Surgical management of Aortic Root Disease

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The aortic root is a functional and anatomic structure which is composed of the aortic leaflets, the sinuses of Valsalva, the coronary ostia, and the inter-commissural triangles. The superior border is demarcated by the ST junction and the basal margin is defined by an imaginary plane on which the three nadirs of the leaflet annular scallop rest. The various components of the aortic root are believed not only to be anatomically contiguous, but intricately interconnected to ensure that each component contribute to maintaining and preserving the functional integrity of the whole root structure. Therefore the purpose of each component is to provide an environment that is conducive to maintaining the durability and functional integrity of the aortic valve. Pathology of even a single component may predictably adversely affect the aortic root function or predispose it to a more serious structural abnormality such as an acute dissection. For example, annuloaortic ectasia, may cause aortic insufficiency through one of several mechanisms. If the aortic leaflets are pliable with minimal thickening and well preserved motion, a successful valve sparing root replacement procedure may spare the patient the trouble of lifelong anticoagulation. Furthermore, a vastly superior hemodynamic performance may be anticipated compared to a mechanical composite valved conduit replacement. Currently stabilization of the aortic root at or below the level of the imaginary basal plane has conceptually emerged as an integral component of the repair procedure as it aids in maintaining optimal leaflet coaptation surface and preventing prolapse by elevating the leaflet height. Furthermore, future recurrence of insufficiency is minimized by preventing progressive dilatation at the annular level. Annulus stabilizing valve sparing root replacement may be achieved through one of various modifications of the David reimplantation technique or by a separate annulus stabilization procedure performed in conjunction with a remodeling type valve sparing root replacement procedure as originally described by Sarsam and Yacoub. Isolated root stabilization may be achieved through various methods including continuous circumferential suture placement along the imaginary basal plane or by the implantation of an external annuloplasty ring. With regards to the external annuloplasty ring it may be inelastic versus elastic, the latter of which is purportedly more physiologic. By design, a separate basal annuloplasty ring is unnecessary with the David procedure as the basal anchoring sutures serve to stabilize the aortic root much in the fashion of a separately implanted stabilizing annuloplasty ring. All of these different surgical modifications aim to achieve the same objective. However, prospective randomized data are pending to fully appreciate the differing clinical implications of the diverse surgical variations.