Isolated pulmonary valve endocarditis with pulmonary annular abscess in a patient of Noonan syndrome

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ABSTRACT

Right-sided endocarditis is a rare entity, with various series reporting an incidence of 5%–10%. Pulmonary valve (PV) is not only the least commonly involved valve in infective endocarditis (IE), with an incidence of 1.5%–2%, but 'isolated' pulmonic valve endocarditis (PVE) without tricuspid valve involvement is even rarer with limited published data. We report a middle-aged man with Noonan syndrome and a dysplastic PV with severe pulmonary stenosis. He presented with a large isolated mobile PV vegetation with moderate pulmonary regurgitation (PR). Initially, he was managed conservatively, but due to persistent fever, pulmonary regurgitation and evidence of pulmonary annular abscess extending into the right ventricular outflow tract, he required surgical intervention. Considering the low incidence of isolated PVE, it poses a challenge for physicians in prompt diagnosis and timely management of the infection.

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INTRODUCTION

Infective endocarditis (IE) is associated with mortality, notwithstanding the use of appropriate antibiotic therapy and surgical intervention. Right-sided endocarditis is uncommon, with various series reporting an incidence of 5%–10%.[1] Among patients with right-sided IE, tricuspid valve (TV) involvement is seen in 90% of instances[2] and 'isolated' pulmonary valve endocarditis (PVE) is rare, affecting <2% of patients with IE.[3] Early identification and prompt management are key to prevent long-term complications and reduce mortality in these patients.

THE CASE

A 50-year-old man with no history of intravenous (i.v.) drug abuse, alcoholism and surgery presented with the complaints of increased shortness of breath and fever for 1 month. His shortness of breath progressed from New York Heart Association (NYHA) class II to class III within 15 days. It was accompanied with fever, reduced appetite and myalgia. On examination, the patient was febrile (102 °F). Pallor and clubbing were present. He had tachycardia (pulse rate 120/minute) and hypotension (systolic blood pressure 90 mmHg). He had features of Noonan syndrome such as dysmorphic facies in the form of hypertelorism, low-set and backward rotated ears, small lower jaw, short neck and low hairline (Fig. 1a). On auscultation, Grade 4/6 ejection systolic murmur was present in the pulmonary area along with short diastolic murmur of pulmonary regurgitation in the third intercostal space in the left parasternal region. There were crepts in the left infra-axillary area. He also had splenomegaly. Blood investigations showed normocytic normochromic anaemia with haemoglobin of 8.4 g/dl, significantly elevated total leucocyte count of 42 800/cmm with 88% neutrophils, increased platelet count (700 000/ml), erythrocyte sedimentation rate of 50 mm in the 1st hour and C-reactive protein of 110 mg/L. Renal and liver function tests were normal. On chest X-ray, there was a patch in the left lower lobe. Transthoracic echocardiography (TTE) was done due to suspicion of endocarditis which showed dysplastic pulmonary valve (PV) (PV thick and dooming) with severe pulmonary stenosis (gradient 98 mmHg) and moderate pulmonary regurgitation (PR) with evidence of mobile vegetation on the PV. There was presence of pulmonary annulus (PA) abscess of 3 mm extending into the right ventricular outflow tract (RVOT) (Fig. 1b–d). Aortic, mitral and TVs were structurally and functionally normal. Blood cultures were sent, and he was started on ceftriaxone 2 g/24 hours i.v. and gentamycin 3 mg/kg/24 hour i.v. Blood culture grew *Staphylococcus haemolyticus* sensitive to ceftriaxone, hence gentamycin was discontinued. He received i.v. antibiotics for 4 weeks. The blood counts decreased to 24 000/cmm, but due to persistent fever, moderate PR and PA abscess formation, the patient was taken up for PV replacement (PVR). PVR was done with a 21-mm Hancock II porcine heart valve with excision of the aneurysmal anterior wall of the pulmonary artery with pericardial patch plasty of PA. PV showed multiple vegetations over the cusp and annulus with no subvalvular pathology. Subsequently, he was discharged and advised follow-up.

