The role of serum lipoprotein(a) levels in bioprosthetic aortic valve degeneration

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Introduction: Lipoprotein(a) [Lp(a)] is associated with an increased incidence of aortic stenosis. Bioprosthetic aortic valve degeneration and native aortic stenosis share similar pathological mechanisms. Evidence regarding the role of serum Lp(a) concentrations in bioprosthetic aortic valve degeneration is lacking.

Purpose: To evaluate the association between serum Lp(a) concentrations and bioprosthetic aortic valve degeneration.

Methods: In this retrospective multicenter study, consecutive patients who underwent a bioprosthetic aortic valve replacement between Jan-2010 and Dec-2020 and had a preoperatory serum Lp(a) measurement were included. A baseline transthoracic echocardiography (TTE) was performed following the aortic valve replacement and a follow-up TTE was performed at least 24 months after the baseline study to determine the presence of bioprosthetic valve degeneration. Significant degeneration was defined as: (a) an increase >10 mmHg in mean bioprosthetic aortic valve gradient from baseline status + a decrease in effective orifice area + a decrease in Doppler velocity index + exclusion of clinically thrombotic leaflet thickening, OR (b) new moderate or severe prosthetic aortic regurgitation (if the main component was periprosthetic, then it was not considered). Lp(a) concentrations were compared between patients with and without degeneration and regression analysis was conducted to investigate the association between bioprosthetic valve degeneration and Lp(a) levels.

Results: In total, 211 cases were included (mean age 74.1 ±9.4 years, 72.0% males, 29.9% transcatheter aortic valve replacements) (Figure 1). Median time between baseline and follow-up TTE was 5.0 (IQR 3.7) years. Bioprostheses degeneration was observed in 33 (15.6%) patients at follow-up. Median serum levels of Lp(a) were significantly higher in the patients affected by degeneration versus non-affected cases (50.0 vs 15.7 mg/dl, p=0.003). In the regression analysis, high Lp(a) levels (≥30 mg/dl) were associated with degeneration both in a univariate analysis (OR 4.8, 95%CI 2.2-10.9, p<0.001) and multivariate analysis adjusted by other risk factors for bioprostheses degeneration (age, sex, hypertension, smoking, patient prosthesis mismatch, creatinine levels, and body surface area) (OR 5.2, 95%CI 2.1-12.8, p<0.001).

Conclusion: Serum Lp(a) concentrations seem to be a risk factor for bioprosthetic aortic valve degeneration (Figure 2). There is an increasing need to accurately predict bioprosthetic aortic valve degeneration and to develop novel methods and treatments to increase their durability. Prospective studies are needed to confirm these findings and to investigate whether lowering Lp(a) could slow bioprostheses degradation.

Population characteristics
Lp(a) and bioprostheses degeneration