Aortic valve sparing and repair for aortic root aneurysms with tricuspid valves

Remodeling associated with an external subvalvular aortic annuloplasty (CAVIAAR technique)

1

	Ø Aortic annular base (mm) Hegar Dilators			
	25-26	27-28	29-30	31-32
Ø Graft **(Gelweave Valsalva™)**	26	28	30	32
Ø Subvalvular ring (Extra-Aortic™)	**23**	**25**	**27**	**29**

Criteria for choice of the aortic ring and tube graft diameters: Diameter of the Gelweave ValsalvaTM (Vascutek, Inc.) graft used to remodel the aortic root is equal to the native aortic annulus diameter measured with Hegar dilators. Expansible aortic ring is undersized by one size (ExtraAortic®, CORONEO, Inc.) in order to increase coaptation height while protecting cusp repair.

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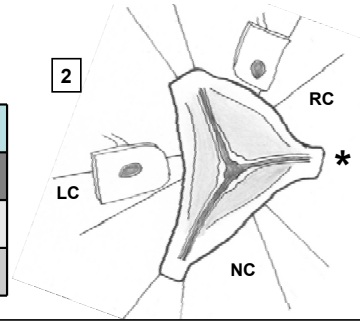

5 subvalvular "U" stitches (2-0 pledgeted polyester needle 25 or 26 mm) are placed inside out as circumferentially in the subvalvular plane. Three stitches are placed 2 mm below the nadir of insertion of each cusp, and two stitches are placed below two of the three commissures at the base of the interleaflet triangles (no suture is placed at the base of the interleaflet triangle situated between the right and noncoronary sinuses to avoid potential injury to the bundle of Hiss and membranous septum(*))

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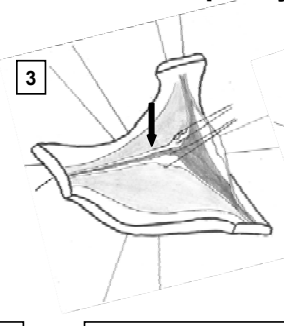

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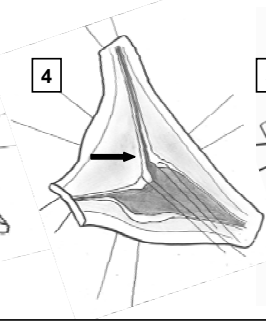

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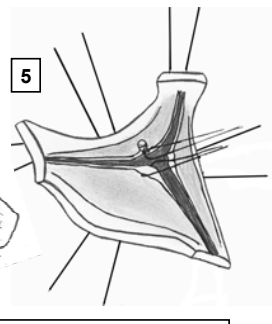

First step of cusp repair: Alignment of cusp free edges (3, 4). A stay suture of polypropylène 6/0 is passed through each noduli of Arantius. A grasper pulls outwards on the corresponding commissure while the two stitches at the level of the noduli of Arantia are tracted on the opposite side. Excess of length of free edge is then determined (3). Same step is performed for each hemi-cusp (4). Distance between the two stitches determines the area for the central plicating stitches to equalize each hemi-cusp (polypropylene 5 or 6/0-13) (5).

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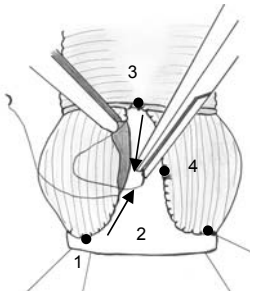

Remodeling of the aortic root is standardized by scalloping the Valsalva graft into three symmetrical neosinuses using the linear demarcations on the bulging part of tube. The heights of the scallops to suture the commissures were cut up to the transition point between circumferential and axial folds in the graft. Suture of the graft starts on the left coronary sinus at the nadir of the sinus (1) towards half sinus (2). Another running suture is begun at the tip of the commissure (3) towards corresponding hemi-sinus (4). (polypropylene 4.0 or 5.0). Right and non coronary sinuses are then sutured.

