Aortic valve calcium score in patients undergoing TAVI: would 3mensio software be an alternative to the classic Agatston score?

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Topic(s):
Computed Tomography: Valve Disease

Citation:
Background: CTangio(CTA) is currently the recommended method for planning transcatheter aortic valve implantation (TAVI). Calcium score seems to be associated with the severity of valvular disease and may be an important predictor of complications, as peri-prosthetic leak. Currently there are softwares that allow quantification of calcium in the valve using CT with and without contrast.

Purpose: to compare two methods of calcium quantification in the aortic valve (3mensio ValvesTM and Agatston’s score) and to evaluate its relation with the severity of valvular disease and the prognosis.

Methods: Retrospective, single-center study, that evaluates CTA from patients(pts) submitted to TAVI between October 2017-October 2018, with calcium quantification by the 2 methods. Demographic, clinical, echocardiographic, and procedure-related data were collected. The correlation between the 2 forms of calcium measurement with the echocardiographic measurements of aortic stenosis quantification was done with correlation tests. The existence of an association between these scores and the occurrence of events or complications was performed using T-student and chi-square tests (X2).

Results: 112 consecutive patients (55.4% women, 81±6.8 years) were included. The majority of pts had severe aortic stenosis (95.5%), 2.8% had prosthesis dysfunction and 1.8% had aortic insufficiency. The mean EuroScore II was 3.91 ± 3% and the STS was 5.7±4.2%. In 43.8% of the pts a CoreValveTM was implanted and in 51.8% a SapienTM. After procedure, 1.8% of pts had stroke (only 1 major stroke) and 24.1% required a pacemaker.

Only 6.3% pts had significant leaks after the procedure, all of moderate severity. A significant calcification of the valves was observed, with a mean calcium score calculated by the Agatston’s method of 3140±1489HU and 892±592mm3 by the 3mensioTM. There was a strong correlation between the two forms of quantification (r = 0.769 p <0.001). Calcium quantification performed by the 3mensioTM software correlated with the mean gradient (r = 0.25 p = 0.015) and the indexed aortic valve area (r = -0.35 p = 0.015).Calcium quantification by the Agatston score and 3mensioTM were associated with mortality (p = 0.034 and p = 0.001, respectively), but were not independent predictors. None of the scores were associated with other complications.

Conclusion: the amount of calcium in the aortic valve by 3mensio ValvesTM software shows a strong correlation with the conventional method using the Agatston’s score, both associated to mortality. There was also a correlation between the quantification of the calcium volume by the 3mensioTM and the severity of the aortic stenosis. With the future likelihood of performing TAVI in patients at lower risk, reduction of radiation dose in imaging methods is critical. This study suggests that 3mensioTM can be used alternatively to the Agatston’s score, allowing the quantification of calcium in CT with contrast, reducing the dose of radiation.
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