DISCUSSION

Incidence

The incidence of right-sided IE ranges from 5% to 10% in different series.[1] Concomitant left-sided and right-sided IE account for approximately 13% of all IE cases. PVE is rare, affecting <1.5%–2% of patients in the absence of concurrent involvement of other cardiac valves.[3] Review of previously reported data showed fewer than 90 cases of infective PVE.[4]

Patients at risk

Most instances of PVE in children are secondary to the presence of a congenitally abnormal PV and in adults secondary to i.v. drug abuse. Other risk factors are alcoholism (13%), sepsis (7%), central venous catheter or pacemaker interventions with subsequent lead infection (5%), bowel surgery (2.6%), renal or liver transplantation (2.6%) and colonic angiodysplasia (2.6%).[3,5]

Pathophysiology

The cause of rarity of right-sided IE is presumed to be the low-pressure gradients within the right heart, the lower oxygen content of venous blood, the lower prevalence of congenital defects in the right heart and differences in the covering and vascularization of the right heart endothelium.[4]

Symptoms

PVE usually presents without the classic signs and symptoms of IE and, thus, the diagnosis is more challenging.[6] Presentation can be with persistent fever, bacteraemia and multiple septic

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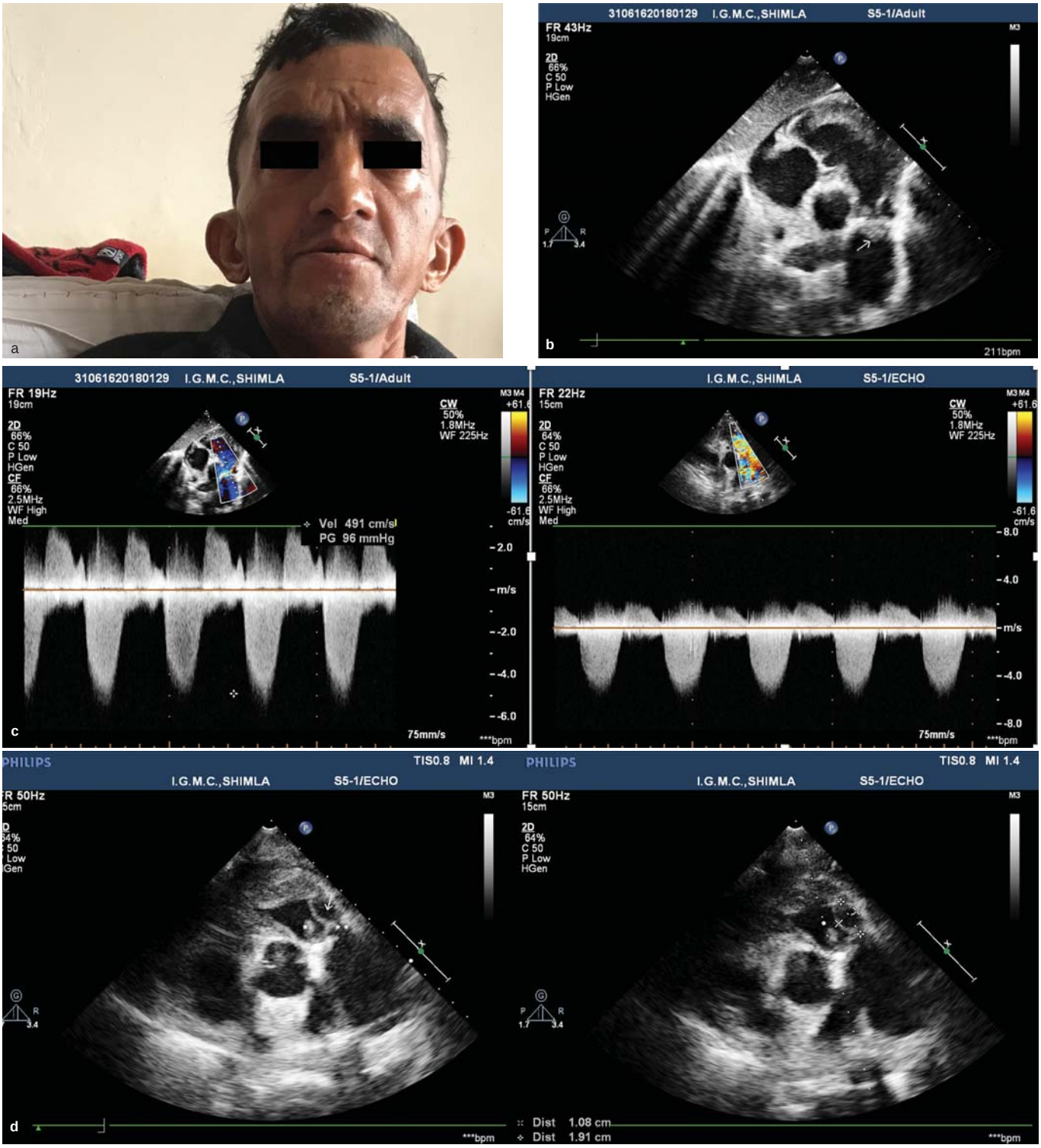

