Radiationless transseptal puncture

The transseptal puncture is commonly performed during cardiac interventions, although we have observed an increase in the number of procedures using this access to the left heart chambers (1). The clinical anatomy of the interatrial septum is difficult, and its lack of familiarity can cause serious complications. The true interatrial septum represents only approximately 20% of the entire interatrial septum area. Only the floor of the fossa ovalis and its immediate muscular inferior-anterior rim can be resected without leaving the cavities of the heart (2, 3). The relatively small area of approximately 140 mm^2 can be punctured without complication; however, this would necessitate the use of catheter guidance techniques. The transseptal puncture is mainly performed under fluoroscopic guidance, resulting in exposure to ionizing radiation.

The catheter ablation of persistent atrial fibrillation often utilizes the "2C3L" strategy, which combines bilateral circumferential pulmonary vein isolation with three linear ablation lesions across the mitral isthmus, left atrial roof, and cavotricuspid isthmus (4). This approach requires multiple passages of the catheter between the left and right atrium through the interatrial septum while using the same puncture site. However, the "2C3L" strategy may also be complicated and time-consuming, especially in patients with unfavorable anatomical conditions. This in turn may also be associated with increased doses of radiation (5, 6).

A study by Yuan et al. (7), which was published in this issue of the Anatolian Journal of Cardiology, presents a conceptual and practical guide for repeated crossing through the interatrial septum without using radiation. Three-dimensional fast anatomic mapping has been used with the Carto3 system for visualizing the track of the catheter passing through the puncture site. This important randomized study with relatively small cohort (involving 40 patients divided into two groups) has demonstrated that this procedure may be performed easily with zero fluoroscopy (as well as without any differences observed in the success rate between patients undergoing the procedure guided by fluoroscopy and those undergoing the procedure guided by track image). Moreover, the mean procedural time for crossing the septum in patients undergoing the procedure guided by the Carto3 system was significantly reduced compared with that in those undergoing the procedure guided by the traditional approach (4±3 s vs. 20±10 s, $p<0.01$). In conclusion, the built "highway" between the right and left atrium renders the interatrial septum passage procedure safe, simple, and fast (7).

The radiation risk associated with electrocardiological techniques, not only to patients but also to medical staff, is significant and not devoid of side effects (8). Minimize ionizing radiation has been highly recommended. Electrocardiological procedures using zero or minimal fluoroscopy are preceded by pre-procedural cardiac imaging (9, 10), and those guided by three-dimensional anatomic mapping systems, intracardiac electrograms, transesophageal and intracardiac echocardiography, or augmented reality in cardiology are the future direction of this discipline (11–15). More importantly, such approach may facilitate catheter manipulation and is associated with short procedural times, reduced risk of complications, and substantial cost-saving (11, 13). Future development and improvement of non-radiation catheter guidance techniques will hopefully shift the direction of electrocardiology beyond the traditionally perceived catheter laboratories.

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Accepted Date: 21.02.2017 **Available Online Date:** 09.05.2017

DOI:10.14744/AnatolJCardiol.2017.24711

Roentgenol 2016 Jul 19. Epub ahead of print.
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