J Clin Exp Pathol 2018, Volume 8
DOI: 10.4172/2161-0681-C5-058

Association between iron deposition and neovascularization in patients with aortic valve stenosis

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Introduction: Calcific aortic stenosis (AS) is characterized by calcification, restricted leaflet motion, and reduction in valve area. It has been shown that neovessels, intraleaflet hemorrhage, and iron deposition may be involved in the pathophysiology of the disease. We sought to evaluate the association between aortic valve intraleaflet neovascularization and iron deposition in patients with AS using histologic techniques.

Methods: Aortic valve leaflets of 10 consenting patients with AS were extracted during surgical aortic valve replacement, fixed, embedded and sectioned. Presence of microvessels, macrophages, and iron was assessed with standard immunohistochemical staining with CD34, CD68 and iron respectively. Histological analysis was performed using Leica software. For each stain, the areas of CD34, CD68, and iron positive pixels were calculated. To assess linear dependence between variables, the Pearson's correlation coefficient for normally distributed or Spearman's rank correlation coefficient for non-normally distributed variables was calculated. A value of $p<0.05$ was considered statistically significant.

Results: The demographic characteristics, risk factors, and echocardiography of study patients. There was a positive correlation between detection of cd34 cells and iron (r=0.7, P=0.02). Detection of CD34 cells was also positively correlated with the peak transvalvular gradient (0.41, p=0.5), and negatively associated with valve area (r=-0.14, p=0.05).

Conclusion: Our results suggest that iron deposition occurs in association with neovascularization. These preliminary findings support the hypothesis that angiogenesis may promote intraleaflet inflammation by allowing iron deposition.

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