

Intermittent intravalvar regurgitation of a mechanical aortic valve prosthesis — diagnosis and clinical implications

A case report

P. SARELI, R. CHUN

Summary

Mechanical prosthetic valve regurgitation may be either periprosthetic or intraprosthetic. The latter is usually mild, occurring in the majority of normally functioning valves and is due to the 'regurgitant flow' closing the valve. An unusual case is reported of intermittent intraprosthetic regurgitation through a normally functioning aortic Medtronic-Hall prosthesis caused by tissue ingrowth below the valve 4 years after implantation.

S Afr Med J 1991; 79: 221-222.

Abnormal function of mechanical prosthetic valves is mainly due to intravalvar occlusion caused by thrombosis and/or tissue ingrowth or to periprosthetic regurgitation. An unusual case of intermittent intraprosthetic regurgitation through a normally functioning aortic Medtronic-Hall prosthesis caused by tissue ingrowth below the valve is reported.

Case report

A 25-year-old woman presented with a 4-day history of tiredness palpitations and poor effort tolerance. She has also noticed intermittent absence of the valve clicks. Four years earlier the patient had undergone aortic valve replacement with a 23 mm Medtronic-Hall prosthesis for severe aortic regurgitation of rheumatic aetiology.

On auscultation both opening and closing clicks were detected and there were no abnormal murmurs across the prosthesis. Anticoagulation with warfarin was adequately controlled. However, 2 days later repeated auscultation detected intermittent absence of both clicks associated with a long early diastolic murmur of aortic regurgitation (AR) and a positive Duroziez's sign. Fluoroscopic screening of the valve confirmed abnormal disc motion. Although the disc opened to its fullest extent (75° to the housing ring axis) and closed properly, it remained intermittently open for a few cardiac cycles. Two-dimensional echocardiography revealed the same abnormal disc motion (Fig. 1) and the Doppler examination demonstrated AR when the disc was 'stuck' in the open position. No obvious cause for the malfunction was evident on two-dimensional examination, i.e. no lesions below or above the valve nor any lesions within the valve apparatus were visible.

Division of Cardiology, Department of Medicine, Baragwanath Hospital and University of the Witwatersrand, Johannesburg

P. SARELI, M.D. (HADASSAH)

R. CHUN, M.B. B.CH., F.C.P. (S.A.)

At surgery it was found that the valve was normal and free of thrombi and tissue ingrowth. However, a thickened ridge of fibrous tissue was present just below the valve, which was catching the tilting disc in the open position. This was excised while the valve itself remained untouched. The postoperative course was uneventful and no mechanical abnormality was detected by auscultation, fluoroscopy or Doppler echocardiography.

Discussion

Malfunction of mechanical prosthetic valve is a potentially lethal condition that requires prompt and effective intervention.

A clinical evaluation, including careful auscultation, is the first step in the routine assessment of mechanical prosthetic valves. If there is any evidence of valve malfunction or cardiac dysfunction, further investigation is mandatory. In the first instance, cine fluoroscopy and/or Doppler echocardiography should be performed. Cine fluoroscopy is a simple method for rapid and accurate detection of reduced disc/leaflet motion and excessive mobility of the housing ring. Doppler echocardiography is used to assess the severity of obstructive/regurgitant prosthetic valve lesions and their haemodynamic consequences. These methods are complementary and can be used singly or in combination, depending on their availability and the preference of the attending physician. When valve malfunction is detected by one of the two methods, the diagnosis may be confirmed by application of the other.

