CHAPTER 23 POSTERIOR MITRAL LEAFLET ANATOMY AND MARKER SITES

In previous chapters we have studied hearts with 23 anterior leaflet markers but only a single marker on the free edge of the central posterior leaflet. In this and the next several chapters we conduct a more complete study of the dynamics of the posterior leaflet(s) employing datasets from hearts with 9 markers on the posterior leaflet edges and 10 markers on the anterior leaflet. These datasets and animations arising from them are given in Appendix E.

We begin by examining the anatomy of the posterior mitral leaflet(s) as shown in Figures 23.1 and 23.2, both adapted from Antunes’ excellent text MITRAL VALVE REPAIR.

![Anatomical diagram of the mitral valve](image)

Figure 23.1 Anterior leaflet (AL), posterior leaflet (PL) and papillary muscle (PM) anatomy with posterior leaflet regions (P1, P2, P3) identified. Adapted from Antunes M.J. Mitral Valve Repair 1989, Page 17, Figure 2.3, Verlag R.S. Schulz

Figure 23.1 illustrates the chordal attachments of the posterior leaflet(s) to the papillary muscles as well as the connection between the posterior and anterior leaflets. As viewed in this unrolled fashion, it is tempting to describe all the mitral valve leaflets as one large connected leaflet structure, and in many ways this is correct. But, as we have already documented, and will document further, the anterior and posterior leaflet(s) exhibit quite distinct behavior and the reason that we use parentheses in the term “posterior leaflet(s)” is that, in many ways, various portions of the posterior leaflet also exhibit quite distinct dynamics. This is not a new observation, as distinct regions of the posterior leaflet (P1, P2, and P3) have long been identified.
Figure 23.2 is a closer view of the posterior leaflet. It should be noted that P1 is nearest the anterior commissure, P2 is the central posterior leaflet scallop, and P3 is located nearest the posterior commissure. Note also that the central meridian of P2 is relatively free of chordal attachments, but is supported on either side by chordal attachments from the anterior and posterior papillary muscles. This is similar to the chordal support of the central meridian of the anterior leaflet and allows the central portion of these leaflets to be supported, without placing chordal obstructions in the primary outflow pathway for left ventricular ejection.
Figure 23.3, a repeat of Figure E.1 in Appendix E, shows the markers arrays used in the study of posterior leaflet dynamics. Markers #15, 22, and 21 are trigonal, Marker #16 is at the anterior commissure, Marker #20 at the posterior commissure, Markers #17, 18, and 19 are on the contractile portion of the mitral annulus, Markers #1, 4, 7, 10, and 13 are on the anterior leaflet edge, Marker #2 is on the anterior commissural leaflet of the posterior leaflet complex, Marker #14 is on the posterior commissural leaflet of the posterior leaflet complex, Markers #3, 5, and 6 are at the P1-P2 boundary, Marker #8 is on the central meridional edge of the P2 scallop of the posterior leaflet, Markers #9, 11, and 12 are at the P2-P3 boundary, Markers #26, 27, and 28 are on the anterior papillary muscle tip, Marker #29 is the point of insertion of the strut chord from anterior papillary muscle tip Marker #26 to the anterior leaflet, and Markers #23, 24, and 25 are on the posterior papillary muscle tip, with Marker #30 at the point of insertion of the strut chord from the posterior papillary muscle tip Marker #23 to the anterior leaflet.

Figure 23.3. Marker locations. See detailed descriptions in text.