Human Coronary Sinus Venous System as a Target for Clinical Procedures

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Abstract : Introduction: The coronary sinus venous system (CSVS), which has always been overshadowed by the coronary arterial tree, has recently begun to attract more attention. Since it is a target for clinicians the knowledge of its anatomy is essential. Cardiac resynchronization therapy, catheter ablation of cardiac arrhythmias, defibrillation, perfusion therapy, mitral valve annuloplasty, targeted drug delivery, and retrograde cardioplegia administration are commonly used therapeutic methods involving the CSVS. The great variability in the course of coronary veins and tributaries makes the diagnostic and therapeutic processes difficult. Our aim was to investigate detailed anatomy of most common clinically used CSVS`s structures: the coronary sinus with its ostium, great cardiac vein, posterior vein of the left ventricle, middle cardiac vein and oblique vein of the left atrium. Methodology: This is a prospective study of 70 randomly selected autopsied hearts dissected from adult humans (Caucasian) aged 50.1±17.6 years old (24.3% females) with BMI=27.6±6.7 kg/m2. The morphology of the CSVS was assessed as well as its precise measurements were performed. Results: The coronary sinus (CS) with its ostium was present in all hearts. The mean CS ostium diameter was 9.9±2.5mm. Considered ostium was covered by its valve in 87.1% with mean valve height amounted 5.1±3.1mm. The mean percentage coverage of the CS ostium by the valve was 56%. The Vieussens valve was present in 71.4% and was unicuspid in 70%, bicuspid in 26% and tricuspid in 4% of hearts. The great cardiac vein was present in all cases. The oblique vein of the left atrium was observed in 84.3% of hearts with mean length amounted 20.2±9.3mm and mean ostium diameter 1.4±0.9mm. The average length of the CS (from the CS ostium to the Vieussens valve) was 31.1±9.5mm or (from the CS ostium to the ostium of the oblique vein of the left atrium) 28.9±10.1mm and both were correlated with the heart weight (r=0.47; p=0.00 and r=0.38; p=0.006 respectively). In 90.5% the ostium of the oblique vein of the left atrium was located proximally to the Vieussens valve, in remaining cases was distally. The middle cardiac vein was present in all hearts and its valve was noticed in more than half of all the cases (52.9%). The posterior vein of the left ventricle was observed in 91.4% of cases. Conclusions: The CSVS is vastly variable and none of basic hearts parameters is a good predictor of its morphology. The Vieussens valve could be a significant obstacle during CS cannulation. Caution should be exercised in this area to avoid coronary sinus perforation. Because of the higher incidence of the presence of the oblique vein of the left atrium than the Vieussens valve, the vein orifice is more useful in determining the CS length.

Keywords : cardiac resynchronization therapy, coronary sinus, Thebesian valve, Vieussens valve
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