Aortic annulus sizing strategy in TAVI, comparison of echocardiography and CT, impact on aortic regurgitation incidence and patients prognosis

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Background: Aortic regurgitation (AR) after TAVI is the main limitation of this procedure. The aim of this study was to evaluate i) aortic annulus sizing by CT and/or echocardiography (TEE or TEE) ii) the incidence of AR and its determinism iii) the prognostic impact of AR and other survival predictors.

Methods: 136 consecutive patients undergoing TAVI were included between 2010 and 2013. The aortic annulus sizing for prosthetic choice was done by TEE in 29 patients and by CT in 107 patients. Aortic valve calcium volume was measured by the volume technique in 67% of patients who have got CT. Follow-up was performed at 1, 6, 12 and 24 months.

Results: Aortic annulus sizing by TTE and TEE echocardiography (TEE) were well correlated (r=0.73, p=0.0001, n=51) but were significantly lower than CT sizing (p=0.0001). The incidence of AR ≥ 2/4 was 13% and was not significantly different according to the strategy of aortic annulus sizing for prosthetic choice. No predictor of AR ≥ 2/4 was identified. Calcium volume was not associated either with AR with 1 month mortality. Mortality was 13% at 1 month, 25% at 1 year and 39% at 2 years. Predictors of mortality at 2 years in univariate analysis were Euroscore ≥ 25%, aortic regurgitation ≥ 2/4, anemia after TAVI < 8g/dl, transmural effusion, and tamponade. In multivariate analysis, independent predictors were aortic regurgitation ≥ 2/4, anemia after TAVI < 8g/dl and tamponade (OR 2.75 CI 1.3-6.7; OR 2.5 CI 1.15-5.55 respectively).

Conclusion: This study showed that aortic annulus sizing by echocardiography is significantly lower than sizing by CT. AR have an independent prognostic impact on survival. Prevention of aortic regurgitation is an important issue for the future of this technique.

Comparison of transcatheter aortic valve implantation (TAVI) and surgical aortic valve replacement in very high risk patients, monocentric registry of early experience

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Introduction: The PARTNER trial has shown that TAVI is not inferior to surgical aortic valve replacement (AVR) in high-risk aortic stenosis. However, real life registry comparing TAVI and surgery are lacking.

Methods: monocentric registry of high-risk patients (EUROSCORE1 ≥ 15%) undergoing TAVI (114 patients) or AVR (81 patients) between 2009 and 2013 in our institution.

Results: mean age was 84.4 and 83.6 yo (p=NS). TAVI patients had higher EUROSCORE1 (31 vs 24.5%, p=0.001), lower LVEF (48.4 vs 57%, p=0.0001) and lower mean aortic gradient (46 vs 53mmHg, p=0.001). Mortality in hospital was not statistically different between TAVI and AVR; 9.6 vs 17.5% (p=0.12). TAVI patients presented more vascular complications (11.4 vs 0%, p=0.001), needed more Pace-Maker (24.6 vs 4.9%, p=0.0001) but presented less in-hospital infections (11 vs 19%, p=0.008), less new atrial fibrillation (20 vs 41%, p=0.002), and needed less transfusions (25.4 vs 82.0%, p=0.0001).

Conclusion: the present registry results confirm that TAVI is a real alternative to surgery in patients with high surgical risk. Longer follow up is required to confirm these results.

Comparison of transcatheter aortic valve implantation (TAVI) and surgical aortic valve replacement (AVR) in high-risk aortic stenosis. However, multiple comorbidities and excessive surgical risk. We defined and split patients into 3 populations as followed: PLFLG (iAVA < 3 5mL/m2, LVEF < 40 mmHg, MaxV < 4 m/s, LVEF > 50%), LFLG (MaxV > 4 m/s, MG > 40 mmHg, LVEF > 50%, Zva > 4.5 mmHg/mL/m2, MaxV < 4 m/s), and SAS (MaxV < 4 m/s, MG < 40 mmHg, LVEF < 50%). The primary endpoint of our study was to evaluate global and cardiovascular mortalities; secondary endpoints included VARC 2 variables. A significant decrease in survival rate regarding the PLFLG group (n=59) in comparison to the PLFLG (n=31) and SAS (n=172) groups, which had similar survival rates. Regarding the immediate post-procedural outcomes, the PLFLG group had more CHF (p=0.001) and a higher BNP before discharge (p=0.009) than the other groups. VARC 2 variables analysis did not show any significant results. Intrahospital and 30-days mortalities were higher in the PLFLG and LFLG groups (p=0.05). There was a trend toward an increase in MACCE in the PLFLG group (p=0.13) at one month. TAVI for PLFLG patients is
Oversizing, undersizing or just the right sizing for TAVI patients?
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Oversizing strategies to avoid post-procedural aortic leak following TAVI are developing. The purpose of the study was to investigate if the oversizing strategy compared with normal sizing was deleterious on the immediate and late post-procedural outcomes.

