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CARDIOVASCULAR RESEARCH PROVE JOURNAL (CVREP)

CARDIOVASCULAR RESEARCH PROVE Journal

“CVREP” Journal

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“CVREP” Journal is the official Journal of **CardioAlex Research, Education & Prevention foundation**. It is a peer-reviewed journal, engaged in publishing high quality material on all aspects of Cardiovascular Medicine. It includes updates on cardiology, information to junior doctors, review articles, abstracts, articles related to research findings and technical evaluations. It also provides a forum for the exchange of information in all fields of cardiology.

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SECTION (1):
ABSTRACTS



Comparing Diagnostic Accuracy of Resting Full-Cycle Ratio and Fractional Flow Reserve in The Assessment of Intermediate Grade Coronary Lesion: A Real-Clinical Experience

Sherif Seif^{1,2*} MSc, *Aly Zaki*², *VJ Karthikeyan*² MD, *Abhishek Kumar*² MD, *Ayyaz Sultan*² MD

ABSTRACT

OBJECTIVE:

This study compares the diagnostic accuracy of resting full-cycle ratio (RFR), a recent non-hyperemic pressure index with the standard fractional flow reserve (FFR).

METHODS AND RESULTS:

This retrospective, observational study included 180 patients presented to Royal Albert Edward Infirmary either for elective or urgent coronary intervention for stable angina or acute coronary syndrome (>48 h) with intermediate-grade lesions (typically around 40-90% stenosis). All patients underwent assessment of RFR and FFR, that was followed by evaluation of the correlation between both indices and assessment of the diagnostic adequacy of RFR against $FFR \leq 0.80$.

A total of 253 pressure wire studies were included for analysis. A significant correlation between RFR and FFR values was observed with a correlation

coefficient (r value) of 0.68 (p values < 0.001). Using receiver operating characteristic (ROC) curves (area under the curve for RFR 0.91), and the best cut-off value for RFR was ≤ 0.89 , for an FFR ≤ 0.80 . The overall diagnostic accuracy of RFR compared to FFR were nearly identical (RFR: 84.3%, $p=0.486$). The sensitivity of RFR against FFR was 77.2%.

CONCLUSION:

RFR has a good correlation with FFR, therefore a good diagnostic performance for detecting the functional significance of coronary stenosis. However, further investigations are still needed.

KEYWORDS:

Coronary artery disease; Percutaneous coronary intervention; Hemodynamic assessment of coronary stenosis

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Effect of Calcium Concentrations in The Dialysate on Echo Cardiology Findings in Regular Hemodialysis Patients

Kariem Mohamed Salem MD

ABSTRACT

BACKGROUND

Calcium Concentrations in the dialysate can be customized depending on the current and targeted serum Ca levels as well as the desire to maintain hemodynamic stability during dialysis and prevent the progression of secondary hyperparathyroidism

OBJECTIVE

to investigate the relative role of Different Dialysate Calcium Concentrations on Parathyroid Hormone Levels and Cardiovascular stability in end stage renal disease (ESRD) patients on regular hemodialysis

METHODS

A total number of 80 patients with ESRD on regular hemodialysis (HD) for more than 1 year, were divided into 2 groups: Group (A): consists of 40 Patients who were dialyzed with low calcium dialysate (LdCa, 1.25 mmol/L) and Group (B): consists of other 40 Patients who were dialyzed with high calcium dialysate (HdCa, 1.75 mmol/L). Dialysate composition was otherwise the same, all routine labs were done together with ECG and transthoracic echocardiography

RESULTS

The mean value \pm SD of: Total serum Calcium of Group A (7.93 ± 1.008) mg/dl and Group B (8.518 ± 1.01) mg/dl. ($p < 0.05$). Ionized Calcium of Group A (1.08 ± 0.09) and Group B (1.139 ± 0.1) mmol/l. ($p <$

0.05). Serum Parathyroid Hormone of Group A (492.75 ± 282.57) pg/ml and Group B (389.33 ± 223.240) pg/ml. (P value:0.073).

