

## Post-Pericardiotomy Syndrome: Beware or Just Be Aware?

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One of the least discussed and least examined complications in cardiac surgery is post-pericardiotomy syndrome (PPS). One reason for this lack of attention and probable underdiagnosis of the condition is the lack of a definitive blood test or imaging examination. Instead, the diagnosis rests on clinical findings. According to the European Society of Cardiology Guidelines: “the diagnosis of Post Cardiac Injury Syndrome (PCIS) may be reached after a cardiac injury following clinical criteria: (1) fever without alternative causes, (2) pericarditic or pleuritic chest pain, (3) pericardial or pleural rubs, (4) evidence of pericardial effusion and/or (v) pleural effusion with elevated CRP [C-reactive protein]. At least two of five criteria should be fulfilled.”<sup>1</sup> Fever, chest pain, and effusions are findings that are seen in a large proportion of patients after cardiac surgery, which makes the diagnosis difficult. In addition, the timing of PPS occurrence may make it likely to occur when the patient will already have been discharged home, thus escaping medical diagnosis unless the symptom is severe enough to warrant medical attention.<sup>2</sup>

However, further awareness of PPS would draw attention to it as a likely immune-mediated phenomenon that occurs in a large percentage of patients after cardiac surgery. It has been thought of as having a good overall prognosis.<sup>3</sup> However, it is also a large contributor to postoperative morbidity because it has been associated with tamponade, longer hospital stays, more readmissions, and a theoretical risk of constrictive pericarditis.<sup>2,4</sup>

In this issue of the *Journal of the American Heart Association (JAHA)*, Lehto et al examined the likelihood of PPS according to operation type and the possible relationship of PPS to postoperative mortality.<sup>5</sup> They used a Finnish national health database to study >28,000 patients undergoing cardiac surgery from 2005 to 2013. Their analysis concluded that patients undergoing aortic or mitral valve surgery or an operation on the aorta were more likely to experience PPS compared with those

undergoing coronary artery bypass grafting. Patients experiencing PPS postoperatively also had an elevated risk for mortality, with a rate 1.7-fold that of patients who did not have a PPS diagnosis. Although prior studies have demonstrated an association of PPS with cardiac tamponade, this appears to be the first study to make a direct association between PPS and an increased risk of mortality.

The authors are to be congratulated for a meticulous study with the strength of a national database, which provides for completeness of data and excellent follow-up. The conclusion that PPS may be more common after valvular and aortic surgery as opposed to coronary artery bypass grafting may be tied to a mechanism of increased pericardial injury or increased inflammation attributable to a longer operative time. It is also easy to posit a mechanism whereby patients who experience PPS, which is known to be associated with tamponade, constrictive physiological features, and increased length of stay, may experience a higher risk of mortality.<sup>3,6,7</sup>

However, when reviewing this analysis, the reader must also be aware of some limitations of the study. Only 6 preoperative variables were analyzed (presented in Table 1), so it is not possible to conclude that postoperative mortality was in any way linked to occurrence of PPS as opposed to being attributable to a higher number of comorbidities. One need only look at the variables used to calculate the Society of Thoracic Surgeons' risk score or the Euroscore II calculator to see that many preoperative variables that influence postoperative mortality were not included in this study.<sup>8,9</sup>

An additional limitation is that this analysis only included patients who experienced PPS that was severe enough to require hospital admission or to be included as a cause of death. This introduces a bias because the analysis will, therefore, exclude patients who developed a less severe form of PPS. Because of this bias, PPS will be seen as having a worse prognosis in this study than it might in the overall

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population. Such an effect has similarly been noted in research conducted using national health databases and electronic medical records (ie, patients with data available for analysis are more likely to come from a sicker cohort and may not be representative of the general population).<sup>10,11</sup>

Regardless of the type or strength of PPS sequelae, however, it cannot be denied that reduction of the occurrence of PPS would be in the best interests of our patients. Strategies for prevention of PPS have studied the use of aspirin, methylprednisolone, dexamethasone, and colchicine, among others.<sup>12–16</sup> Colchicine has been crowned the victor of these analyses and has been shown to significantly reduce the incidence of PPS. The COPPS (Colchicine for the Prevention of the Postpericardiotomy Syndrome) and COPPS-2 trials provide us with a strong evidence base to support the use of colchicine.<sup>15,16</sup> Unfortunately, they also highlight one of the major drawbacks of colchicine use (ie, gastrointestinal tract intolerance, usually in the form of diarrhea). In the COPPS trial, 8.9% experienced gastrointestinal tract intolerance and 11.7% discontinued use of colchicine. In the COPPS-2 trial, 14.4% of patients reported gastrointestinal tract intolerance and 21.7% discontinued use of colchicine. Clearly, colchicine is effective at reducing PPS, but it is also a difficult drug for patients to tolerate. Although pharmaceutical strategies have been tested for prevention of PPS, there has yet to be a study on a simpler intervention (ie, pericardial closure at the end of cardiac surgery). The decision about whether to close the pericardium is currently left to individual surgeon preference because of a paucity of data and theoretical advantages and disadvantages of each approach.<sup>17</sup> Because PPS is thought to occur as a result of pericardial injury, it is possible that pericardial closure would possibly have an effect, albeit unknown.

In summary, Lehto et al<sup>5</sup> have increased our awareness of PPS and generated hypotheses for further testing on the risk factors and consequences of the syndrome. Increased awareness will lead to increasing numbers of PPS diagnoses and with that will come the need for an appropriate strategy of prevention.

## Disclosures

None.

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