Discussion

Dr. C. Melvin Bernhard (Louisville, Kentucky): During my residency, almost fifty years ago, at the Louisville City Hospital, as it was called at that time—a teaching hospital of the University of Louisville—we were practicing and giving intraoperative auto transfusions.

Dr. Griswold, a member of this organization for many years, popularized and devised this method of transfusion. We would simply aspirate the blood from the abdominal cavity and pelvis, pass it through a filter, which consisted of several layers of cheesecloth, into a bottle containing sodium citrate, and give it immediately back to the patient.

This source of blood was, of course, a godsend to us, because we had no blood banks as we know them today.

Louisville City Hospital did have a small blood bank, and when we needed blood we would call the fire department, and they would send over volunteers. This was how we kept the blood bank going.

In 1932, I witnessed Dr. Irvin Abell, Sr., a past President, and Dr. Joe Henry, a member of this organization, giving blood by direct transfusion under sterile technique in the operating room. This was a major procedure and time consuming. As skillful as Dr. Abell was in his operating, it was unfortunate that his time was spent in this way. On many occasions, we gave blood in this manner.

At this time, rumble seats were very popular in Kentucky and in our community. The frame of the rumble seat was just about the level of the spleen. With a strong impact the individual would be thrown against this front frame. Needless to say, we had a number of splenic ruptures. We used this blood mainly for ruptured spleens and ruptured ectopic pregnancies. I can truthfully say that we had no severe reactions from the use of this blood. We did have a few febrile reactions, which we thought were due to contaminants or pyrogens.

Dr. Isidore Cohn, Jr. (New Orleans, Louisiana): Our experience with the Cell Saver is nowhere near as extensive as that reported by Dr. Gray and his colleagues, nor is it as well studied, but we have had an interesting experience that I thought you might enjoy hearing about.

In 33 cases that we monitored (Boudreaux, Bornside, and Cohn, J Trauma, January 1983) over a brief period of time, we were able to demonstrate that we saved over 80 L of blood that we were able to give back to the patients, and thus reduced the drain on the blood bank by that amount. Eight of these cases were patients subjected to some kind of trauma, and these patients used 31½ L of blood. In going back over the record, we noticed that three of these patients had perforations of either the small or the large bowel or both, and none of these patients had any ill effects as a result of this kind of transfusion.

This stimulated us to take the problem to the laboratory and see exactly what was happening, since, clearly, we were infusing contaminated blood into these patients. We used one of the Cell Saver instruments in the laboratory, using discarded blood bank blood and contaminating it with a given number of bacteria, to see how many of the organisms could be recovered after the washing operation was completed.

We were able to demonstrate by studying various segments of the procedure that we could remove up to 95% of the bacteria that were originally injected into the blood, but even washing with an additional 10 L of saline did not get rid of any additional quantity of bacteria. The bacteria seemd to be fixed on the red cells, though we do not know anything about the mechanism of this fixation.

I think what this demonstrates is that this kind of transfusion does carry some risk. The exact amount of risk is not clear, but I think it means that in a patient who is desperately in need of blood, and for whom no other source is available, this at least might be one mechanism for preserving that patient's life until we can find out a little bit more about what is going on. Possibly these patients can be protected with antibiotics, but we do not even know that that is essential at this time.

Dr. William A. Gay, Jr. (New York, New York): We have utilized a slightly different approach at The New York Hospital, in that in cardiac surgery we developed a policy that if the contents of the pump oxygenator totaled less than 1000 ml at the end of the pump run, we would merely transfer these contents into a transfusion pack and use them directly. They are always, however, administered through a standard blood filter, to filter out any particulate matter. If the contents of the oxygenator were greater than 1000 ml, we would send them to the blood bank to be concentrated, much in the way that Dr. Gray has shown this morning. This has obviated the need for us to purchase the Cell Saver mechanism for use in the operating room.

Since 500 of the 700 cases that Dr. Gray discussed were cardiac, and since you have a built-in reservoir right there, this blood is not really wasted. It is utilizable, and, as such, could be readily transferred to a pack. This method, of course, would not help in the situation of aortic surgery, where one has to transfuse the blood directly from the operative field, so that there is a definite indication for both a retrieval and separator system.

Dr. Shires mentioned that in the 1980s, we are in the age of cost containment, and I think that utilizing every drop of shed blood that we can is indicated. Our experience has been similar to that of the authors, in that we have cut our blood utilization in routine cardiac cases down from a prior level of 3 to 4 units per hospital stay to somewhere between 1 and 2 units per patient per hospital stay.

I would like to ask the authors if they have utilized, in addition to the Cell Saver device described, any mechanism for retrieval of shed blood and reinfusion of this in their trauma patients or in patients having chest tube drainage.

Dr. Laman A. Gray, Jr. (Closing discussion): We have considered the use of the Cell Saver for the postoperative blood loss, but have not felt that that was cost efficient, because our normal blood loss in the chest tubes following surgery is well less than 500 cc, and we did not feel we could justify spinning the blood down and regiving it at that point.

There have been some people that have used postoperative chest tube blood without spinning it down and without washing it—just directly infusing it—and that is a different technique from what I am discussing. It is an alternative.

The cost part of the blood may be interesting to people. Different cities have different costs of blood. In Louisville, our blood is free, and it costs approximately $75 per unit to type and cross it and to match it to the hospital; so if we are saving two units of blood per patient—actually, we are running at a little more than that—the cost of the Cell Saver is around $300 in one institution, and, actually, less than that in one of the other institutions in which we are using it, so it starts to become economically feasible when you get over 1000 cc to use it.

In addition, for cardiac surgery, of which I did not go into too much detail, we do not use cardiotomy suction for the routine coronaries, because the blood loss from the routine coronary at the time of surgery is really very small. It is well less than 500 cc during the actual surgery.

We have used the Cell Saver some in trauma. The hospitals in which we are using this are not major trauma hospitals at this time. We have had a very extensive experience with the use of the auto transfuser in the past; this has been a disaster in trauma cases, and I stress to everybody the difference between the auto transfuser and the Cell Saver. In the Cell Saver, you give back washed red cells—packed cells. In the auto transfuser, which is virtually just a macropore filter—the filter that was put on first—the blood just goes to a filter and is reinfused right directly into the patient. We have had very major coagulation problems and primary coronary problems, with debris in the lung and pulmonary complications from that.

We have had the Cell Saver used in about two patients who have had G.I. problems with small bowel perforations, and we, fortunately, have not had any problems with that. I share the concern about it, about the possible infection when we are dealing with infected fields. I do not have any other answer.