Mechanical prosthetic valvular regurgitation may be either intraprosthetic or periprosthetic. In the aortic position, mild intraprosthetic regurgitation is detected by Doppler in 17 - 63% of normal valves.^{1,2} Auscultation in such cases (tilting disc valves) will reveal that both valve clicks are present. Occasionally a very early diastolic murmur due to the regurgitant flow closing the valve — so-called 'closure flow' — may be heard. This becomes more obvious with tachycardia and in the presence of a low cardiac output.³ On cinefluoroscopy the disc motion is normal.⁴⁻⁶

Aortic periprosthetic regurgitation is usually due to infective endocarditis or primary suture dehiscence. Opening and closing clicks are present, with a long early diastolic murmur along the left sternal border, and cinefluoroscopy will reveal abnormal rocking of the housing ring. Recently published reports have indicated that colour Doppler scanning is useful in differentiating between intravalvar and periprosthetic regurgitation.^{1,2-6}

Auscultation in the above case detected intermittent significant aortic regurgitation associated with absent clicks. The assessment mechanical function of the prosthesis was further evaluated by cine fluoroscopy and two-dimensional echocardiography. Both techniques demonstrated a normal disc motion, suggesting absence of significant thrombosis or intravalvar tissue ingrowth. However, an intermittent abnormal motion of the disc remaining in the open position for few cardiac cycles was identified. The haemodynamic function of the prosthesis evaluated by Doppler echocardiography confirmed the findings.

Accepted 24 Apr 1990.

Reprint requests to: Dr P. Sareli, Dept of Cardiology, Baragwanath Hospital, PO Bertsham, 2013 RSA.

