

LEGAL



BRIEFS

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Dr Sims has disclosed that she has been compensated for reviewing records and providing testimony in some of the cases highlighted in *Legal Briefs*. This commentary does not contain a discussion of an unapproved/investigative use of a commercial product/device.

Retroperitoneal Hemorrhage

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Only Palpable Blood Pressure and Delayed Capillary Refill in a Pregnant Woman

A 2,385-g 35–6/7-weeks' gestation male was delivered to a 26-year-old woman whose pregnancy was unremarkable until 2 days before delivery. She was walking up the staircase in her mother's home during a family celebration where she briefly lost her footing, stumbled, and twisted her body, although she braced herself without falling. Two days later, she experienced vomiting, cough, shortness of breath, and severe left flank as well as chest and abdominal pain. The paramedics were summoned to her home, where they found her blood pressure (BP) to be only palpable and her capillary refill delayed. She had a heart rate (HR) of 74 beats/min, a respiratory rate (RR) of 16 breaths/min, and a pulse oximetry reading of 100%. She was conscious but weak. They inserted an intravenous line and began infusion of 1,000 mL of normal saline, leaving the stopcock wide open on the way to the emergency department (ED).

The woman arrived at the ED 20 minutes later, at 0000. Her BP was 96/70 mm Hg, HR was 70 beats/min, RR was 70 breaths/min, and temperature was 35.6°C. She was conscious but drowsy and having difficulty breathing. On physical examination, she was pale and had tenderness on her left side. She was transmitting her history through her husband because she was so weak and only he could understand what she was saying. The ED physician's differential diagnoses were pulmonary embolism and pneumonia. Blood was drawn for a complete blood count (CBC), blood chemistries, acti-

vated partial thromboplastin time (APTT), prothrombin time (PT), and d-dimers. *The treating physicians and defense experts pointed out that the woman was totally stable when she arrived at the ED and showed no signs of hypotension or bleeding on arrival. The plaintiff experts pointed out that her BP was not obtainable by the paramedics before the fluids started. Therefore, the normal BP on arrival should not have been reassuring.*

At 0040, the woman and her blood samples were transferred to labor and delivery (L&D). The blood that was drawn in the ED was eventually sent to the laboratory from the L&D, but it was not analyzed because no order was entered into the computer. *During depositions, the ED physician said they probably gave a verbal order because no order was written. The nurses did not enter an order into the computer. The laboratory director acknowledged a memo stating that the blood was not analyzed because the laboratory did not receive an order via the computer.* In the L&D, the woman had a BP of 94/67 mm Hg, HR of 96 beats/min, RR of 18 breaths/min, and temperature of 36.1°C. At 0132, an external monitor was placed. The fetal heart rate (FHR) was 140 beats/min, and *the strips were read as normal by the treating obstetrician as well as the plaintiff and defense experts.*

The obstetrician thought that the mother had pyelonephritis or deep vein thromboses and ordered Doppler examination of extremities, urinalysis, and renal ultrasonography. At 0233, the BP was 109/70 mm Hg and the HR was 95 beats/min. The RR and temperature were not evaluated. Between 0250 and 0354, the fetal monitor was removed while the obstetrician

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performed bedside ultrasonography. During the imaging, the obstetrician noted that the FHR was intermittently decreased. The ultrasonography equipment could not count and record the FHR, but the obstetrician said she intermittently counted, and it was 120 to 130 beats/min. The monitor was off for 1 hour, although the time for ultrasonography was approximately 20 minutes. *The plaintiff experts in obstetrics and neonatology said that the fetus would have been born intact if delivered at this point.* At 0354, the external fetal monitor was reapplied, and the FHR baseline had shifted to a lower level than recorded earlier. It had been 140 to 150 beats/min but now was 120 to 130 beats/min, with late decelerations down to 70 beats/min. *The plaintiff experts stated that the fetus would probably have lived but probably would have had some neurodevelopmental issues if delivered at this point.*

Between 0400 and 0420, specimens for a CBC, APTT, PT, rapid plasma reagin, and antibody screening for rubella were obtained and sent to the laboratory. At 0423, the external monitor was removed again while official ultrasonography was performed, and the external monitor was reapplied at 0457. The FHR was 60 beats/min, with a slow return to 90 beats/min. The obstetrician called for an emergency cesarean section.

When the woman was taken to the operating room, the anesthesiologist noted that she was extremely diaphoretic. She had a systolic BP of less than 60 mm Hg, an HR of 180 beats/min, and a temperature of 32.9°F. The only previous temperatures were on admission to the ED (35.6°C) and at 0132 admission to L&D triage (36.1°C). Dark red blood with clots was found in the intraperitoneal and retroperitoneal spaces. The obstetrician estimated that 1,000 mL of blood was in the peritoneum and

1,500 mL was in the retroperitoneal space. A pale, lifeless, perfectly developed infant was delivered. Despite full resuscitation, the infant never developed a heartbeat. A general surgeon was paged stat and arrived in 30 minutes. The surgeon could find no source of the bleeding and elected not to explore the retroperitoneal space because of the potential for unleashing the tamponade and creating more bleeding. *Both the plaintiff and defense experts agreed on that approach.* The woman received 4,000 mL of lactated Ringer solution and 1,000 mL of normal saline in the operating room.