From January 2010 to August 2013, consecutive severe symptomatic aortic stenosis patients were referred for TAVI. They all underwent preoperative Multislice-angio CT scan (MSCT) and the procedures were achieved using Edwards Sapien® or Corevalve devices. Early and late follow-up were completed. Retrospectively, according to pre-procedural MSCT and the valve size, patients were classified into three continuous groups: normal sizing, moderate and severe oversizing, depending on the ratio between the prosthesis area and the annulus area indexed and calculated on MSCT. Main endpoint was the all-cause and cardiovascular mortality and secondary endpoints corresponded to the VARC2 endpoints.

268 patients had a MSCT and underwent TAVI procedure, with mainly Corevalve. While all-cause and cardiovascular mortality rates were similar in all groups, post-procedural new pace-maker implantation rate was significantly higher in the severe oversizing group (p=0.03), while we observed more in-hospital congestive heart-failure (p=0.02) and tamponade (p=0.02) in the normal sizing group. There was also a trend toward more moderate to severe AR in the oversizing groups. At 1 month there was significantly more MACCE in the oversizing group. There was also a trend toward more moderate to severe AR in the severe oversizing group (p=0.03), while we observed more in-hospital congestive heart failure (p=0.02) and tamponade (p=0.02) in the normal sizing group.

Conclusion: Re-PMV in patients with restenosis after a prior PMV is feasible, effective and achieves interesting immediate and long-term results.

Immediate and long-term results of repeat percutaneous mitral valvuloplasty
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Introduction: it is unknown whether patients who developed symptomatic mitral restenosis after percutaneous mitral valvuloplasty (PMV) may benefit from repeat PMV (re-PMV). The purpose of this study is to assess the immediate and long-term results of the re-PMV in patients with mitral restenosis following to previous PMV.

Methods: Retrospective study from a series of 40 procedures of re-PMV with the Inoue balloon at 8±4 years after prior procedure, performed between 1996 and 2012. A clinical and ultrasound follow-up was achieved in 31 patients with a mean follow-up period of 43±26 months.

Results: The mean age of patients was 54±11 years (23; 63), 87.5% of the population being female (5 men and 35 women). The immediate procedural success was achieved in 31 patients (77.5%). A severe mitral regurgitation (MR) was observed in 3 patients (7.5%). A cerebrovascular stroke occurred in 1 patient (2.5%). No other death or cardiac tamponade were noted. Class I or II of NYHA, a pre-procedural MR, pulmonary hypertension and a Patil score >10 were identified as predictors of failure. More the score of Wilkins is high (>8), more it is predictive of failure. Only a left atrial area ≤25 cm² was linked to high risk of severe MR. At long-term, most patients (84%) had no functional impairment, the mean mitral valve area was 1.5±0.33 cm² [0.9;2.2], mitral restenosis was observed in 13 patients (42%) at 53±30 months [9;128] after re-PMV. 9 patients had mitral valve replacement (32%), 4 patients underwent a re-PMV (13%), 2 patients presented thromboembolic events (6%) and no death. Only the male had been identified as a predictor of restenosis.

Conclusion: Re-PMV in patients with restenosis after a prior PMV is feasible, effective and achieves interesting immediate and long-term results.

Hemodynamic and regurgitation after TAVI An in-vitro study
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Introduction: Observations of EDWARDS SAPIEN prosthesis (ED SA) once deployed in vivo, shows a frequent elliptic geometry, which can cause inadequate transvalvular hemodynamic and the occurrence of valvular regurgitation (intra and/or para).

Objectives: This study aims to quantify in vitro, hemodynamic and valvular regurgitation of ED SA in circular and elliptic deployment conditions.

Method: A pulsed simulator reproducing the human circulation was used. ED SA 23 and 26 were implanted in circular annulus with increasing diameter (18, 20, 22 mm for the size 23 and 21, 23, 25 mm for 26) and in 4 elliptical annulus for each size prosthesis (3 annulus with increasing Eccentricity Index (EI) at 0.17, 0.26, 0.33 starting to a small fixed diameter and 1 with the smallest and biggest diameters of circular annulus). The Effective Orifice Area (EOA) was calculated by the continuity equation and mean transvalvular gradient (TVG) were obtained by Doppler. The performance index (PI=100xEOA/annulus area) was calculated. The ultrasound allowed the research of regurgitation, quantified by flow measurement.

Results: The highest TVG were observed for circular annulus 20 and 22 mm, respectively 17.7 and 12.2 mmHg, which was correlated with the lowest EOA (1.27 and 1.44 cm²). We observed a mismatch leaflets-stent for annulus 18 with plicature of leaflets. Hemodynamic parameters and mean PI (48.5 vs 43.2) were better with elliptic geometry than circular. No significant intraprosthetic regurgitation was observed. Just 1 paraprosthetic regurgitation occurred for the ED SA 26 in the elliptic annulus with largest EI.

Conclusion: Hemodynamic parameters of ED SA obtained in vitro with elliptic geometry appear to be better than those with circular. A “leaflets-stent mismatch” can occur in the case of undersizing in annulus with smaller area.