3.1 Aortic Stenosis

3.1.1 Epidemiology

Aortic stenosis is an obstruction to blood ejection from the left ventricle (LV) due to a fixed or dynamic stenosis located in the valve either over (supravalvular) or below (subvalvular) it [1]. Aortic valve stenosis (AS) is the most frequent form, and it accounts for the majority of congenital forms and all of the acquired forms.

AS is the most frequent valvular heart disease in Western countries. The most common cause is degenerative calcific disease, with an incidence of 2–7% in the population older than 65 years [2]. The characteristic morphological appearance of the calcific AS consists of the presence of calcific, fibrous and thickened cusps, preventing valve opening during outflow (Fig. 3.1). Calcification starts in the fibrous part of the valve. The stratified microscopic structure is usually preserved and, unlike in the rheumatic variety, there is no commissural fusion. The process of calcific valve degeneration is secondary to inflammatory and proliferative changes, with accumulation of lipids, hyperactivity of angiotensin-converting enzyme and infiltration of macrophages and T lymphocytes [3,4]. These lesions are seemingly related to an atherosclerotic process with the typical presence of an initial chronic inflammatory cell infiltrate (macrophages and T lymphocytes) as the first ultra-structural changes, lipid deposits and fibrotic thickening with collagen and elastin [5,6].

Less common is AS in congenital bicuspid aortic valve, which has an incidence of 1–2% and affects men three to four times more frequently than it does women [7]. (Fig. 3.2). In most cases the cusps have different dimensions and a median raphe is often present due to their incomplete splitting. At birth, bicuspid aortic valves are not usually stenotic, but they are predisposed to gradually become stenotic owing to sclerosis and calcifications of mechanical origin. The raphe is the site where calcifications develop most frequently.
Aortic stenosis of rheumatic origin is the rarest form, but remains the most common in developing countries. It is the result of adhesion and fusion of commissures and cusps, causing retraction and stiffening of their free edges; calcified nodules develop on both surfaces and the orifice is reduced to a small round or triangular opening. As a result of these processes, a rheumatic aortic valve is often insufficient as well as stenotic.