occlusion. Used rarely because balloon dilation in the catheterization laboratory is the first-line procedure. Newborns with critical AS and small left-sided structures may undergo a stage 1 Norwood procedure (see Hypoplastic Left Heart Syndrome, Box 23-4).

Prognosis: Aortic valve replacement offers a good treatment option and may lead to normalization of left ventricular size and function (Arnold, Ley-Zaporozhan, Ley, et al, 2008). Aortic valvotomy remains a palliative procedure, and approximately 25% of patients require additional surgery within 10 years for recurrent stenosis. A valve replacement may be required at the second procedure. An aortic homograft with a valve may also be used (extended aortic root replacement), or the pulmonary valve may be moved to the aortic position and replaced with a homograft valve (Ross procedure).

Nonsurgical treatment: The narrowed valve is dilated using balloon angioplasty in the catheterization laboratory. This procedure is usually the first intervention.

Prognosis: Complications include aortic insufficiency or valvular regurgitation, tearing of the valve leaflets, and loss of pulse in the catheterized limb.

Subvalvular Aortic Stenosis

Surgical treatment: Procedure may involve incising a membrane if one exists or cutting the fibromuscular ring. If the obstruction results from narrowing of the left ventricular outflow tract and a small aortic valve annulus, a patch may be required to enlarge the entire left ventricular outflow tract and annulus and replace the aortic valve; this is known as the *Konno procedure.*

Prognosis: Mortality from surgical repairs of subvalvular AS is less than 5% in major centers. About 20% of these patients will develop recurrent subaortic stenosis and will require additional surgery (Schneider and Moore, 2008).

Pulmonic Stenosis