Fig 5.8  Self-expandable Perceval© valve (Sorin Group, Milan, Italy), unlike transcatheter aortic valve implantation (TAVR), is placed operatively via aortotomy. Ratio of effective orifice area to diameter of sewing ring is larger relative to other tissue prostheses. Image is of collapsed valve just before implantation.

Fig 5.9  In left panel, initial valve deployment has been accomplished, and inflatable balloon placed to facilitate expansion of annular ring. Right panel shows valve fully deployed.

Fig 5.10  Midesophageal short-axis view of valve in diastole. No aortic regurgitation is visible.
The two major categories of prosthetic valves are tissue valves and mechanical valves. Bioprosthetic (or tissue) valve leaflets are fashioned from bovine pericardium or a porcine aortic valve. The leaflets are supported by a rigid ring around the annulus with metal or polymer stents that support the commissures of the valve leaflets or by the cylindrical stent of the self-expandable valve. Implantation of these “stented” bioprostheses involves sewing an appropriately sized valve into the annulus, with the valve height and symmetry ensured by the annular ring and struts. In contrast, stentless tissue valves are supported only by a cylinder of flexible fabric or tissue. Implantation of stentless valves involves placement and suturing both at the annulus, and at the top of the commissures at the appropriate height.

Tissue valves open with a central circular orifice with a valve opening and closing motion similar to a native trileaflet aortic valve. However, the antegrade velocities (and pressure gradient) are higher than expected for a native valve because the sewing ring reduces the effective orifice area. At smaller valve sizes, the degree of functional stenosis can be significant,

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Fig 5.11  Corresponding midesophageal long-axis images.

Fig 5.12  From midesophageal short-axis view of valve, with slight probe rotation, upper end of deployment apparatus is visible (white arrow; black arrow in inset).

Fig 5.13  Valve on midesophageal 3D TEE from aortic perspective. The black arrow indicates the LMCA.
with a smaller effective orifice area than a similar-size mechanical valve. Thus the optimal valve choice in each patient depends on the size of valve that can be implanted, in addition to considerations of valve durability and long-term anticoagulation. If the implanted valve is too small for the patient size, patient-prosthesis mismatch (defined as an indexed effective valve area $<0.85 \text{ cm}^2/\text{m}^2$) is associated with increased short-term mortality and suboptimal long-term outcomes.

Echocardiographic evaluation of the prosthetic valve after implantation should follow a standard format as shown in Fig 5.1

### Suggested Reading


### CASE 5-2

**Bioprosthetic Mitral Valve**

![Stented mitral bioprosthesis (Medtronic Mosaic Mitral Prosthesis, Minneapolis, Minnesota), attached to holder, is seen from lateral view (left) and from ventricular aspect of valve (right) with leaflets in open position. Blue sutures maintain shape of prosthesis and provide orientation but are removed at time of implantation.](image1)

![With valve implanted, four-chamber TEE view shows sewing ring, struts, and valve leaflets in systole. There are prominent acoustic shadows from sewing ring on 2D image (left). Color Doppler (right) shows no mitral regurgitation.](image2)