FIG 1. (a) Patient with dysmorphic facies in the form of hypertelorism, low-set and backward rotated ears, small lower jaw and having features of Noonan syndrome; (b) transthoracic echocardiography short-axis view showing evidence of pulmonary valve vegetation; (c) continuous-wave Doppler demonstrates severe pulmonary stenosis (gradient 98 mmHg) with moderate pulmonary regurgitation; (d) transthoracic echocardiography showing evidence of vegetation (marked with*) with evidence of pulmonary annular abscess extending into the right ventricular outflow tract (marked with arrow) of size 1.9 cm×1.0 cm

pulmonary emboli manifesting as cough, dyspnoea, chest pain or haemoptysis. Isolated right HF is rare, but can be caused by pulmonary hypertension, severe right-sided valvular regurgitation or obstruction.[7] The murmur of PR is mostly low pitched and short, making it difficult to detect during physical examination in 50% of cases, leading to discordance between auscultatory and echocardiographic findings. Non-specific symptoms and the lack of peripheral stigmas typical of mitral or

aortic valve involvement can cause delay in the diagnosis of PVE of up to 6 months.[5]

Management

TTE is normally the initial investigation in most cases of PVE diagnosing as many as 91% of cases,[3] but trans-oesophageal echocardiography is employed if TTE is negative in the setting of strong clinical suspicion. Echocardiography may also reveal complications such as valvular regurgitation or rupture or presence of an abscess, as found in our case. Leucocytosis with a left differential shift is observed in acute endocarditis as seen in our patient. Thrombocytopenia is likely to be a specific prognostic marker in endocarditis rather than simply a surrogate marker for the acute-phase reaction.[8] Blood cultures should be collected before the induction of empirical antibiotic therapy. Several microorganisms have been isolated in PVE such as *Staphylococcus* sp. (>50%), *Streptococcus* sp. (10%), *Enterococcus* sp. (9%) and fungal organisms (4%). Infections with coagulase-negative *Staphylococcus aureus* (CONS) account for approximately 2% of the PVE among *Staphylococcus* species.[9,10] Considering the rare isolation of CONS in PVE, ours was a unique case of PVE caused by *Staphylococcus haemolyticus*. Chest X-ray or CT is warranted to evaluate the presence of septic pulmonary emboli, infiltrates (with or without cavitation), lung abscess, congestive HF and potential alternative causes of fever and systemic symptoms. A conservative approach is advocated for the majority of cases with PVE due to its benign course. The choice of empirical antimicrobial therapy depends on the suspected microorganism. However, *S. aureus* must always be covered. The antibiotics include penicillinase-resistant penicillin, vancomycin or daptomycin (depending on the local prevalence of methicillin-resistant *Staphylococcus*)[11] in combination with gentamicin for 2 weeks. A 4–6-week regimen must be used in situations where PVE is complicated by right heart failure, vegetation >20 mm, septic metastatic foci outside lung,[12] therapy with antibiotics other than penicillinase-resistant penicillin,[13] slow clinical or microbiological response (96 hours) to antibiotic therapy,[12] i.v. drug abuser with severe immunosuppression (CD4 count <200 cells/ml) with or without AIDS[14] and associated left-sided IE. Once the causative organism has been isolated, therapy has to be adjusted accordingly. Our patient had persistent fever, minimal response to i.v. antibiotics and a pulmonary annular abscess, so he was considered for surgery. In the literature, the role of surgery in infective PVE is unclear. Despite relatively low in-hospital mortality, surgery is recommended particularly for intractable symptoms, failure of medical therapy, recurrent septic emboli to the lungs or paradoxical emboli.[15] Surgical options include transcatheter PVR,[16] debridement of infected area and vegetation excision with either valve preservation or valve repair/replacement. It is recommended to preserve the native PV whenever possible, and use of a homograft or xenograft is preferred if replacement is unavoidable.[17]