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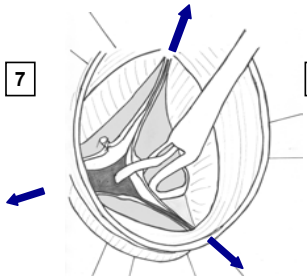

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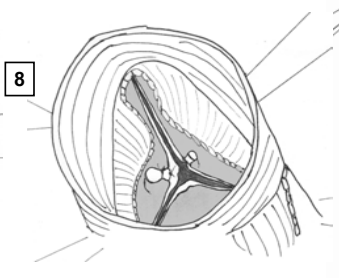

Second step of cusp repair: Commissural traction suture (polypropylene 5/0-13) are placed in order to measure the effective height of each cusp (arrows). A dedicated cusp caliper is used to evaluate any residual or induced cusp prolapse (Fehling Instruments, Karlstein, Germany) (7). Plicating stitches are added on the free edge of the culprit leaflet until an effective height of 8 to 10 mm is obtained (8).

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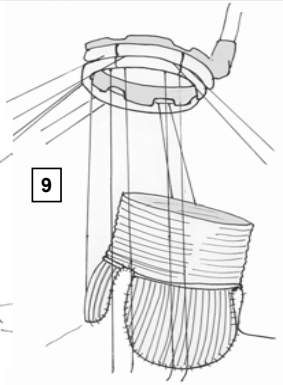

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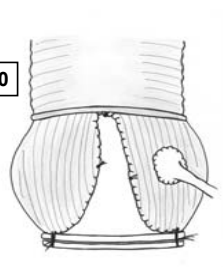


The five anchoring "U" stitches are then passed through the inner aspect of the prosthetic aortic ring. The ring is descended externally around the remodelled aortic root. Holder is removed before tying the ring in subvalvular position (9). Final aspect of the neoaortic root after anastomosis of the coronary ostia (10)

Aortic valve sparing and repair for aortic root aneurysms with bicuspid valves

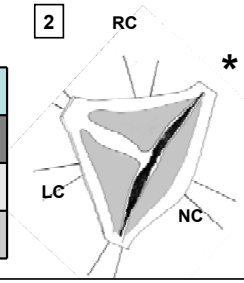
Remodeling associated with an external subvalvular aortic annuloplasty (CAVIAAR technique)

1

	Ø Aortic annular base (mm) Hegar dilators			
	25-26	27-28	29-30	31-32
Ø Graft **(Gelweave Valsalva™)**	26	28	30	32
Ø Subvalvular ring (Extra-Aortic™)	**23**	**25**	**27**	**29**

Criteria for choice of the aortic ring and tube graft diameters: Diameter of the Gelweave ValsalvaTM (Vascutek, Inc.) graft used to remodel the aortic root is equal to the native aortic annulus diameter measured with Hegar dilators. Expansible aortic ring is undersized by one size (ExtraAortic®, CORONEO, Inc.) in order to increase coaptation height while protecting cusp repair.

2



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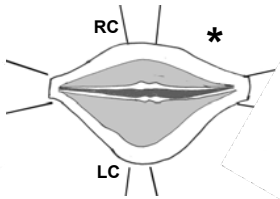
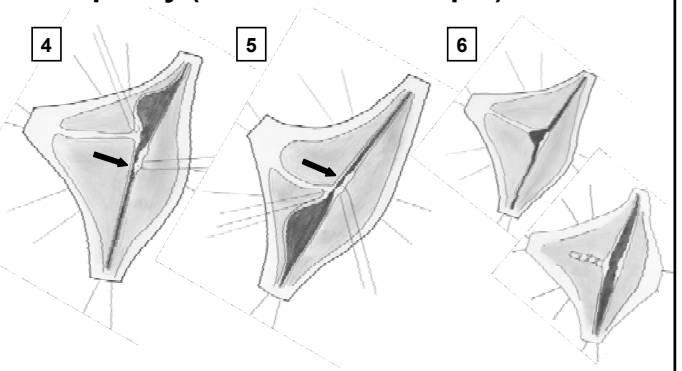


Bicuspid valve type 1 (2): 5 subvalvular « U » stitches (3-0 pledgeted polyester needle 25 or 26 mm) are placed inside out as circumferentially in the subvalvular plane. Three stitches are placed 2 mm below the nadir of insertion of each cusp, and two stitches are placed below two of the three commissures at the base of the interleaflet triangles (no suture is placed at the base of the interleaflet triangle situated between the right and noncoronary sinuses to avoid potential injury to the bundle of Hiss and membranous septum(*))

Bicuspid type 0 (3): 4 subvalvular « U » stitches are placed inside out as circumferentially in the subvalvular plane 2 mm below the nadir of insertion of each cusp and below each commissure

4 5 6



First step of cusp repair: Alignment of cusp free edges (4, 5). A stay suture of polypropylène 6/0 is passed through each noduli of Arantius. A grasper pulls outwards on the corresponding commissure while the two stitches at the level of the noduli of Arantia are tracted on the opposite side. Excess of length of free edge is then determined. Same step is performed for the other hemi-cusp (5). Distance between the two stitches determines the area for the central plicating stitches or limited resection of a median raphe to equalize each hemi-cusp (polypropylene 5 or 6/0-13) (6).

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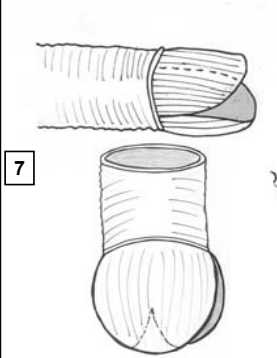

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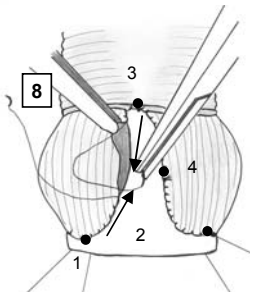

Remodeling of the aortic root is standardized by scalloping the Valsalva graft into two symmetrical neosinuses (7, 8). The heights of the scallops to suture the commissures were cut up to the transition point between circumferential and axial folds in the graft. In case of bicuspid type I one of the hemi-sinus is tailored to accommodate the rudimentary commissure. Its height is adapted to the height of the rudimentary commissure (9). Suture of the Remodeling starts at the nadir of the sinus towards half sinus. Another running suture is begun at the tip of the commissure towards corresponding hemi-sinus (polypropylene 4.0 or 5.0).

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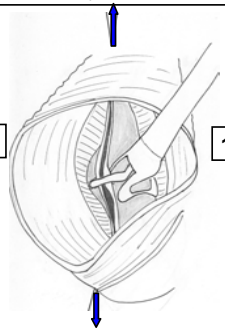

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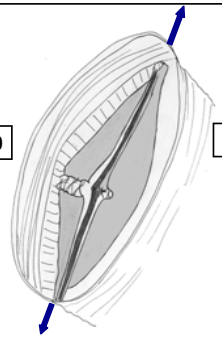

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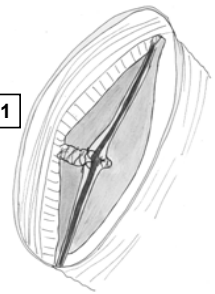
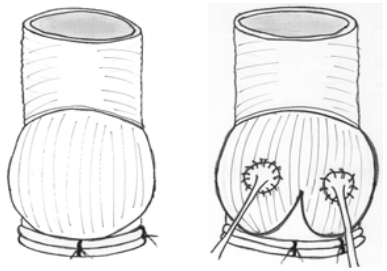


Second step of cusp repair: Commissural traction suture are placed in order to measure the effective height of each cusp (arrows). A dedicated cusp caliper is used to evaluate any residual or induced cusp prolapse (Fehling Instruments, Karlstein, Germany) on the un-fused cusp. Plicating central stitches are added on the free edge of this cusp until an effective height of 10 to 12 mm is obtained (9). Re-alignment of cusp free edges is then performed on the fused cusp in order to equalize it on the unfused cusp after plicating stitches (10). Plicating central stitches are added on the free edge of the fused cusp in order to obtain a symmetrical resuspension when compared to the unfused cusp (11).

12



The five anchoring “U” stitches are then passed through the inner aspect of the prosthetic aortic ring. The ring is descended externally around the remodelled aortic root. Holder is removed before tying the ring in subvalvular position. Final aspect of the neoaortic root after anastomosis of the coronary ostia (12)