Commentary: Exploring the learning process in aortic surgery

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In recent years, there has been considerable interest in monitoring and evaluating the effect of the learning curve on the outcomes of cardiac surgical procedures. Although many studies have shown decreased rates of complications and mortality with the acquisition of individual and institutional proficiency in many procedures (coronary artery bypass grafting, valve surgery, and transcatheter aortic valve implantation), little is known about the learning process in thoracic aorta surgery.¹⁻³

In this issue of the *Journal*, Mazine and colleagues⁴ present their results from analyzing the Canadian Thoracic Aortic Collaborative database, with reported results of 1025 procedures performed by 8 early-career surgeons in 8 Canadian centers during a period of 15 years. Interestingly, all the procedures represent the initial experience of these surgeons, and this allowed Mazine and colleagues⁴ a unique opportunity to study the impact of learning process and its implication in aortic surgery.

For the purpose of their study, Mazine and colleagues⁴ investigated the performance of each surgeons through the use of the cumulative sum curve analysis (CUSUM) curves. This statistical tool is a visual method that allows the user to establish easily whether a production process is “in control” or has become “out of control.” Initially developed by Page⁵ in an industrial context, CUSUM curves have been applied in many fields, such as military, aviation, and medicine. The graphic presentation of CUSUM curves permits rapid assessment of competence and readily demonstrates the acquisition of skill at a given task simply by assessing the slope of the curve.⁶ The major result of the study of Mazine and colleagues⁴ is that aortic surgery with the use of hypothermic circulatory arrest can be performed safely by surgeons at the beginning of their practice without exposing patients to any additional risks. After adjustment of the results for preoperative characteristics of the patients, the CUSUM curves showed that all the surgeons involved in the study performed better than expected. Interestingly, none of the surgeons

Michele Murzi, MD, PhD (left), and Antonio Miceli, MD, PhD (right).

Central Message

Aortic surgery with hypothermic circulatory arrest can be performed safely by surgeons in the early stage of practice.

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demonstrated the typical pattern of the learning curve, with an initial cluster of failures followed by deflection of the curve. Although it may be tempting to conclude that the learning process has a limited effect in aortic surgery, it should be remembered that almost all surgeons involved in the study received a formal aortic fellowship before embarking on their individual practice. The message that comes out this study is that you can get good results even at the beginning of your practice as long as you have received an appropriate aortic training. The use of CUSUM curves can be an ideal monitoring system, allowing both surgeons and institutions to identify periods of negative performance and then to take the necessary countermeasures.

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