to urinary dysfunction on univariate analysis; the latter association was confirmed with multivariate analysis. Twenty-four women (7.1%) reported postpartum de novo anal incontinence at 6 months (mostly passive), with 23 (6.8%) still having problems at 12 months. At 6 and 12 months postpartum, 302 (89.9%) and 330 (98.2%) respondents had restarted sexual activity, respectively. Of these, 72 of 302 (23.8%) had reported painful intercourse at 6 months and 26 of 330 (7.9%) at 12 months. At 6 months, decreased libido and anorgasmia were reported by 17.2% and 12.6%, respectively. At 12 months, these results continued with decreased libido affecting 16.3% and anorgasmia affecting 13%. None of the specific obstetric risk factors investigated were found to be significantly associated with anal incontinence or a worsened sex life at final follow-up.

These results suggest a high incidence of pelvic floor disorders after vaginal delivery, especially urinary incontinence, which does not spontaneously resolve by 12 months for most women. The authors recommended that urinary incontinence at 6 months should indicate prompt and effective therapeutic intervention programs to prevent long-term symptoms. They also noted that the strong association between urinary disorders and a prolonged second stage of labor should call for more aggressive obstetric management of labor.

Contamination of Salvaged Maternal Blood by Amniotic Fluid and Fetal Red Cells During Elective Cesarean Section
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(Br J Anaesth, 101:225–229, 2008)

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Use of red blood cell (RBC) salvage has not been fully embraced in obstetric practice because of concerns that the salvaged maternal blood may be contaminated with amniotic fluid (AF) and fetal RBCs. A washing process to remove contaminants has been investigated and newer studies, which have included the use of leukodepletion filters in obstetrics, have shown encouraging results. Some have opined that 2 suction devices—one to aspirate as much AF as possible before any lost blood is collected by the other—may achieve superior results. The authors conducted this exploratory study to measure AF, heparin, and fetal RBC contamination of washed, filtered, salvaged maternal blood during elective cesarean section and to investigate the efficiency of using 1 versus 2 suction devices, when filtering the washed product through a leukodepletion filter.

Thirty-four women undergoing elective lower-segment cesarean section under spinal anesthesia were recruited over a 4-month period and randomized to either group 1 (n = 17), involving 1 suction where all AF and blood was collected into the cell salvage machine, or group 2 (n = 17), where a second suction was first used to collect AF to waste before any lost blood was collected. During the surgical procedure, lost blood was salvaged into a Dideco Electa Autotransfusion Cell Separator and mixed with heparin 30,000 IU/L. Suction was set at 100 to 150 mm Hg, with wash volumes of 900 mL on a continuing wash at 100 mL/min, and washed blood was emptied into 55 mL Latham bowls. Blood from swabs used was also reconstituted and processed. Washed blood was gravity-run through a Pall RS1 VAE leukodepletion filter into another reinfusion bag. Prewash, postwash, and postfiltration samples from both groups were tested for AF contamination and heparin levels and postfiltration samples were also tested for fetal RBCs.

Both groups had similar demographics and there were no surgical problems in any case. Four cases did not lose enough blood for postfiltration samples (1 from group 1 and 3 from group 2) and 3 further cases yielded partially filled bowls, which provided erroneous postfiltration results. All 7 were excluded from analysis. The collected blood volumes were 1782 mL in group 1 and 1497 mL in group 2, and the RBC volumes were 168 and 135 mL, respectively, not statistically different. In both groups, α-fetoprotein (AFP) was reduced an average of 98.7%, squamous cells were significantly reduced (P < 0.001) and removed in all but 2 cases (in group 1), and heparin was completely removed by the washing and filtering process. Mean AFP levels postfiltration were 2.58 IU/mL in group 1 and 3.53 IU/mL in group 2. Fetal RBCs were still present in the final product (range: 0.13% to 4.33%). Group 1 had higher hemoglobin and hematocrit concentrations, with lower white blood cell, AFP, and fetal RBC counts compared with group 2.

The study displayed the efficiency of the washing process when combined with a leukodepletion filter. The authors concluded that use of a 1-suction device technique may be sufficient in the obstetric setting, and that washed filtered blood from partially filled bowls should not be retransfused.

