Carpentier’s Surgical Classification of Mitral Valve Pathology

This is a surgical classification of mitral leaflet pathology initially described by Carpentier in 1983 in his seminal paper: Cardiac Valve Surgery—the “French Correction”, and later modified by him in 1995 to include Type IIIb as a mechanism of leaflet restriction during systole causing regurgitation.

The classification is as follows:

The Carpentier classification is defined surgically as follows. The mitral valve leaflet posterior scallops are identified as P1 (anterior scallop), P2 (middle scallop), and P3 (posterior scallop) as viewed by the surgeon though a left atriotomy. The three corresponding segments of the anterior leaflet are termed A1 (anterior part), A2 (middle part), and A3 (posterior part). The remaining two segments are the anterior commissure (Ac) and posterior commissure (Pc).

The regions of the mitral valve leaflets are defined surgically through a left atriotomy by taking nerve hooks and lifting each posterior leaflet scallop and their corresponding, coapting anterior leaflet. The posterior leaflet P1 scallop coapts with A1. The posterior leaflet P2 scallop coapts with A2. The posterior leaflet P3 scallop coapts with A3. Surgical pathology was then defined by leaflet section: P1/A1, P2/A2, P3/A3. (Functionally this is what we do today using echocardiography).

For example, a type II, A3 P3 indicates a prolapse (type II) of both the posterior scallop (P3) and the corresponding posterior part of the anterior leaflet (A3), two prolapses that must be corrected. A combined type II A2, Type IIIa P3 indicates a localized prolapse (type II) of the middle portion of the anterior leaflet (A2) associated with a restricted opening (type IIIa) of the posterior scallop (P3).
When the ASE/SCA developed their echocardiographic terminology for mitral valve leaflets the Carpentier terminology of mitral valve leaflet scallops was adopted.

Understanding of papillary muscle—chordal –leaflet scallop relationship is imperative. This has been defined anatomically by Lam et al. The anatomical review in this handout attempts to provide these relationships as they relate to the Carpentier classification.

In defining this classification, Carpentier also differentiated between types of leaflet prolapse: prolapsed leaflet, billowing valve (Barlow), and billowing valve plus prolapse leaflet (Figure 2). This and Carpentier’s reference to the gross description of mitral valve pathology as either Barlow’s Disease or Fibroelastic Deficiency has led to the use of these terms as gross descriptors of mitral valve leaflet appearance (see section on mitral valve pathologic terminology).

![Diagram of prolapsed, billowing valve, and billowing valve plus prolapsed leaflet](Figure 2)

The diagnosis of “mitral valve prolapse” has been given to those people that on auscultation have a midsystolic click. The term Barlow’s Syndrome refers to the syndrome of a midsystolic click and systolic murmur. Adams reviews the history of the terminology nicely. Note that Carpentier’s definition of a billowing valve (Barlow) would on physical exam exhibit a midsystolic click. The billowing valve and prolapse would give a midsystolic click and regurgitant murmur.
References:


