

AI, 9.4 ± 1.1 mm in 370 with mild, 7.9 ± 1.4 mm in 43 patients with moderate and 6 ± 1 mm in three patients with severe AI. The difference in means of effective height between the four different grades of AI were significant ($P < 0.005$). Of 497 AVR patients with an eH ≥ 9 mm, 309 had no or trivial, 186 mild and only two moderate AI.

Conclusions: Parameters of aortic root dimensions follow a seemingly constant pattern in humans of different size. Effective height has a constant relationship to root dimensions and body size. In AVR, normalisation of eH leads to a high probability of normal or near-normal aortic valve function.

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VALVE SPARING AND REPAIR OF THE FAILED AUTOGRAFT FOLLOWING ROSS OPERATION

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Objectives: Failure of the pulmonary autograft (PA) is mainly due to dilatation and/or cusp prolapse causing insufficiency. We analysed the result of PA valve-sparing and repair techniques developed for native aortic root and valve.

Methods: Out of 260 patients having the Ross operation between 1991 and 2006, 30 needed PA reoperation. In 25 of them, the PA valve could be preserved. As initial Ross procedure, 19 had free standing root and six had inclusion. Mean redo interval was 9 ± 3 years (2.5-15) and mean age at redo was 44 ± 13 years (19-63). Indications for reoperations were PA dilatation ($n=10$), insufficiency ($n=4$) and dilatation + insufficiency ($n=11$). Root aneurysms were repaired using the reimplantation ($n=11$) or the remodeling technique ($n=1$). Supra-coronary aneurysms were repaired by tubular replacement of ascending aorta ($n=9$). Cusp prolapse were repaired by commissural resuspension ($n=1$), cusp plication ($n=8$) or resuspension with PTFE 7/0 suture ($n=6$).

Results: The PA valve was successfully preserved in all patients with none to mild post procedural insufficiency. The first patient of this series having a commissural resuspension required valve replacement for early repair failure. There was no hospital death. Median follow-up was 15 months (1-100). At follow-up, all patients were in NYHA functional class I or II. Transthoracic echocardiography showed no or mild PA insufficiency in 19 patients, moderate insufficiency in three and severe insufficiency in one.

Conclusions: Preservation of the PA valve can be safely and effectively performed in selected patients. Longer follow-up is necessary to assess the durability of PA valve preservation.

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STANDARDISATION OF AORTIC VALVE-SPARING AND REPAIR WITH AN EXPANSIBLE AORTIC RING: A PROSPECTIVE MULTICENTRE COHORT OF 142 PATIENTS

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Objectives: Multiplicity of valve-sparing techniques results in lack of standardisation, limiting their widespread use. In order to treat dilated aortic annular base and sinotubular junction diameters while maintaining root dynamics, we propose to standardise a physiological approach to valve sparing and/or repair by using an expansible subvalvular ring for the remodeling procedure (root aneurysm) or a supra-annular ring (isolated aortic insufficiency (AI)).

Methods: From 2003 to 2009, 142 patients underwent remodeling with external subvalvular annuloplasty (125 aneurysms) or double sub- and supra-annular annuloplasty (17 isolated AI) in 10 centres. Preoperative AI $\geq$ grade 2 was present in 67.6% (96), Marfan syndrome in 12.7% (18) and bicuspid valve in 21.1% (30). Cusp repair was performed in 40.1% (57) patients.

Results: Valve sparing was successful in all but two cases. Operative mortality was 2.8% (4). The ring produced a significant annular base reduction from 26.7 ± 3.2 to 20.7 ± 2.3 mm ($P < 0.01$) without significant mean transvalvular gradient (7.8 ± 3.4 mmHg). During follow-up (28.8 ± 21.1 months), five patients died and seven required reoperation. Six were operated during our early experience. Since 2007, aggressive management of cusp prolapse was started, increasing significantly rate of valve repair (from 27.3% (21) before 2007 to 55.4% (36) after 2007, $P < 0.01$) with only one reoperation. Freedom from AI $\geq$ grade 2 was 91.9% (114).

Conclusions: Implantation of an external aortic ring provides a reproducible approach to aortic valve sparing and repair. The ongoing CAVIAR trial (Conservative Aortic Valve surgery for Aortic Insufficiency and Aneurysms of the Aortic Root) will compare this standardised technique to mechanical valve replacement.

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SHOULD ROOT REPLACEMENT WITH AORTIC VALVE-SPARING BE OFFERED TO PATIENTS WITH BICUSPID VALVES OR SEVERE AORTIC REGURGITATION?

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Objectives: To examine the results of root replacement with aortic valve-sparing in patients with bicuspid aortic valve or severe aortic regurgitation (AR).

Methods: Between 2000 and 2009, 102 patients (mean age 47 ± 17.5 years) underwent aortic valve-sparing procedures for ascending aortic aneurysm or dissection. Twenty-one (20.5%) presented with Marfan's syndrome. Patients were assigned to three different groups according to the aortic valve pathology: bicuspid aortic valve ($n=11$), tricuspid aortic valve with AR<III ($n=51$), and tricuspid aortic valve with AR $\geq$ III ($n=40$). Remodelling of the aortic root was performed in 28 (27.5%) patients, reimplantation of the aortic valve in 74 (72.5%) and a concomitant cusp repair in 30 (29.4%). All patients were prospectively studied with annual clinical assessment and echocardiography.

Results: Overall actuarial five-year survival was $97.8 \pm 1.5\%$ with no differences between the groups. Actuarial five-year freedom from aortic valve-related reoperation was $92.2 \pm 3.2\%$ in all patients, 100% in patients with a bicuspid valve, $98 \pm 1.9\%$ in patients with a tricuspid valve and AR <III, and $82.7 \pm 7.5\%$ in patients with a tricuspid valve and AR $\geq$ III ($P=0.07$). Among patients who required reoperation for recurrent AR, 3/6 (50%) presented with Marfan's syndrome.

Conclusions: The outcome in terms of survival is excellent for all patients after aortic valve-sparing operations. There is no difference in terms of reoperation between patients who presented with bicuspid or tricuspid aortic valves. Reoperation rates are higher for patients who presented with AR $\geq$ III but do not reach statistical significance. Hence, root replacement with aortic valve-sparing should be offered, even in the presence of a bicuspid aortic valve or severe AR.

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AORTIC ROOT STABILITY IN BICUSPID AORTIC VALVE DISEASE: PATCH AUGMENTATION PLUS REDUCTION AORTOPLASTY VERSUS MODIFIED DAVID REPAIR

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Objectives: The unreinforced aortic root in bicuspid aortic valve disease has been shown to dilate and cause recurrent regurgitation. The objective of this study was to determine whether reduction aortoplasty can reliably prevent aortic root dilatation after aortic valve repair in bicuspid disease.

Methods: Sixty-six patients, with a mean age of 41.2 ± 12 years, with incompetent bicuspid aortic valves and concomitant dilatation of the aortic root, were included in this study. Forty-nine patients had patch augmentation of the free edge of the bicuspid aortic leaflets and reduction aortoplasty, and a further 17 patients had patch augmentation and a modified David type repair. Patients were followed-up by echocardiography and clinically at yearly intervals.

Results: At mid-term (range 3-7 years), only one patient in the reduction aortoplasty group showed aortic root dilatation, leading to significant aortic valve regurgitation. Other than that, there was no progression of regurgitation