Intradialytic Hypotension was observed in 22.5 % of Group A patients while observed in 15 % in Group B (P: 0.39). Aortic valve calcification was present in 22.5% in Group A patients while present in 42.5 % in Group B (P:0.065) while Mitral valve calcification was present in 25 % patients in Group A patients while present in 42.5 % in Group B (P:0.09), Both valve calcification were present in 7.5 % of Group A and 17.5% of Group B (P:0.176) while No valve calcification was observed in 60% of Group A and 32.5 % of Group B (P: 0.014)

CONCLUSION

A lower dialysate Ca concentration of 1.25 mmol/L will offer much less risk of Ca loading and resultant hypercalcemia and calcification However, may predispose to cardiac arrhythmias and hemodynamic unstable dialysis sessions with intradialytic hypotension while A Higher dialysate Ca concentration of 1.75 mmol/L is effective in Suppression of hyperparathyroidism, however may predispose to hypercalcemia, valvular calcification, and over suppression of parathyroid hormone

KEYWORDS

Parathyroid Hormone - Dialysate Calcium - Valvular Calcification

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Evaluating The Impact of Fractional Flow Reserve (Ffr) On Decision-Making for Treatment of Borderline Coronary Artery Lesions: Must University Experience; Egypt

Ahmed I Elbarbary¹ MD, Ghada A. Kazamel² MD, Ahmed F Tamara³ MD

ABSTRACT

BACKGROUND

Fractional flow reserve (FFR) is considered the primary reference criterion used for the evaluation of functional significance of coronary artery stenosis. It helps the physician to define appropriate angiographic patients with borderline incidence coronary lesions that should or should not be treated with a stent.

FFR was first applied as part of a clinical trial in Egypt in 2013, and was used in clinical practice in 2015 and was first used in our Cath Laboratory at Misr University for Science and Technology (MUST) hospital, 6 October 2016, Egypt.

OBJECTIVE

This study aimed to evaluate the effect of the use of FFR in the selection of effective treatment strategy at Misr University for Science and Technology University (MUST) Hospital for angiographic borderline coronary lesions.

METHODS

The current retrospective study was carried out during the period from December 2016 to December 2019 on eighty-six patients undergoing coronary angiograms; three experienced interventional cardiologists (blinded to FFR results) re-analyzed their angiographic importance and whether to delay or conduct an operation with moderately stenotic lesions (40-70 percent) for which FFR was

performed. A distinction was made between the findings of visual assessment, quantitative coronary angiography, and functional assessment of the severity of coronary stenosis. The concept of severe stenosis was $FFR < 0.80$.

RESULTS

In our sample, 86 patients with a mean age of 57.60 ± 9.20 (range 45-70) (55 male and 21 female) were included. The FFR was < 0.80 in 26.74 percent (23/86) of patients who underwent coronary angioplasty. The association between visual measurement and lesion diameter quantitative evaluation was 0.804 ($P < 0.001$). In addition, 5.81 (5/86) of the patients had $FFR > 0.80$ left main (LM) lesion and stenting was performed on the other vessels with large coronary lesions.

CONCLUSION

In patients with moderate coronary artery lesion intensity, assessment of FFR is a valuable method in making clinical decisions regarding revascularization procedures. FFR results in a shift in the coronary intervention judgement. Further assessment is needed of the clinical and cost effects of such adjustments in areas with limited resources.

KEYWORDS

Fractional Flow Reserve Myocardial, Coronary Stenosis, Coronary Angiography

1- MUST university

2- National heart insititute

3- Ain Shams university

Impact of Digitalization Technology on Improving Patients' Adherence to Medications

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ABSTRACT

BACKGROUND

Clinical pharmacist has a fundamental role in improving patients' adherence to chronic medications, and that has a distinct and significant impact in improving health outcomes. This impact is maximized when patients receive continuous interventions to minimize the lack of adherence sustainability, and this could be achieved by using smart devices.

OBJECTIVE

Our study aimed to improve medication adherence in heart failure patients using the benefits of digital technology to promote a medication adherence app (MediCoach KSA) that is freely available on Apple's App Store and the Google Play Store in Saudi Arabia. MediCoach KSA app is providing a timely reminder for medications daily doses that requires a user confirmation at each time and at the same time providing HCPs with monthly tracking reports that can be easily analyzed to monitor improvement in adherence level.

