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Commentary: Cardiac surgery around the clock!

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Francesco Amendolara, MD,^a and
Antonio M. Calafiore, MD^b

Circadian rhythms (CRs) are endogenous autonomous oscillators of physiological activities resulting 24-hour day/night cycles that allow organisms to adapt to a fluctuating environment.¹

How much CRs could influence the outcome of patients undergoing cardiac surgery in the morning versus in the afternoon is still debated.²⁻⁴ In this scenario, the multicenter study by Nemeth and colleagues⁵ try to shed light on the actual prognostic role of daytime variation. The strengths of this study are the large size of the cohort and the possibility to subanalyze the most frequent cardiac operations such as coronary artery bypass grafting and aortic valve replacement. The authors clearly demonstrate that undergoing cardiac surgery in morning versus in the afternoon does not influence the outcome. Why is that?

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CENTRAL MESSAGE

The outcome of our patients does not depend on the time of day of the operation.

To answer that question, we should be asking how much morning surgery can be different from afternoon surgery in terms of CR desynchronization. The circadian clock can be divided into input pathway, core circadian clock, and output pathway.¹ A series of external timing cues called synchronizers can reset the circadian clock and place all cells at the same phase of circadian oscillation. Synchronizers include light, feeding, arousal stimuli (eg, social interactions, exercise, and restraint stress), temperature, chemical factors, and oxidative stress. Intriguingly, sedatives, anesthetics, surgical stress, and the intensive care unit environment have all been shown to disrupt the circadian system in patients, altering all the synchronizers independent of the time of day for which surgery is scheduled.⁶

However, chronobiology should be applied also during the perioperative period. For instance, acute coronary syndrome occurs more frequently in the early morning, so beta-blockers or other rate-control drugs as well as nitrates and anti-arrhythmia drugs should be administered between 6 AM and 12 noon.⁶

The routine practice requires us to submit patients to cardiac surgery both during the morning and during the afternoon. After the study by Montaigne and colleagues,² many patients and surgeons wondered whether it was better to wait until the afternoon to undergo or to perform a cardiac operation, especially a high-risk operation. The study by Nemeth and colleagues⁵ provides us with the opportunity to tell a patient that the outcome of his or her intervention depends on many factors, but certainly not on the time of day he or she enters the operating room.

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Check for updates

Commentary: Maybe timing isn't everything!

Derrick Y. Tam, MD, and
Stephen E. Fremes, MD, MSc

Commonly, in North America, operating rooms perform 2 cases of open-heart surgery a day, resulting in a morning case and an afternoon case. Not infrequently, when our patients are told that they will be the afternoon case (ie, the second case of the day), they may have concerns regarding the potential for surgeon fatigue on performance. Although we often simply reassure our patients that their outcome would be the same regardless of whether they went in the morning or in the afternoon, the impact of the timing of surgery on patient outcomes is not entirely clear and remains controversial. Interestingly, the controversy is only partly related to the surgeon and the team's ability to perform a

Stephen E. Fremes, MD, MSc, and Derrick Y. Tam, MD

CENTRAL MESSAGE

Outcomes in coronary bypass and aortic valve replacement surgery are similar regardless of morning or afternoon case.

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safe operation in the afternoon and potentially more related to the impact of the patient's circadian rhythm on reperfusion injury after cardiopulmonary bypass. In addition, recent work published the *Journal* by Huard and colleagues¹ also showed that 24-hour coverage of the cardiac surgery intensive care unit led to better outcomes than intensive care units that were only managed by intensivists during the day (with residents and fellows covering in the evening). Thus, there may be several factors that impact