

Early postoperative paravalvular leak among Egyptian population: An observational study

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Objectives: Several reports described the incidence of postoperative paravalvular leakage (PVL) early after valve replacement surgery, however, there is a paucity of data regarding the outcomes and complications correlated to the severity of PVL. The aim of the current study was to evaluate the incidence, causes, and short term outcome of early postoperative PVL.

Methods: Data were collected from patients presenting to the cardiovascular department at Cairo University Hospital for aortic and/or mitral valve replacement surgery from May 2014 to May 2015. Transthoracic echocardiography (TTE) was done for all patients early postoperative. Transesophageal echocardiography (TEE) was done if diagnosis was not confirmed by TTE. All patients with detected PVL were subjected to TTE and TEE after a 3 month follow-up period.

Results: Two hundred patients were enrolled in the study. Seventy five percent of patients were known to have rheumatic heart disease, while 16.5% had infective endocarditis. The mitral valve was replaced in 40% of patients, the aortic valve was replaced in 36%, and other patients had both valves replaced. Early postoperative period PVL was detected in 25 patients. The most common underlying etiologies were rheumatic heart disease and infective endocarditis. PVL was common in patients with both valves replaced compared with either mitral or aortic valve replacement. Infective endocarditis as underlying valve disease was significantly high in patients with PVL compared with those without ($p < 0.001$).

Conclusion: The incidence of PVL was high in patients with both valves replaced compared with either mitral or aortic valve replacement. Moreover, every patient with PVL should be properly investigated for infective endocarditis. Surgical intervention, although associated with high morbidity and mortality, reduces PVL recurrence.

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Introduction

The presence of paravalvular leaks (PVLs) is a well-known complication after both aortic (AVR) and mitral (MVR) valve replacements. It occurs because of the incomplete apposition of the sewing ring to the native annular tissue. PVLs can be seen either immediately after valve replacement in the operating room or during the follow-up period. The immediate PVLs usually are associated with technical difficulties related to calcification of the native annulus. Late PVLs are commonly a consequence of suture dehiscence caused by prosthetic valve endocarditis or the gradual resorption of incompletely debrided annular calcifications [1]. Although most PVLs are asymptomatic and have a benign clinical course, an estimated 1–5% of patients with PVLs can develop serious clinical consequences [2].

Patients with symptomatic PVLs present with congestive heart failure from volume overload in 90% of cases and hemolytic anemia from shear stress on the red blood cells ranging from one-third to three-quarters of cases. Hemolysis can be identified by serum lactate dehydrogenase level >460 U/L and any two of the following criteria blood hemoglobin <13.8 g/dL for males or <12.4 g/dL for females, serum haptoglobin <50 mg/dL, and reticulocyte count >2%. Severe hemolytic anemia may even manifest as congestive heart failure [3].

Furthermore, PVL, like any intracardiac defect creating a significant turbulent flow, is an important pre-existing condition in the context of bacteremia to develop infective endocarditis [2].

Transthoracic echocardiography (TTE) along with transoesophageal echocardiography (TEE) can be utilized to determine these spatial characteristics and prosthetic valve function. Three-dimensional TEE is superior to two-dimensional TEE for evaluation of PVL regurgitation because it provides improved localization and analysis of the PVL size and shape, especially in patients with multiple PVLs [4].

Until recently, surgery has been the only available therapy for the treatment of clinically significant PVLs despite the significant mortality associated with reoperation [5,6]. The transcatheter closure of PVLs is performed using trans-septal, retrograde transaortic, and/or left ventricular (LV) transapical approaches. The choice of approach depends on the valve involved, the location of the leak, the presence of mechanical valves hindering entry, and the vascular access

Abbreviations

PVL	Paravalvular leak
TTE	Transthoracic echocardiography
TEE	Transoesophageal echocardiography
AVR	Aortic valve replacement
MVR	Mitral valve replacement
PWD	Pulsed wave Doppler
CWD	Continuous wave Doppler
EOA	Effective orifice area
VTI Pr V	Velocity-time integral through the prosthetic heart valve
DVI	Doppler velocity index
LDH	Lactate dehydrogenase
RHD	Rheumatic heart disease
IE	Infective endocarditis

difficulties of an individual patient. There are several complications that can occur either during transcatheter closure or in follow-up. Complications include the need for emergency cardiac surgery in 0.7–2% and death in 1.4–2% [7].

The aim of the current study was not only to evaluate the incidence, causes, and short-term outcome of PVL with variable degree of severity in patients with prosthetic cardiac valves, but also to describe the association of hemolytic anemia with different grades of PVL.

Patients and methods

Study design

This was an observational study in which we collected data from patients with mechanical or biological valve prostheses complicated with PVL presenting to the Cardiovascular Department at Cairo University Hospital, Egypt for aortic and/or mitral valve replacement surgery from May 2014 to May 2015. Patients were subjected to history taking and physical examination. Demographic parameters were recorded, including age, sex, and body mass index. Written informed consent was obtained from all participants. The study protocol was approved by the Ethics Committee at Cairo University Hospital. Patients who were not willing to participate in the study or refused to undergo TEE were excluded.

Laboratory data

Hemolytic anemia was detected by blood analysis for hemoglobin, bilirubin (total and direct), lactate dehydrogenase, and reticulocyte count. Patients with suspected infective endocarditis (IE) had three sets of blood cultures that were

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