

Recognition of the Specialised Conducting Tissues



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There is no question but that one of the dreaded complications of cardiac surgery, particularly for patients undergoing correction of congenital cardiac malformations, is the iatrogenic production of disturbances of cardiac conduction. When encountered, this is usually the consequence of damage to either the sinus node or the atrioventricular conduction axis. It is now over 100 years since the location of these crucial components of the heart were first recognised.^{1,2} The fact that controversies have continued regarding their precise location across the century that has passed since these initial descriptions reflects the difficulties that still exist in their identification. This is because the structures are made up of specialised cardiomyocytes, which show minimal distinction from the adjacent working cardiomyocytes. If it proved possible to distinguish with relative ease the extent of the specialised areas in the operating room, this would prove an immense boon to cardiac surgeons throughout the world. In the current issue of the journal, the group working in Boston Children's Hospital, in collaboration with engineers working in Salt Lake City, describe their ongoing attempts to produce a system designed to provide the necessary discrimination.³ They have previously demonstrated the potential of the technique in a rodent model.⁴ In this report,³ they describe its use in sheep undergoing simulated cardiac surgical procedures.

While they are to be congratulated for their efforts, I anticipate that much more work will be required before their system can be used routinely during cardiac surgical procedures. It is possible that they also exaggerate the value that their system might provide when compared with current knowledge regarding the location of these vital cardiac components. Their basic premise is that 'the disposition of these vital structures cannot be accurately identified, and the surgeon must approximate the location of these anatomical sites'. One wonders, however, whether the precision provided by their tool will provide any more accurate identification of the 'anatomical sites'? It is now surely well accepted that if the surgeon avoids totally the terminal groove and keeps all surgical activities outside the



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Central Message

Efforts to help cardiac surgeons to avoid the specialised cardiac conduction tissues are to be applauded.

confines of the triangle of Koch, it is highly unlikely that damage will be inflicted on either the sinus or the atrioventricular nodes. When considering injury to the sinus node, furthermore, this is just as likely to be due to damage to the prominent artery supplying the node. The location of this artery will not be demonstrated by their technique. And, when considering damage to the atrioventricular node, this is more likely to be incurred when the node itself is abnormally positioned, as for example in the situation encountered with straddling and overriding of the tricuspid valve. The surgeon, therefore, will still be required to understand the likely location of the atrioventricular conduction axis. In this regard, it could well be that the authors underestimate the accuracy with which these features can now be predicted.⁵

Whilst congratulating the authors on their success in recognising the location of the cardiac nodes in their sheep model, therefore, I would suggest that there is a long way to go until their technique becomes universally acceptable as the 'gold

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standard' for recognition of the cardiac conduction tissues. In the meantime, cardiac surgeons will need to continue to recognise the 'danger areas' in congenital cardiac surgical procedures. In particular, it will be crucial to recognise the lesions in which these areas are not in their usual locations.⁵

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