METHODS

This is a medication adherence and service evaluation study, conducted in a single primary care cardiac center located in Riyadh, Saudi Arabia and including subjects in a single-arm prospective design. 79 patients with chronic HF that were taking 3-15 medications as part of their treatment plans. Patients who identified with low to moderate adherence levels (≥ 2 on MMAS-4) and who had smartphones were included. Participants were offered 30-minute counselling sessions at study start-up, followed by collecting adherence tracking reports from the MediCoach KSA app at one, two and six months. Medication adherence was assessed

for three main drug classes: diuretics, ACE inhibitors/ARBs and β -blockers. Medication adherence was assessed and compared statistically for the three pooled medication classes (overall medication adherence) and each class separately at one, two and six months.

RESULTS

79 patients (mean age 57, 46.8% male, 46% with MMAS-4 score 2) were included in the per-protocol report. Overall medication adherence for patients was 75.8% (90% CI: 74.9 to 76.6) at 1 month, 81.3% (90% CI: 80.3 to 83.4) at 2 months and 83.4% (90% CI: 82.6 to 84.2) after 6 months/study end. Overall adherence level was significantly improved at study end compared with 1 month and 2 months, and also between 1 month and 2 months, with $p < 0.001$, $p = 0.003$ and $p < 0.001$, respectively. Medication adherence for diuretics, ACE inhibitors/ARBs and β -blockers after 6 months (at study end) was 80.6%, 82.3% and 87.3%, respectively, in comparison with 77.4%, 76.4% and 73.5% after one month, and 77.6%, 82.4% and 84.0% after two months.

CONCLUSION

This study provides evidence that the freely available MediCoach KSA app can potentially improve medication adherence in HF patients with minimal cost to the Saudi healthcare system. After six months of continuous use of the MediCoach app, medication adherence levels significantly improved for the three studied medications and each class separately compared with reported levels after one month.

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Monastir Left Main Stenting Registry (MONA MAIN): Left Main Stenting Registry in Fattoum Bouregiba University Hospital Cardio B Department: Retrospective Study

*Mattouk Fawzy, Ben Hamda Kh, Jomma W, Hammami R, Chamtouri I, Fahmy K El
Sokkary H.*

ABSTRACT

OBJECTIVE

Study the prognosis of left main stented patients in 3 Years Retrospective registry

METHODS

We had access to the files and studied the patient clinically, angiographically in the procedure and post procedure.

RESULTS

30 patients were studied in our study
The patients were 24 males (80%), and 6 females (20%), 18 of them were diabetics (60%), radial access was used in 20 patients (66.66%) of cases with no significant bleeding complications either from Femoral or Radial access.
The left main was affected ostially in 22 patients (73.33%) of cases and were treated by stenting while in 8 patients (26.67%) the left main was affected distally and also were treated by stenting.
The patients were presented by Anterior myocardial infarction in 40 % of cases 12 patients while NONSTEMI in 30% of cases (9 patients) and were presented by unstable angina and chronic stable angina in 9 patients (30% of cases).
In 47 % of cases (14 patients) the patients were stented in other sites than left main before stenting in the left main also 6.67%.
(2 patients) was stented in the left main before and

we faced instant restenosis and was treated by stenting with excellent result and follow up in clinic.

In 6.67% of cases (2 cases) we treated by using 2 stents technique (TAP) technique and 93.33 % (28 patients) were treated by 1 stent provisional stenting with TIMI III Flow in both Left anterior descending and Left circumflex.

We Had 1 case (3.33%) died on table which was presented by anterior myocardial infarction was thrombolysed 8 hours after presentation, was arrested after Left main stenting and died on table.

40 % of cases (12 patients) were treated by pre dilatation before stenting while 60% (18 patients) were treated as direct stenting with excellent TIMI III distal flow.

50 % of cases (15 patients) had post dilatation after stenting with excellent TIMI III distal flow.

40% of cases (12 patients) were treated by Sirolimus eluting stents while 60% of cases 18 patients were treated by Everolimus Eluting stents with excellent follow up for all cases in our outpatient clinic

CONCLUSION

Left main stenting is uprising method for treatment of left main stenosis.

KEYWORDS

Left main stenting, Registry, Eluting stents.

