Commentary: Negative pressure wound therapy: Not so negative!

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Near-infrared spectroscopy to assess the parasternal tissue oxygen saturation after coronary artery bypass grafting has not been previously reported. In this elegant study, Jenkins and colleagues evaluated the effect of negative-pressure wound therapy (NPWT) and left internal thoracic artery (LITA) harvesting on tissue oxygen saturation in diabetic patients, and its correlation with sternal wound infections.1

The study confirmed a reduction in the parasternal tissue oxygen saturation on the fifth day that returned to preoperative levels 6 weeks after internal thoracic artery harvesting, in both NPWT and standard dressing groups. The effect of NPWT on tissue perfusion and oxygen levels has been a subject of debate and controversy.2,3 One of the proposed theories is that although the oxygen saturation remains constant, NPWT leads to an increase in blood velocity, with a resultant increase in total available oxygen to the tissues.3

The combined effects of LITA harvest and NPWT has been previously studied in a porcine model. This study reported a reduction of blood flow in the left parasternal region after LITA harvest with a significant improvement in perfusion after application of NPWT. The study proposed that NPWT creates a pressure gradient at the application site compared with the surrounding tissues that results in increased blood flow to the wound.4

NPWT in this study did not show any increase in wound edge oxygenation compared with standard dressings. In this context, it has to be noted that despite the trial being well planned and conducted, there was a considerable decrease in power of the study because of early discharge in some and failure to return for 6-week follow-up in others. This led to an incomplete data set in 30% (24/80) patients, which was far greater than the anticipated 7.5%. Three patients were reexplored and should have been excluded from the study in keeping with the protocol and might have further affected the observations. The study also showed no correlation between wound edge oxygenation and occurrence of sternal wound infections. Rather than being a negative finding, this observation is of considerable importance aligned with the knowledge that etiology of wound infections is multifactorial, with reduced perfusion and tissue hypoxia being one of the determinants. The benefit of NPWT is not limited to improved perfusion alone. In closed sternotomy wounds, NPWT has been hypothesized to exert beneficial effects by extracting exudates, barrier function against bacterial contamination, and by reducing lateral stress on the skin edges after skin closure with sutures or staples.5 Clinical corroboration of beneficial effects of NPWT over conventional surgical dressings has also been obtained in observational as well as randomized settings.5-9 The benefit has been most apparent in obese patients (mean body

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Disclosures: The author reported no conflicts of interest.

The Journal policy requires editors and reviewers to disclose conflicts of interest and to decline handling or reviewing manuscripts for which they may have a conflict of interest. The editors and reviewers of this article have no conflicts of interest.

Received for publication Jan 20, 2022; revisions received Jan 20, 2022; accepted for publication Jan 20, 2022; available ahead of print Jan 31, 2022.

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J Thorac Cardiovasc Surg 2024;167:269-70
0022-5223/$36.00
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https://doi.org/10.1016/j.jtcvs.2022.01.026
mass index of 37) and in patients with multiple risk factors for developing wound complications.

The study provides valuable information on parasternal tissue oxygenation after internal thoracic artery harvest in diabetic patients with or without NPWT. Besides filling an important knowledge gap that existed in this area of cardiac surgery the study also provides a base on which larger studies in the future could be built and the authors must be congratulated for their efforts.

References