L.P.P. serves on the ClearFlow Scientific Advisory board, and both L.P.P. and P.D. have received honoraria for scientific presentations. S.S.O. has nothing to disclose with regard to commercial support.

Author has nothing to disclose with regard to commercial support.

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CHOICE OF SECOND PERICARDIAL DRAINAGE TUBE FOR POSTERIOR PLACEMENT

Reply to the Editor:

The letter from Demers and colleagues highlights a major question that still remains, namely whether effective pericardial space drainage with properly placed tubes that are kept patent will improve outcomes similar to the result achieved by Gozdek and colleagues.¹ It is reassuring that they have initiated a well-designed randomized trial to address this question such as I suggested my editorial. In their previous study referred to in the letter, they used a posterior Blake tube left in place for 5 days but had a high incidence of tube occlusion and did not see a benefit.² The other study that they quoted, by Sirch, and coworkers,³ used an active-clearance technique for the chest tube and found similar benefit to that seen in the study by Gozdek and colleagues,¹ but almost all those patients had only anterior mediastinal tubes placed. It is to be hoped that in the randomized trial proposed by Demers and colleagues they not only optimize chest tube patency but also choose a posterior pericardial tube, such as a soft rubber flat or oval tube with antithrombotic coating, that most surgeons would consider both harmless and effective when placed behind the heart.

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POSTERIOR PERICARDIAL DRAINAGE BY ANY MEANS MAY IMPROVE OUTCOMES AFTER CARDIAC SURGERY

Reply to the Editor:

We read with great interest the letter to the Editor by St-Onge and colleagues¹ on our recently published research article.² At the same time, we are glad that our findings have drawn the attention of international readership to the unmet need of adequate draining of the pericardial space after heart surgery procedures.

In brief, with a meta-analysis of 19 randomized controlled trials (RCTs) that enrolled 3425 patients, we assessed the efficacy and safety of posterior pericardial drainage, defined as posterior pericardiotomy incision, chest tube to posterior pericardium, or both compared with the control group that received no posterior pericardial drainage. Adequate drainage in the experimental group was associated with a significant 90% reduction of the odds of cardiac tamponade ($P < .001$) and 58% reduction of postoperative atrial fibrillation ($P < .001$). The odds of early and late pericardial effusion were significantly reduced: relative risks of 0.20 (95% confidence interval, 0.11-0.36; $P < .001$) and 0.05 (95% confidence interval, 0.02-0.10; $P < .001$), respectively. Reductions in postoperative complications translated into a significantly reduced odds of composite end point of death or cardiac arrest ($P = .03$), numerically lower odds of acute kidney injury ($P = .08$), and shorter length of hospital stay ($P < .001$).

The question raised by both Conti³ in an accompanying editorial and St-Onge and colleagues¹ is whether placement of a posterior intrapericardial drainage tube is as effective as the procedure of posterior pericardiotomy given the theoretic risk of procedural complications with the latter approach being vein graft compression, bleeding from the

Authors have nothing to disclose with regard to commercial support.

additional pericardial incision, and potential for cardiac herniation.

A number of surgeons do routinely place a posterior pericardial tube (usually soft flexible or oval rubber tube) in addition to an anterior mediastinal tube at the same time, avoiding potential risk of pericardiotomy-related complications. Although not reported across the studies included in the current meta-analysis, placement of an additional posterior pericardial chest tube by many is still feared because of reports of ventricular arrhythmias and bypass graft “suck-down.” Furthermore, no consensus exists on the required duration of such drainage^{4,5} and its efficacy in preventing delayed cardiac tamponades.

The primary objective of our study was to compare posterior pericardial drainage with no posterior pericardial drainage. Although we admit that posterior pericardial drainage per definition encompassed both posterior pericardiotomy and an additional chest tube to the posterior pericardium, it was not pertinent to the design of the meta-analysis to compare those 2 techniques within the single intervention arm. The principal reason for this is the lack of RCTs. Indeed, data from 1 study only⁵ could have been included to satisfy such a direct comparison. The study by Kaya and colleagues⁵ included patients undergoing posterior pericardiotomy (group I, $n = 30$), a control group (group II, $n = 33$), and patients without pericardiotomy who received posterior pericardial tubes (group III, $n = 33$). The total mediastinal drainage volume in group I (200 ± 118.7) was lower than in group III (272.7 ± 164.1). On the other hand, pericardiotomy-shunted blood was drained with thoracic tubes (340 ± 165.3 mL vs 304.5 ± 259 mL in group I vs III), but the differences were not statistically significant. Both postoperative hospitalization ($P = .03$) and reoperation due to tamponade ($P = .019$) were significantly higher in group II.

We have partially addressed these concerns in an added subgroup analysis stratified by operative technique. Rather than looking for statistically significant outcome with either technique, which we believe is unjustified given the uneven number of studies and patients across subgroups, we focused on the between subgroup interaction and indirectly demonstrated that there are no statistically significant differences between the subgroup

estimates ($P_{int} = .42$). We acknowledge that with the limited number of patients the stability of the stated results for interaction analysis will remain as long as further RCTs are becoming available to prove surgeons that draining the posterior pericardium with an extra tube is significantly beneficial.

One of the eagerly awaited studies on active pericardial drainage in that perspective^{6,7} was without doubt report by St-Onge and colleagues.⁸ They assessed the impact of active clearance of chest drainage catheters (placed in the anterior mediastinum) on postoperative atrial fibrillation; in the matched cohort, active tube clearance was associated with a reduction of 31% in the rate of postoperative atrial fibrillation ($P = .09$) and a trend toward shorter postoperative length of stay ($P = .08$). The authors found no differences in the incidence of cardiac tamponade and pericardial interventions between investigated subgroups.

We believe that adequate postoperative drainage can be obtained only by posterior pericardial drainage, be that posterior pericardiotomy or posterior tube, along with conventional drainage of the anterior mediastinum.

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