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Novel Transcatheter Mitral Valve Repair Technique in Specific Severe Mitral Regurgitation: Tips, Tricks, and Outcomes

Fatma Taha

ABSTRACT

OBJECTIVE

This study aimed to review our experience in transcatheter closure of residual/iatrogenic VSDs and to report on the 12-month outcome.

METHODS

All patients who underwent transcatheter closure of residual/iatrogenic VSDs after surgical or transcatheter congenital heart disease (CHD) interventions between January-2015 and January-2020 were included. Patients' medical records were reviewed, and analyzed.

RESULTS

Fourteen patients with a mean age of 14.31 ± 8.81 years were included. The original diagnosis was isolated VSD in 5 (35.71%) patients, VSD/DCRV in 3 (21.43%) patients, TOF in 3 (21.43%) patients, coarctation/VSD/PDA in 1 (7.14%) patient, SAM/PDA in 1 (7.14%) patient, and AVSD/TAPVD/VSDs/PDA in 1 (7.14%) patient. The age at first intervention was 8.93 ± 7.49 years and the time since last intervention was 6.09 ± 5.16

years. The VSD was residual in 11 (78.57%) patients and iatrogenic in 3 (21.43%) patients. The VSD site was peri-membranous in 6 (42.86%) patients, high-muscular in 4 (28.57%) patients, mid-muscular in 2 (14.29%) patients, and Gerbode shunt in 2 (14.29%) patients. The QP/QS ratio was 2.45 ± 0.73 , and the VSD diameter was 6.08 ± 2.10 mm. Most, 10 (71.43%) patients underwent antegrade device deployment, and 4 (28.57%) patients underwent retrograde deployment with 1 (7.14%) patient required two devices. Amplatzer™ muscular VSD devices were used in 9 (64.29%) patients and duct occluders were used in 5 (35.71%) patients with a mean device size of 8.77 ± 2.77 mm. Procedural and fluoroscopy times were 55.13 ± 16.24 and 16.25 ± 4.03 minutes respectively. During follow-up (23.31 ± 15.88 months), no patient required re-intervention or exhibited mortality.

CONCLUSION

Transcatheter closure of post-operative and post-intervention residual/iatrogenic VSDs represents a safe, and effective therapeutic approach.

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Safety of Radial Approach in Yemeni Patients, Local Experience of Nabdh Al -Hayat Cardiac Centre, Mukalla

Bafadhl, Tayeb¹, Munibari, Abdelnaser, El Falaq, Mohammed

ABSTRACT

BACKGROUND

The use of radial access in coronary angiography reduced vascular complications. However, it had long learning curve and may increase fluoroscopy time and amount of dye used.

OBJECTIVE

This study aimed to evaluate the fluoroscopy time as surrogate marker of radiation exposure during diagnostic coronary angiography and amount of dye used and compare with studies done

METHODS

Retrospective observational study including patients who underwent diagnostic coronary angiography from 23/10/2017 to 31/7/2018 through radial approach. Patients with coronary intervention (PCI), coronary artery bypass surgery (CABG), or procedure involving right heart catheterization were

excluded from the study

RESULTS

This study included 4202 patients, 1794 were male (74.6%), while 608 patients were female (24.4%) with age of patients range from 45-70 years. Fluro time was 3.6 ± 3.8 min, and amount of dye used was 60 ± 30 ml. Only few cases reported vascular complications limited to local hematoma

CONCLUSION

Use of trans-radial approach for diagnostic coronary angiography is safe procedure without increase the radiation exposure of patient and staff with low incidence of vascular complications

KEYWORDS

coronary angiography, Radial, Yemen.

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The Effect of Optimal Cardiac Resynchronization Therapy Pacing Rate in Non-Ischemic Heart Failure Patients on The Quality of Life and Echocardiographic Findings

Islam Talaat AbdelQader, MSc, Mohammad Shafiq, MD, Yasser Ahmed AbdelHady, MD

ABSTRACT

BACKGROUND

Cardiac resynchronization therapy (CRT) has become an important treatment strategy for a select group of heart failure (HF) patients; few studies have examined the optimal basal atrial pacing rate and its impact on long-term outcome in CRT patients.