Conflicts of interest. None declared

REFERENCES

1 Frontera JA, Gradon JD. Right-side endocarditis in injection drug users: Review of proposed mechanisms of pathogenesis. *Clin Infect Dis* 2000;**30:**374–9.
2 Murdoch DR, Corey GR, Hoen B, Miró JM, Fowler VG Jr, Bayer AS, *et al*. Clinical presentation, etiology, and outcome of infective endocarditis in the 21st century: The International Collaboration on Endocarditis-Prospective Cohort Study. *Arch Intern Med* 2009;**169:**463–73.
3 Ramadan FB, Beanlands DS, Burwash IG. Isolated pulmonic valve endocarditis in healthy hearts: A case report and review of the literature. *Can J Cardiol* 2000;**16:**1282–8.
4 Nishida K, Fukuyama O, Nakamura DS. Pulmonary valve endocarditis caused by right ventricular outflow obstruction in association with sinus of Valsalva aneurysm: A case report. *J Cardiothorac Surg* 2008;**3:**46.
5 Cassling RS, Rogler WC, McManus BM. Isolated pulmonic valve infective endocarditis: A diagnostically elusive entity. *Am Heart J* 1985;**109:**558–67.
6 Dhakam S, Jafary F. Pulmonary valve endocarditis. *Heart* 2003;**89:**480.
7 Carozza A, De Santo LS, Romano G, Della Corte A, Ursomando F, Scardone M, *et al*. Infective endocarditis in intravenous drug abusers: Patterns of presentation and long-term outcomes of surgical treatment. *J Heart Valve Dis* 2006;**15:**125–31.
8 Sullam P, Frank U, Yeaman M, Tauber M, Bayer A, Chambers H. Effect of thrombocytopenia on the early course of streptococcal endo-carditis. *J Infect Dis* 1993;**168:**910–14.
9 Yuan SM. Right-sided infective endocarditis: Recent epidemiologic changes. *Int J Clin Exp Med* 2014;**7:**199–218.
10 Chang CH, Huang MM, Yeih DF, Lu KC, Hou YC. A chronic hemodialysis patient with isolated pulmonary valve infective endocarditis caused by non-albicans Candida: A rare case and literature review. *BMC Nephrol* 2017;**18:**286.
11 Sousa C, Botelho C, Rodrigues D, Azeredo J, Oliveira R. Infective endocarditis in intravenous drug abusers: An update. *Eur J Clin Microbiol Infect Dis* 2012;**31:**2905–10.
12 Hecht SR, Berger M. Right-sided endocarditis in intravenous drug users. Prognostic features in 102 episodes. *Ann Intern Med* 1992;**117:**560–6.
13 Fortún J, Pérez-Molina JA, Añón MT, Martínez-Beltrán J, Loza E, Guerrero A. Right-sided endocarditis caused by *Staphylococcus aureus* in drug abusers. *Antimicrob Agents Chemother* 1995;**39:**525–8.
14 Pulvirenti JJ, Kerns E, Benson C, Lisowski J, Demarais P, Weinstein RA. Infective endocarditis in injection drug users: Importance of human immunodeficiency virus serostatus and degree of immunosuppression. *Clin Infect Dis* 1996;**22:** 40–5.
15 Habib G, Lancellotti P, Antunes MJ, Bongiorni MG, Casalta JP, Zotti, FD, *et al*. 2015 ESC Guidelines for the management of infective endocarditis: The Task Force for the Management of Infective Endocarditis of the European Society of Cardiology (ESC). Endorsed by: European Association for Cardio-Thoracic Surgery (EACTS), the European Association of Nuclear Medicine (EANM). *Eur Heart J* 2015;**36:**3075–128.
16 Giugno L, Faccini A, Carminati M. Percutaneous pulmonary valve implantation. *Korean Circ J* 2020;**50:**302–16.
17 Musci M, Siniawski H, Pasic M, Grauhan O, Weng Y, Meyer R, *et al*. Surgical treatment of right-sided active infective endocarditis with or without involvement of the left heart: 20-year single center experience. *Eur J Cardiothorac Surg* 2007;**32:**118–25.