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CONG

Commentary: What is invisible to the eye could be seen through the heart: How advancements to the visualization of the conduction tissue can improve surgical and electrophysiology procedures

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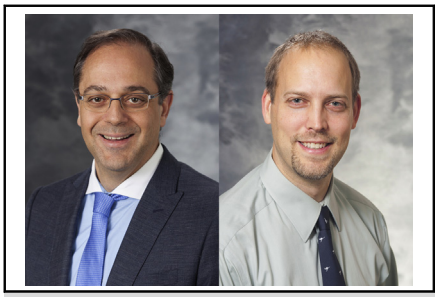

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CENTRAL MESSAGE

A novel imaging technology provides detailed anatomic information on the location of the cardiac conduction system and creates exciting possibilities for the future.

The ability to visualize the structure of the conduction tissue of the heart has substantial implications for the electrophysiologist and surgeon. In the article by Yoshitake and associates[1] in the current issue of the *Journal*, application of phase-contrast computed tomography to cadaver hearts with ventricular septal defects provided a more comprehensive understanding of the structure of the conduction tissue and its relationship to the ventricular septal defect. The importance of understanding the precise location of conduction tissue to avoid injury during surgery and the implications for surgical planning in congenital heart disease are self-evident. This type of information could add greatly to the understanding and treatment of many types of congenital heart disease.

However, as with many innovations, the real value rests in its ability to unlock clinical applications for future patients. If this technology advances to allow in vivo assessment of the cardiac conduction tissue, the implications for both the surgeon and the electrophysiologist could be profound. For example, when approaching a patient who currently requires pacing, a better understanding of the structure and location of the injury to the conduction system could potentially change the indications for pacing, alter the approach, or even suggest means of rehabilitation. During evaluation for a pacemaker, one could envision a ''preprocedure'' map of the electrical system that could allow for anatomically guided placement of a cardiac resynchronization device at the optimal location to capture the distal His/Purkinje system. Perhaps, as tissue engineering and therapeutics improve, this may even provide a roadmap for placement of conduction tissue replacement material to bypass an area of block, eliminating the need to place pacemakers after postoperative heart block.[2]

Equally exciting are the potential implications for guided ablation therapy. Integrating the structural properties of the atrioventricular node into the current electrical anatomic maps during an electrophysiologic study could decrease the risk of atrioventricular nodal injury while potentially guiding ablation for selected arrhythmias. With refinement of this technique and the expansion toward detailing the atrial conduction tissue properties, vital information could be provided for right or left atrial maze planning and ablation procedures, while also providing better information for patient selection and recurrence risk.[2,3]

We look forward to the further development of this technique. We hope that, as with many past advances in our field, innovative multidisciplinary teams of anatomists, cardiologists and surgeons will continue to collaborate

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and partner with industry in an all too familiar process that will break down barriers and lead to novel therapies for the benefit of our patients with congenital heart disease and beyond.

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