OBJECTIVE

The aim of this study is to investigate the short-term impact of 70- bpm versus 80-bpm basal atrial pacing rates programming on the quality of life and echocardiography in 30 CRT patients.

METHODS

30 CRT patients were divided to two groups and programmed to 70 – 80 bpm basal atrial pacing rates respectively for 6 months with comparing the effect of each programming on the quality of life using Minnesota heart failure questionnaire and

echocardiographic findings (EF, LVEDD, LVESD, LVEDV, LVESV).

RESULTS

There was a highly significant difference between both groups as group 2 (with basal heart rate=80) had higher MFHQ after the programming with mean=67.2 ±9.1 vs group 1 (with basal heart rate =70) with mean 50.6 ±8.3 (P-value<0.001). also, there was no significant effect of the programming on NYHA of group I (P-value=0.301) but, the programming increase the NYHA of group II significantly (P-value=0.014). The programming didn't affect the (EF, LVEDD, LVESD, LVEDV, LVESV) of both groups significantly (p-value=0.916, 0.786 for both groups).

CONCLUSION

The lower basal trial pacing rate the better quality of life and the lower NYHA class.

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Value of Speckle Tracking Echocardiography for Early Detection of Left Ventricular Dysfunction in Patients with Systemic Lupus Erythematosus

Shereen Ibrahim Farag², Reda Biomy Bastawisy¹, Mohamed Ahmed Hamouda², Wael Anwer Hassib¹, Hala Ahmed Wahdan¹

ABSTRACT

BACKGROUND:

Cardiac dysfunction due to systemic lupus erythematosus (SLE) may be subclinical, but those patients are at high risk for developing clinical heart failure.

OBJECTIVE:

The aim of this study is to assess the role of speckle tracking echocardiography (STE) in the early detection of systolic dysfunction in SLE patients.

METHODS:

This was a case-control study. Participants were subdivided into two groups: Group 1 included 50 SLE patients and Group 2 included 50 healthy controls. Clinical evaluation, echocardiography, tissue Doppler, and STE were performed.

RESULTS:

Global longitudinal strain (GLS) was significantly reduced in SLE group (-18.95 ± 2.02 vs. -21.4 ± 2.1 , $P < 0.001$). However, there was no significant

difference in left ventricular ejection fraction between both groups ($P = 0.801$). There was a significant positive correlation between the disease duration and age ($r = 0.480$, $P < 0.001$), pulmonary artery systolic pressure (PASP) ($r = 0.628$, $P < 0.001$), and GLS (%) ($r = 0.417$, $P = 0.012$). There was also a significant positive correlation between the disease activity index and GLS (%) ($r = 0.7$, $P < 0.001$) and PASP ($r = 0.522$, $P < 0.001$).

CONCLUSION:

SLE group had GLS % lower than the control group, and this was statistically significant, denoting early systolic dysfunction. Longer duration and high SLE activity index significantly affect GLS. GLS is an excellent noninvasive tool for early detection of subclinical left ventricular systolic dysfunction in SLE patients.

KEYWORDS:

Speckle tracking echocardiography, systemic lupus erythematosus, ventricular function

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Vascular Complications Among patients undergo cardiac catheterizations in Nabdh Al Hayat Cardiac center, Yemen

Bafadhel, Tayeb A.¹, Munibari, Abdenaser A., Basbaih, Hanaa

ABSTRACT

BACKGROUND

Cardiac catheterizations are becoming the gold standard for the diagnosis, evaluation, and treatment of cardiac diseases. Despite the beneficial effect of cardiac catheterization in reducing morbidity and mortality of the cardiovascular disease, this invasive procedure is not free of complications. Vascular access-site complications remain a major cause of morbidity and mortality with cardiac catheterization and percutaneous intervention using the femoral approach. Radial approach is an alternative to femoral with less bleeding complication

OBJECTIVE

To evaluate the incidence of vascular complications among patients undergo cardiac catheterization in Hadramout

METHODS AND RESULTS

Between march to November 2019, 1296 patients underwent both diagnostic and coronary intervention procedures in NABDH AL-HAYAT Cardiac center located in Mukalla, Hadramout