COMMENT

This is another study validating the effectiveness of blood salvage equipment in the removal of amniotic fluid contaminants in a salvaged blood product. From the results of this study, the authors conclude that blood salvage should be used more broadly and should not be only reserved for life-threatening hemorrhage. Within my institution, we have performed exactly what the authors recommend. We have performed over 100 obstetrical cases without incident. Although this does not “prove” the safety of blood salvage in obstetrics, the lack of data indicating otherwise is compelling when compared with the litany of problems associated with allogeneic transfusion. The 1 point in this article with which I might take exception is the conclusion that the double suction setup is unnecessary. Although this might be true on the basis of their data, I would contend that their data are incomplete. First, their study only evaluated 2 measures of amniotic fluid contamination—AFP and squamous cells. In addition, the concentration of these 2 measures was not large. The importance of the double suction setup resides in contamination that is massive in nature. For instance, a 99% reduction in bacterial contamination will take place with the combination of blood washing and filtration. Although a 99% reduction sounds close to perfect,
it needs to be understood within the context of the starting concentration of contamination. If there are 10 bacteria in the salvaged blood, a 99% reduction leaves 1 bacterium. However, if the contamination is $10^5$, then a 99% reduction means that you have 10,000 bacteria. This illustrates the point of the double suction setup that is to minimize contamination so that what is presented to the blood salvage system is manageable and leaves clinically insignificant contamination at the end of processing. As we do not understand the mechanism or cause of amniotic fluid contamination, I believe that it is still prudent to minimize the contamination of the blood that is ultimately readministered to the patient.

Comment by Jonathan H. Waters, MD

Use of the HemoCue Near Patient Testing Device to Measure the Concentration of Hemoglobin in Suction Fluid at Elective Cesarean Section

A. Gupta, I.J. Wrench, M.J. Feast, and J.D. Alderson

(Anaesthesia, 63:531–534, 2008)

Managing hemorrhage during cesarean deliveries is complicated by the difficulty in measuring blood loss. Blood loss estimation is made less accurate by blood dilution with amniotic fluid and loss from the surgical field. The HemoCue B-hemoglobin photometer can be used to measure the concentration of hemoglobin in whole blood and blood containing fluids. This study investigated the suitability of the device to measure the concentration of hemoglobin in suction fluid obtained from 30 women undergoing elective cesarean section (CS).

At arrival for surgery, 1 mL blood was taken during IV cannula insertion from 30 women scheduled for elective repeat CS and the hemoglobin concentration was measured using the HemoCue device. Anesthesia was either spinal or general. During surgery, blood and amniotic fluid were collected in surgical suction bottles. At the end of surgery, the total volume in the suction devices was measured. A sample of 10 to 15 mL of the solution was filtered through a blood-giving set and then 3 mL of this was used to estimate hemoglobin concentration by standard laboratory methods. The rest was tested in the HemoCue photometer. Bland-Altman analysis was used to compare the HemoCue estimation of hemoglobin concentration to the laboratory result. Blood loss was calculated from the volume of the fluid in the suction bottle and the hemoglobin concentrations.

All 30 patients completed the study; 29 had spinal anesthesia and 1 general anesthesia. Indications for cesarean delivery were previous cesarean, breech presentation, twins, and other. The bias and limits of agreement by Bland-Altman analysis were −0.013 and −0.39 to 0.36 mg/dL, respectively. No significant bias was found between the laboratory and HemoCue analyses. The mean preoperative hemoglobin value before induction was 12.7 g/dL. The calculated blood volume lost in the suction bottle was 441 mL. Total estimated blood loss was 758 mL by calculated analyses on the basis of laboratory and HemoCue measurements. Total blood loss calculated using these data was consistently higher than the clinical estimated loss of 506 mL.

Clinical assessment often can underestimate the amount of blood loss in these women. The accuracy of calculation of blood loss during elective CS can be improved with the HemoCue photometer to measure blood content in the suction fluid.

Comment

This study proposes to use the HemoCue B-hemoglobin photometer in estimation of blood loss after a CS. The investigators measured the hemoglobin concentration and volume of the suction canister fluid so that they could estimate the red cell mass lost into this waste collection system. They then measured the starting hemoglobin with their HemoCue so that they could then convert their red cell mass into an estimate of whole blood lost during the procedure. They then weighed their laparotomy sponges for an estimate of blood loss on the sponges. They added the weighed sponge blood loss to their waste blood loss to arrive at a “more accurate” estimated blood loss. Although this is nice, it seems rather convoluted. We estimate the blood loss to determine whether a patient is at risk for severe anemia. If we think that there has been excessive blood loss, we then proceed to measure a patient’s hemoglobin. If one has a HemoCue available, it seems to me that a more direct, logical approach simply would be to measure the patient’s hemoglobin.

Comment by Jonathan H. Waters, MD

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