CORRESPONDENCE

To the Editor,

I read with great interest the article by Mr. David Schill entitled "Optimum Preservation of the Patient's Hematocrit During Cardiopulmonary Bypass" (JECT Vol. 22 No. 4, 1990, pp 157-159). In this evolving era of blood shortages and the abundantly publicized risks associated with its use, such efforts as Mr. Schill's are certainly to be applauded.

However, in efforts at my institution to employ a similar, but more limited, technique, I have not met with the same gratifying results. I have experimented with removal of the prime volume of only the venous reservoir and the venous line (approx. 500 ml of a 2000 ml total circuit priming volume) in the manner described in the article. While this did initially result in a modest preservation of the hematocrit, I consistently experienced low venous reservoir volumes and difficulty with maintaining a safe operational reservoir level. This situation was compounded by other causes for low venous return such as cardiac manipulation. This often required the addition of crystalloid and/or colloid to maintain the level, thereby negating my efforts. In addition, a large volume of crystalloid was required at the end of the cases in order to achieve adequate cardiac filling pressures upon termination of bypass. This would seem to be an unavoidable occurrence when using the patient's blood volume to fill both the patient and the extended volume of the extracorporeal circuit.

In his article, Mr. Schill did not describe his adequacy of venous return volume and what, if any, measures were required to avoid this problem. Nor did he comment on what reservoir levels he was able to maintain, though it was noted that good flows were attained. It would be appreciated if Mr. Schill would comment on these issues and/or elaborate on his description of his technique to better clarify how this situation can be safely avoided.

Eric G. Whitehead, RN, CCP
Director/Chief Perfusionist
DCH Regional Medical Center
Tuscaloosa, Alabama

Mr. Eric G. Whitehead,

This is in response to the questions you raised concerning the technique set forth in my article entitled "Optimum Preservation of the patient's Hematocrit During Cardiopulmonary Bypass" (JECT Vol. 22 No. 4, 1990, pp 157-159). Dealing with an adequate venous reservoir level is the main limiting factor of this technique. It should be noted right off that each perfusionist has a different standard when it comes to this "adequate level." The group I am associated with uses a "minimal" level in our oxygenator set forth by the manufacturer. Again, this is the lowest level of venous volume we will conduct our perfusion practices at. (Our levels range from the previously mentioned value to up to about 1 to 2 liters depending on the particular case.) Another factor which is directly related to a venous blood level is the size of the patient involved. The larger the patient, the more circulatory blood volume will be present. (Estimated Blood Volume = 80 ml/kg x Wt. (kg).) With this in mind, larger patients usually work well with this technique.

Smaller patients present a slightly larger challenge. The perfusionist has a choice at this point. He may keep the same extracorporeal circuit design and run "lower" levels of venous reservoir blood, or design a circuit more compatible to smaller patients. The group I am with has opted for the latter technique. We feel that a 45 kg patient does not need the same circuit configuration as a 120 kg patient. (Oxygenator size and/or tubing size.) As a suggestion, tubing size can easily be determined by using some basic fluid dynamic properties. One such property is using techniques to determine turbulent flow patterns present in your circuit. This can be done by determining the "Reynolds Number" value which is a relationship dealing with velocity, diameter, viscosity and density. As we know, a value under 2,000 will negate the problem of turbulent flow in your circuit. This is an example of only one way to set up a perfusion circuit.

Your letter also brought up the problem of low operating levels of reservoir volume due to cardiac manipulation. As a perfusionist there is little we can do about this except to diligently vent the heart. (If the blood is not directed down the venous lines, then it is entering the heart chambers.) Here is where a good communication network is needed between the perfusionist and the surgical team.

The last point brought up in your letter deals with termination of bypass. With the technique set forth by my article, the situation of not having enough volume to fill a patient and discontinue bypass may occur. The way our surgical team has dealt with this is to wean the patient down to about 30 ml/kg/min blood flow, and then pull the superior vena cava line, drain and return the volume back to the patient. This extra volume should allow further

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CORRECTION

Correction to Page, Perioperative Autotransfusion and its Correlation to Hemostasis and Coagulopathies, (Volume 23, Number 1, p. 19)

Coagulation tests to be evaluated should read:

PTT- The PTT or Partial Thromboplastin Time is prolonged in patients with deficiencies in clotting factors in the intrinsic or common pathway. Normal values range from **32-38 seconds**.

PT- The PT or Prothrombin Time tests factors involved in the extrinsic or common pathway. Normal values range from **13.3 - 15.2 seconds**.

weaning and termination of bypass.

I hope this reply answers all of your questions. Again, it is not always necessary to change the configuration of your tubing circuit or your oxygenator, but this may begin to help in your specific setting. This technique is used routinely in our surgical practice. To date, we have used the procedure on over 3,000 patients.

Thank you,
David M. Schill, CCP, MS
Cardiovascular Surgery Associates
Milwaukee, Wis.

Dear Editor,

In the lecture article "Perioperative Autotransfusion and its Correlation to Hemostasis and Coagulopathies" by Paul Page (JECT Vol. 23, No. 1, pp 14-21) there is a mistake in the normal values range for the PTT and PT tests. On page 19, under Coagulation Tests to be Evaluated, the normal range for the PTT is given as 13.3-15.2 seconds, and the normal range for the PT is given as 32-38 seconds. I believe the normal value ranges should be reversed to be correct.

Mr. Page's article was otherwise well-written and informative. I especially look forward to the lecture articles in JECT.

Yours Sincerely,
Rick Beecher, BS, CCP
Mercy Health Center
Dubuque, Iowa

Dear Mr. Beecher,

You are quite right that the normal value ranges for the PTT and PT were reversed. Thank you for taking the time to point this out. The author and editors apologize for this oversight. A correction is included in this issue.

Sincerely,
Phyllis Palmer, CCP, Editor