Gov., Yemen. 926 was diagnostic coronary angiography and 370 was coronary intervention. Radial approach was dominant access (886 of diagnostic angiography and 339 cases of intervention) while Femoral approach was in 40 cases of diagnostic angiography and 31 cases was intervention. 36 cases had vascular complications (3.6%), 12 were female, coronary intervention was in 27 cases, femoral approach was in 9 cases (2 cases had retro-peritoneal hematoma and 7 cases had groin hematoma). EASY hematoma classification after trans-radial/Ulnar was used for classification of hematoma after radial approach (4 grades), one case via radial approach had pseudoaneurysm treated conservative. no mortality occurs due to vascular complications

CONCLUSION

In spite of cardiac catheterization is invasive procedure, the incidence of vascular complications is low and more with femoral approach

KEYWORDS

Vascular complications, Radial, Yemen.

1. MD Cardiology, Head of cath lab of Nabdh Al-hayat cardiac center, Mukalla, Hadramout, Yemen.

What Is Hidden in The Bushes of Long Covid 19 Syndrome?

Mona Rayan

ABSTRACT

BACKGROUND

The detection of myocardial involvement in patients with long covid syndrome is important for the long-term management and outcome of this category of patients.

OBJECTIVE

To estimate the degree of myocardial involvement in patients with long Covid syndrome using Echocardiography.

METHODS

An extended echocardiographic study was done to 16 consecutive patients who had post covid symptoms to assess global and regional LV longitudinal strain.

RESULTS

All included patients recovered from Covid 19

almost 21 ± 7 days before the study. 56% of patients had palpitation and easy fatiguability and 39% of them had dyspnea on mild effort. 80% of patients were females with a mean age of 36.9 ± 9 years. All patients had normal left ventricular systolic function estimated EF of $66 \pm 5.2\%$, normal diastolic function DT (164.7 ± 39 msec), normal right ventricular size and function TAPSE of 26.4 ± 4.6 estimated RVSP of 22.1 ± 6 mmHg. The most prevalent finding was reduced global longitudinal strain 16 ± 3.34 with the lateral wall being more affected than the septal wall (-16.1 ± 3.3 vs. -20.1 ± 3.2 p value=0.002).

CONCLUSION

Myocardial involvement in long Covid syndrome is highly prevalent as detected by global and regional LV longitudinal strain.

Professor of Cardiology, Ain Shams University, Cairo, Egypt



SECTION 2:
CASE Presentation



Can Aortic Root Dilatation (Ho HH 2015) be implicated in Pathogenicity of Patent Foramen Ovale

Sahar El Shedoudy, Eman Eldokhlah, Reem Rashed

Introduction:

PFO is a remnant of the fetal circulation, right to left shunt across it can be associated with different pathological conditions including paradoxical embolism. PFO pathogenicity is possibly exacerbated by the dilated aortic root by altering atrial septal geometry increasing atrial septal mobility and potentiation of PFO shunting. (1-4)

Case Presentation:

A 33 years old female complaining of chronic back pain, neck pain and arthritis, she was diagnosed as ankylosing spondylitis and she is on treatment. Her previous transthoracic echocardiography (TTE) done 5 years ago, showed no significant findings. She presented to us 2 months ago with migraine headache and TIA. TTE revealed dilated aortic root measuring 47 mm (much larger than previous study) at the level of sinus of Valsalva, aneurysmal bouncing of inter-atrial septum. TEE revealed an inter-atrial septal aneurysm, PFO with definite right to left shunt, gush of agitated saline into the left atrium immediately after its injection even without straining, a very prominent redundant whip like eustachian valve (Figure 1). TCD revealed grade IV micro-embolic signals.

Decision- making:

The decision was made to close PFO percutaneously. Eustachian valve was held by a steerable ablation catheter against the right atrial wall pulling it down into the proximal portion of inferior vena cava (IVC), limiting its mobility to prevent its interference with the device or its cable. It was successfully closed percutaneously using Occlutech PFO occluder (23/25) with no residual shunt across inter-atrial septum and with no complications (Figure 2). TCD done 1 month after closure was negative.

