Surgical cardiac strangulation: Should we worry?

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See related article on pages 522-7.

Carerras and associates¹ from the University of British Columbia present an insightful article regarding cardiac strangulation (CS) after placement of epicardial pacing leads within the pediatric cardiac surgical population. The group defines CS as a product of somatic growth in pediatric patients for whom epicardial leads become adherent to the heart in a circumferential manner and lead to a compressive process, which can affect myocardial perfusion with the potential of arrest and death.

The article serves several purposes as a knowledge gap exists with only 8 case reports within the literature describing this unusual phenomenon. As a result, it creates a platform for the authors to raise awareness regarding this complication, and in doing so, allows for congenital heart surgeons not only to reevaluate implantation techniques and strategies but also to begin the process of devising an accepted follow-up algorithm for patients after placement of epicardial pacing leads.

The author group identifies 2 specific goals. First, the group attempts to provide the reader with a true incidence of CS with an overall belief that it is underreported. Second, the group suggests a clinical pathway to aid in the diagnosis and follow-up of patients at risk for CS.

The authors directly contacted Medtronic Inc (Minneapolis, Minn) on May 25, 2013, to learn that there have been 100,900 epicardial leads implanted per this single manufacturer in the United States over a 30-year period (October 1981 to August 2012). With only 8 case reports in the literature, an incorrect assumption could be made that the incidence of CS is extremely low (0.016%). This is a common inaccuracy in our ability to best quantify complication incidences of certain surgical interventions for which our only data come from case reports. This group was concerned because of their personal experience with CS and a perception that the overall incidence was indeed higher.

In particular, the group noted 2 cases of CS at their institution within a 2-year period with 1 patient being

identified postmortem. As such, they predict a higher overall incidence than the number of reported cases. The study retrospectively evaluated implanted epicardial leads in 86 patients over a 20-year period. They report a 2.3% incidence of CS and a 1.2% mortality rate.

A unique component of the study is that it combines both a retrospective and a prospective approach to obtain its study answers. All patients undergoing epicardial lead placement were retrospectively included, and with 46 of these patients then being prospectively evaluated with a chest radiograph after the realization that they had been lost to formal follow-up scan, which revealed the leads to be clear of any concerning circumferential looping pattern.

Logistic regression was used to study the potential risk factors associated with CS, and the following variables equated to a 17-fold increase in the risk of CS: age less than 6 months at the time of implantation, weight less than 7.3 kg at the time of implantation, placement of a dual-chambered system, and evidence of postpericardiotomy syndrome or postoperative infection. On the basis of these findings and the anecdotal interval between chest radiographs for the 2 patients with CS, the group advises a technical approach for excess lead length to be left anteriorly on the heart and 3-year scheduled interval radiographic evaluations to identify at-risk patients.

The group should be commended for pursuing a critical evaluation of their own experience with CS and then transitioning this investigation into an article that provides data on the incidence, technical approach, and follow-up algorithm for patients receiving epicardial leads. The study is clearly limited by its small sample size of patients with CS and thus weakens the true identification of associated risk factors. In addition, the anecdotal decision of 3-month intervals for chest radiographs is challenging to endorse as a data-driven algorithm.

Despite the statistical limitations and associated weaknesses in analysis, the value of this article is perhaps more a product of the authors' intent. To analyze and investigate in a scholarly fashion a perceived increased incidence of a major complication within one's institution oftentimes is an internal endeavor that does not translate into an academic exercise that is shared. In addition, it also often lacks in proposing a defined strategy to avoid its recurrence. As a surgical community, we should begin to undertake the process of reporting our findings based on retrospective database investigations and using these findings in promoting discussions relating to quality improvement initiatives.

Carerras and associates¹ investigate CS after placement of epicardial pacing leads. Although their study was

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statistically limited secondary to small sample size, the group addresses this potentially fatal complication by suggesting alternative technical approaches, defining at-risk patients, and finally proposing an algorithm for follow-up.

Reference

1. Carreras EM, Duncan WJ, Ognjenka D, Campbell AIM. Cardiac strangulation following epicardial pacemaker implantation: A rare pediatric complication. *J Thorac Cardiovasc Surg.* 2015;149:522-7.