work. We obtained the written consent from all the patients who participated in this research work. The ethical committee of the hospital gave the permission to conduct this research work.

TTE and TEE carried out for all the patients. All the patients received the conventional electrocardiography & blood biochemical assessment at the time of admission and we also collected and recorded the conventional information of patients like their age, sex and risk factors related to stroke. We performed the TEE with the utilization of the Philip iE-33 ultrasonic apparatus in which the 5.0 MHz was the frequency of the single plane probe of TEE. We performed the standard procedure for the compliance of the diagnosis by TEE. We also performed the TTE with the utilization of the Philip iE-33 ultrasonic apparatus whose probe's frequency was 5 MHz

We adopted the standard procedure for its calculations. We determined the severity of complication in accordance with the results of examination. We determined the low-risk CECI if we observed the mitral stenosis, atrial septal abnormality and patent foramen ovale and high-risk CECI if we observed the extreme left ventricular dysfunction, left atrium tumor, aortic atherosclerosis, and extreme injury of mitral valve and thrombus of left ventricular. We used the SPSS V.23 for statistical analysis of the collected information. We used the Chi square method for the presentation of the numeration data after describing them in percentages. We considered the difference as significant statistically if $P < 0.050$.

RESULTS:

The rate of detection of CECI with TEE was high as compared to the detection rate with TTE and there was statistically significant disparity ($P < 0.050$). The disparity of the rate of detection with TEE and TTE was reflected on atrial septum defect & aortic atheromatous plaques as presented in the Table-1.

Table-I: TEE and TTE Comparison of Detection Rates of Cardiac Embolic Cerebral Infarction

Item	TEE		TTE	
	No	Percent	No	Percent
Left atrial spontaneous echo contrast	1.0	2.00	1.0	2.00
Patent foramen ovale	2.0	4.00	1.0	2.00
Mitral stenosis	2.0	4.00	1.0	2.00
Mitral prolapse	1.0	2.00	1.0	2.00
Atrial septal aneurysm	2.0	4.00	0.0	0.00
Aortic plaque	2.0	4.00	0.0	0.00
Atrial septal defect	6.0	12.00	0.0	0.00
Total	16.0	32.00	4.0	8.00

Association between the rate of detection of CECI and clinical traits: Among 50 patients present with occult CI, definite factors of risks were not present in 11 patients and 39 patients were present with at least 1 cerebral vessel related factors of risk. The rate of detection of CECI of patients with various genders & risk factors are present in Table-2. The findings of the research work suggested that there was a strong correlation of the CECI with the hyperlipidemia.

Table-II: Detection Rate of Cardiac Embolic Cerebral Infarction and Clinical Characteristics

Characteristics	No	Cases Detected	Percentage
Female	21.0	7.0	33.30
Male	29.0	9.0	31.00
Smoking	14.0	4.0	28.60
Drinking	3.0	0.0	0.00
Hypertension	21.0	4.0	19.00
Diabetes	8.0	3.0	37.50
Hyperlipidemia	17.0	11.0	64.70
Family history	8.0	2.0	25.00

Impacts of TEE findings on therapy: There are special treatment & prevention of CECI. The possible treatments for various kinds of CECI resulted from this literature are present in Table-3. The patients directly obtained one hundred mg aspirin after the absolute identification of Cerebral Infarction. There was adjustment of the therapy schemes of few patients. We transferred the 6 patients who discovered with atrial septal defect to Cardiology Department of our hospital to undergo occlusion of atrial septal defect and drug therapy and there was no recurrence of in the follow ups. We gave the enhanced statins treatment to 2 patients present with the aortic plaques. We turned to the anti-coagulation treatment following the instruction of the specialists for the patients who were suffering from spontaneous echo-contrast of left artery, mitral stenosis & mitral prolapse.

Table-III: TEE Results and Possible Therapies

TEE results	Possible therapy
Aortic plaques	Aspirin; statins
Atrial septal aneurysm	Anticoagulation; interventional occlusion
Atrial septum defects	Aspirin; anticoagulation; surgery; interventional occlusion
Left atrial spontaneous echo contrast	Oral administration of anticoagulation drugs
Mitral prolapse	Treatment for arrhythmia; ultrasonic monitoring; anticoagulation
Mitral stenosis	Mitral valvuloplasty; anticoagulation
Patent foramen ovale	Aspirin; anticoagulation; surgery; interventional occlusion

DISCUSSION:

The most important step in treatment and prevention of the Cerebral Infarction is the etiological diagnosis. The current medical data proposed that the definite diagnosis of about one third patients and such patients were suffering from occult cerebral infarction. With the development of the medical field, there is observance of the anomalous structure and function of heart [9]. Clinical information stated that the impact of TEE was correspondent to that of transcranial Doppler sonography in collaboration with TTE in the detection of the cardiogenic embolus [10]. There is very important role of TTE in the detection of the cardiac Cerebral Infarction. There is adverse performance of TTE in observing heart structure close to spine, and different factors can also affect this like chest wall's thickness and

fatness [11, 12]. The calculation of the maximum diameter of heart with the utilization of TTE through 4-chamber view & sub-costal view is subject to be interfered by energy of lung. So, there is very limit TTE application. TEE is very advance technology for the detection of the cardiac Cerebral Infarction. As compared to TTE approach, TEE can identify cardiac Cerebral Infarction more precisely because of its high specificity [13-14].

In this current research work, overall rate of detection of occult Cerebral Infarction by TEE was 32% which was much higher than the detection rate of 8.0% by TTE. Moreover, there was high sensitivity of the detection rate of aortic plaques, atrial septal defect, patent foramen ovale and atrial septal aneurysm showing the great values of

application of TEE in the identification of occult Cerebral Infarction. The findings on the rate of detection of CECI and clinical traits suggested that hyperlipidemia will make important effects on the rate of detection of CECI and rate of detection of CECI in the patients suffering from hyperlipidemia was 64.70%, showing clinical traits could have impact on the rate of detection of CECI. Cardiac ultrasonography has the ability to find the possible CECI. On this account, there can be selection of the more reasonable methods of treatment (Table-3). We gave the enhanced treatment to 2 patients appeared with aortic plaques and we transferred the 6 patients suffering from atrial septal defect to Cardiology Department for occlusion surgery.

CONCLUSION:

Diagnosis and identification of the CECI with the TEE was present with high accuracy and precision, which can also give guarantee to timely therapy and improvement in the rate of survival of patients.

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