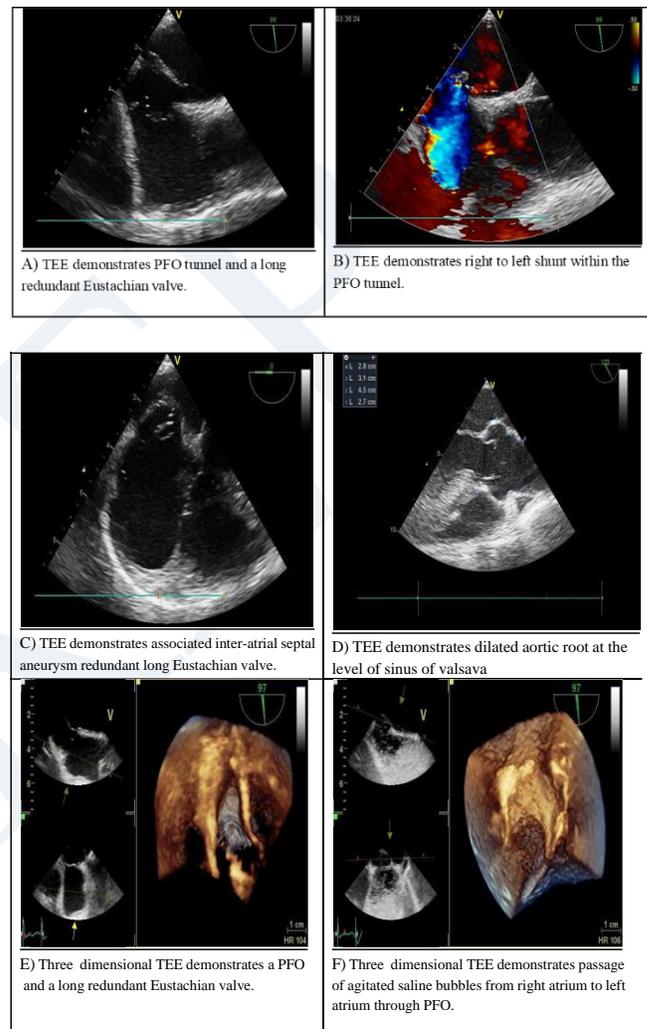


Figure 1: PFO Morphology.

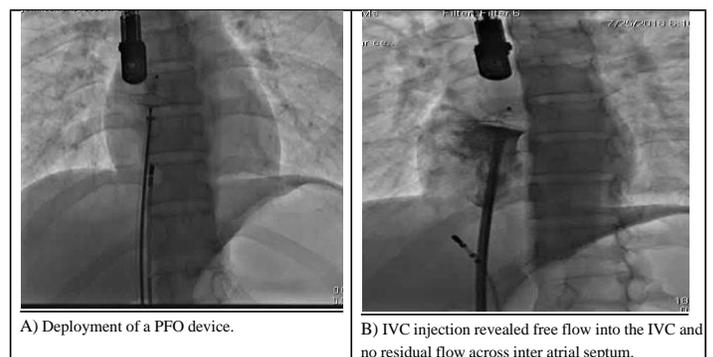


Figure 2: Device Closure.

Discussion

Left atrial pressure is higher than right atrial pressure, right to left shunt can occur with different functional circumstances e.g transient pressure elevation in the right atrium as in Valsalva maneuver and cough. Some anatomical factors can change blood flow direction through the shunt as aortic root dilatation (4, 5).

We report a patient with ankylosing spondylitis, she didn't experience any cerebral complaints for the last 7 years, then, presented to us with migraine headache and TIA 2 months ago associated with aortic root dilatation (as a part of connective tissue disorder) , aneurysmal bouncing of interatrial septum and significant right to left shunt across PFO confirmed by TCD. So, we suggest that aortic root dilatation may have a role in potentiation of right to left shunt across PFO and increasing the mobility and redundancy of inter atrial septum.

Conclusion:

Aortic root dilatation can be implicated in cerebral events induced by right to left shunt across PFO.

Declaration of patient consent:

We certify that we have obtained all appropriate patient consent forms. In the form the patient has given her consent for her images and other clinical information to be reported in the journal. The patient understands that her name and initials will not be published and due efforts will be made to

conceal her identity, but anonymity cannot be guaranteed.

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Conflicts of interest:

There are no conflicts of interest

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