특별 강연 V

Atherosclerosis Imaging in the Heart and Kidney – Plaque and Microvascular Disease

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Atherosclerosis is a systemic and diffuse disease with focal complications. In the current presentation, we would like to focus on several topics of parallel comparison between the heart and the kidney in this regard. We will discuss the relationship between the heart and kidney; the potential imaging of the plaque; the assessment of the microcirculation; and the potential effect on treatment. Previous studies from multiple centers demonstrated the overlap and the coexistence of atherosclerosis disease both in the coronary and in the renal circulation. More than 20% of the patients undergoing coronary angiography have evidence of renal atherosclerosis. The prevalence of poly vascular disease in the REACH registry exceeds 50%. Moreover, there is growing evidence to suggest that the degree of renal dysfunction, and specifically GFR, is one of the most predictive values for cardiovascular event and stroke

One of the main challenges in the treatment of obstructive atherosclerosis disease is the estimation and the decision-making which lesion should be addressed with interventional procedure. This discrepancy is the result of the lack of correlation between anatomical and physiological parameters in the coronary and other circulations. The current practice in the coronary circulation is that physiological assessment with fractional flow reserve is reliable for the prediction which lesion should be addressed rather than anatomical correlation. Moreover, the atherosclerosis plaque is heterogenous in nature, and has multiple components that are different in the prediction of future event. The ability to image tissue characterization of the plaque advances our understanding about the differences between high-risk and low-risk plaque. We recently advanced this concept to the renal circulation, demonstrating that similarly to the coronary circulation, the lesion in the renal artery may contain different tissue characterization similar to the coronary circulation.

Another parallel between the two vascular beds is the role of the microcirculation. The microcirculation regulates the flow to the myocardium as well as to the renal tissue. Endothelial dysfunction exists in the both vascular beds and is tightly related to the conventional atherosclerosis risk factors as well as to the end-point in renal disease, which is GFR. Previous studies from ours and other laboratories demonstrated that the presence of microcirculation disease in one vascular bed tightly correlates and is related to the effect of the microcirculation in other organs, underscoring that microvascular disease may be a systemic disease. As indicated earlier, the presence of physiologically significant atherosclerosis plaque may require interventional procedures. However, it is well-recognized, particularly in the renal circulation, that more than 30% of the patients undergoing renal revascularization actually experience deterioration in renal function. It is difficult to predict which patient will respond favorably to renal artery intervention.

It has become apparent that the characterization of the plaque may determine the prognostics of the procedure. Indeed, the presence of highly necrotic core both in the coronary and renal circulation may predict the outcome of the intervention and may require specific therapy in order to prevent this complication. Thus, in the current presentation, we draw a parallel comparison between these two circulations: the coronary and the renal; the plaque level as well as the microcirculation underscoring the systemic manifestation and the consequences of atherosclerosis.