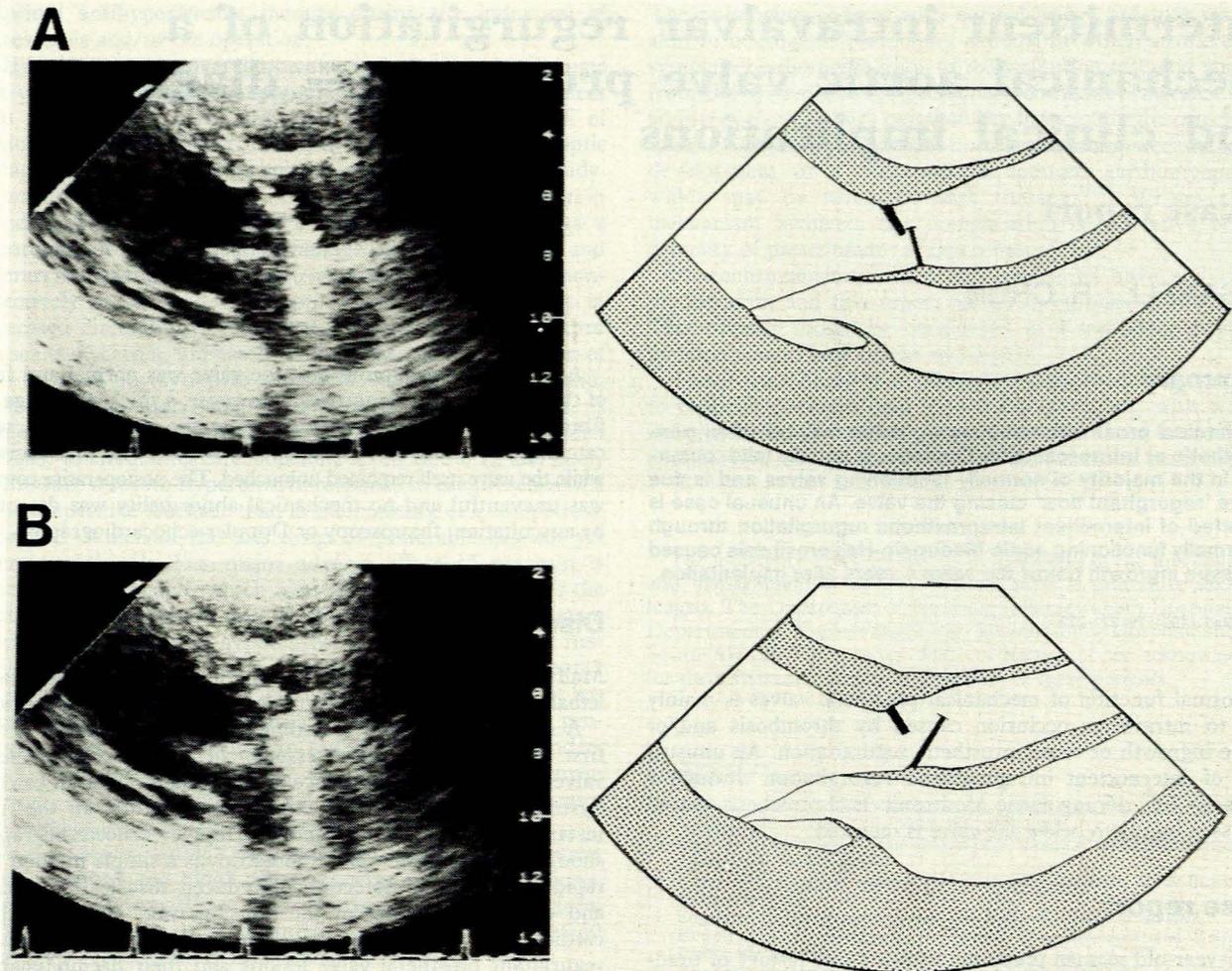


Fig. 1. Two-dimensional echocardiograms in the left parasternal long axial view taken in diastole (mitral valve leaflets in open position). A. The tilting disc of the prosthetic aortic valve is in the normal closed position during diastole. B. The disc is 'stuck' in the open position during diastole.

Intermittent AR in patients with aortic prosthetic valves is unusual and has been described only in the peri-operative period.⁷ The 4 cases described by Antunes *et al.*⁷ developed intermittent AR in the peri-operative period owing to malorientation of aortic Medtronic-Hall prostheses allowing wide opening of the occluder beyond the axis of blood flow, resulting in non-closure during diastole (intravalvar mechanical obstruction was excluded).

Repeated examination of a patient complaining of symptoms related to cardiac function following prosthetic valve implantation is mandatory, especially if intermittent valvar dysfunction is to be determined. Our case is unusual in that malfunction of the prosthetic valve was not due to intravalvar thrombo-occlusive disease, but due to tissue ingrowth below the valve — as was suggested by the normal maximal opening angle of the disc, and by the intermittent occurrence of the problem.

REFERENCES

1. Ramirez ML, Wong M, Sadler N, Shah PM. Doppler evaluation of bioprosthetic and mechanical aortic valves: data from four models in 107 stable, ambulatory patients. *Am Heart J* 1988; 115: 418-425.
2. Dittrich M, Nicod P, Hoit B, Dalton N, Sahn D. Evaluation of Bjork-Shiley prosthetic valves by real-time two-dimensional Doppler echocardiographic flow mapping. *Am Heart J* 1988; 115: 113-118.
3. Dellsperger KC, Wieting DW, Baehr DA, Bard RJ, Brugger J, Harris E. Regurgitation of prosthetic valves: dependence on heart rate and cardiac output. *Am J Cardiol* 1983; 51: 321-328.
4. Kotler MN, Mintz KS, Panidis I, Morganroth J, Ross BL. Non-invasive evaluation of normal and abnormal prosthetic valve function. *J Am Coll Cardiol* 1983; 2: 151-173.
5. Stewart WJ, Currie PJ, Agler DA, Lytle BW, Lombardo HP, Cosgrove BM. Periprosthetic mitral and aortic regurgitation: utility of pre- and intraoperative Doppler colour flow mapping (Abstract). *J Am Coll Cardiol* 1988; 11: 20A.
6. Rashtian MY, Stevenson DM, Allen DT *et al.* Flow characteristics of four commonly used mechanical heart valves. *Am J Cardiol* 1986; 58: 743-752.
7. Antunes MJ, Colsen PR, Kinsley RH. Intermittent aortic regurgitation following aortic valve replacement with the Hall-Kaster prosthesis. *J Thorac Surg* 1982; 84: 751-754.