

References

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In Reply:—We agree with Davies *et al.* and Stover and Siegel that the clinical efficacy and appropriate application of autologous platelet-rich plasma in cardiac surgery is yet to be defined. We also agree that there are important differences in the techniques of platelet extraction and methodologies presented in the works by ourselves and others. We do, however, emphasize the importance of the introduction of blinding methods to the assessment of this particular blood conservation technique.

We acknowledge the concern about platelet yield and the limitations of the Haemonetics Plasma Saver (Braintree, MA). Yet, to our knowledge, the only two prospective, randomized, and blinded trials published to date have used the Haemonetics procedure in primary and repeat cardiac surgical cases and have shown no reduction in bleeding or transfusion requirements.^{1,2} The variability of transfusion practice in cardiac surgery is well recognized and documented.³ We believe that the blinding technique we introduced has enhanced experimental design in trying to limit the observational bias and subjective nature of transfusion practices.

With regard to the technical comments and calculations by Davies *et al.*, we did, in fact, alter the Haemonetics protocol to extend sampling 40 ml into the red cell layer. Our median platelet yield, as reported in our article, was 2.7 units, with a "unit" defined as 5×10^{10} platelets according to the American Association of Blood Banks standards for platelets from whole blood.⁴ Accordingly, our median yield was 1.5×10^{11} , or 42% of the 3.5×10^{11} mean yield Davies *et al.* reported in their first article⁵ to be efficacious and 50% of the American Association of Blood Banks standards for apheresis platelets. Apheresis platelets are stored for as many as 5 days, and the hypothesis that small amounts of fresh platelets might be as efficacious as twice their number of stored platelets is not unreasonable, based on the work of others.⁶

Techniques that provide higher yields of platelet-rich plasma may result in a more effective product. There may, in fact, be a critical level or volume of platelet-rich plasma that must be reached before a difference in transfusion requirements is demonstrated. However, we are unaware of any blinded trials of high-yield platelet-rich plasma procedures. We believe that the routine use of platelet-rich plasma

in cardiac surgery merits further consideration. Whether it is truly clinically efficacious and cost effective in cardiac surgical procedures is not known.

In summary, as we stated in our Discussion, "We cannot conclude that other groups of patients in other clinical situations may not benefit" from the use of platelet-rich plasma. We acknowledge that high-yield platelet-rich plasma techniques may be effective, but we believe that blinded methods must be used to evaluate further this procedure before it can be declared clinically efficacious for routine use in cardiac surgery. We appreciate the comments by the above groups and look forward to reviewing or conducting a prospective, randomized, and blinded trial of high-yield platelet-rich plasma.

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Pacemaker Interactions with Transcutaneous Cardiac Pacing

To the Editor:—Kemnitz and Peters¹ describe interactions of pacemakers with transcutaneous cardiac pacing. We would like to offer alternative explanations to some of their conclusions.

The first case reported¹ involved a patient with sick sinus syndrome who had a permanent VVI pacemaker. Sinus rhythm prevailed for 20 min after induction of anesthesia, at which point the heart rate decreased progressively below the programmed rate to initiate VVI pacing. As the authors point out, this pacing mode was associated with a decrease in blood pressure due to loss of the atrial contribution to ventricular filling. To improve hemodynamics, the anesthesiologist intended to increase the heart rate using a previously applied transcutaneous pacemaker, but before this could be accomplished he noticed that low currents delivered by the transcutaneous pacemaker inhibited the permanent pacemaker and restored sinus rhythm with improved hemodynamics.

We question the very decision to use the transcutaneous cardiac pacemaker because it is a temporary VVI pacemaker and would offer no advantage to this patient with congestive heart failure, who was dependent on atrioventricular synchrony and the atrial contribution. Fortunately, incremental increases in the current were therapeutic to restore sinus rhythm by inadvertently inhibiting the permanent pacemaker. As discussed by the authors, other measures to inhibit permanent pacemakers include applied stimuli *via* a cutaneously applied nerve stimulator or perhaps by another temporary pacemaker; careful titration of isoproterenol; and overdrive transesophageal atrial pacing. In addition, temporary transvenous atrial pacing may be used in the acute setting while the option of a permanent dual chamber pacemaker is considered with the patient's cardiologist.

The second patient described by Kemnitz and Peters¹ was pacemaker-dependent after cardiac surgery. Pacing was achieved by a temporary VVI pacemaker at a rate of 90 beats/min. To test the feasibility of transcutaneous cardiac pacing, the noninvasive pacemaker was set at 95 beats/min with the threshold current progressively increased to 40 mA. The authors state that this maneuver failed to produce ventricular pacing and inhibited the temporary pacing, resulting in temporary asystole.

Here again, intentional delivery of external current transcutane-

ously should not be interpreted as an interference but as an expected interaction with the temporary VVI pacemaker. The failure for pacing capture with the transcutaneous pacemaker may be due to the relatively low current output used, as acknowledged by the authors, especially in a patient recovering from cardiac surgery, because of the presence of air or fluid in the chest, which may mitigate pacing

Table 1. Rate Settings of the Noninvasive Transcutaneous Pacemaker

Pacing Rate Desired (pulses/min)	Actual Heart Rate (beats/min)
60	55
70	63
80	71
90	78
100	86
110	93
120	100
130	107
140	114
150	120
160	126

Comparison of actual paced heart rate and displayed pacing rate. This assumes that every paced beat is sensed.

$$\text{Actual heart rate} = \frac{60,000 \text{ (ms)}}{\text{pacing rate (ms)} + 100 \text{ ms}}$$

$$\text{Example: desired pacing rate} = 60 \text{ (pulses/min)}$$

$$\text{Actual rate} = \frac{60,000 \text{ ms}}{1000 \text{ ms} + 100 \text{ ms}} = 55 \text{ beats/min}$$

Data provided as a technical communication by Zoll Medical Company (Woburn, MA).