The woman was in coma after the surgery. At 0745, she received her first transfusion. At 0800, her temperature was 33.0°C. At 0849, she was cross-matched for blood. The first blood studies that the laboratory evaluated were performed on specimens from around 0400, and results were available at 0940. The following results were found: hemoglobin of 10.1 g/dL (101 g/L), APTT of 30.3 sec, and PT of 12.4 sec. The toxicology screen was negative. The electrolytes and the white blood cell count results were unremarkable. At 0525, 10 units of fresh frozen plasma were ordered. At 1200, her temperature was still 33.0°C, HR was 121 beats/min, and BP was 149/127 mm Hg. Eventually, the treating physician ordered a warming blanket for the patient. Over the next several hours, more blood was sent for hemoglobin and coagulation studies. The hemoglobin value drifted down, and the coagulation studies became very abnormal. The patient remained comatose and in shock. A huge amount of blood products, bicarbonate, steroids, and albumin were administered. At 1700, the patient arrested and despite resuscitation efforts, she died.

The postmortem examination of the mother showed 1,500 g of clotted blood in the retroperitoneal space. The cause of the hemorrhage

was assigned to the fall. An ecchymotic area lateral to the ribs was noted. The infant was stillborn without any remarkable findings. The cause of death was assigned to asphyxia due to the mother's retroperitoneal hemorrhage.

Nineteen depositions of individuals involved with the care of the mother were taken. These individuals included the paramedics, physicians, nurses, laboratory staff, and a risk management nurse. The hospital was sued because of failure of the: 1) *ED nurses to enter orders for the blood that was drawn initially and, therefore, not analyzed;* 2) *L&D and critical care nurses for not appropriately monitoring the patient's vital signs; and* 3) *L&D and critical care nurses for not keeping the patient warm. The obstetrician was sued for lack of timely delivery of the fetus in the face of deterioration of the FHR tracings. The intensivist, surgeon, obstetrician, and several consulting physicians were sued for:* 1) *their management, including failure to monitor the woman's vital signs and BP appropriately;* 2) *not keeping the patient warm;* 3) *not ordering timely blood studies and following them serially; and* 4) *not appropriately managing a coagulopathic state. The plaintiff internist was critical of the treating physicians for not being proactive with blood product replacements in the face of administration of huge amounts of fluids. He pointed out that it was predictable that a coagulopathic state would develop following that much dilution of the clotting factors. He further pointed out that the clotting mechanism is dependent on a reasonably normal body temperature. He stressed that the clotting factors could not function in the hypothermic state that this patient was allowed to develop and remain in for many hours.*

The defense deposed 10 relatives and friends of the woman who had attended the party when she stumbled on the stairs. The defense focused questions on domestic abuse. Nothing emerged from this line of questioning. The defense retained nine experts in multiple fields (emergency medicine, obstetrics, pulmonology, hematology, a “blood transfusion specialist,” and a labor and delivery nurse). The defense experts and treaters emphasized that the family did not give the complete history by excluding the stumble. They further maintained that a large blunt force had to be the basis for the hemorrhage and suggested a situation of domestic violence, despite no evidence to support this. Plaintiff experts pointed out that connective tissue is more relaxed during pregnancy and perhaps a minor stumble could result in more devastation in the pregnant state. Despite repetitive questioning, the relatives and friends said they never saw or remotely entertained any thoughts of any violence in the relationship between the deceased and her husband. The plaintiff retained an obstetrician, a neonatologist, a critical care specialist, and a labor and delivery nurse. The plaintiff experts pointed out that there were neither physical external signs of violence nor evidence by history or behavior.

The defense experts said that hypothermia and hypotension are used as beneficial interventions to reduce the chances of brain injury. The plaintiff expert pointed out that this is a useful technique when the patient is hemodynamically stable and under a very controlled situation with a protocol. It was ludicrous to invoke

that as an intervention in a patient who was poorly monitored and managed and who developed shock and a bleeding diathesis during care. The defense said that she did not have a bleeding disorder because the laboratory values did not support it. The plaintiff experts pointed out that the blood in the peritoneal space at the time of the cesarean section probably reflected fluids seeping into that space from the retroperitoneal area. Results of the coagulation studies that were obtained after surgery were very abnormal but did not return until after the woman died.

The trial was started and a jury was chosen, but before opening statements were made to the jury, the defense made a settlement offer that was accepted.

Discussion

Retroperitoneal hemorrhage is rare and generally associated with: 1) blunt trauma, with an organ bleeding into the retroperitoneal space or vessels bleeding from injury from a pelvic fracture; 2) penetrating trauma such as a bullet or sharp object; 3) anticoagulant therapy or hemorrhagic disease such as hemophilia or leukemia; 4) hemorrhage into a renal or retroperitoneal neoplasm; 5) rupture of an abdominal aortic aneurysm; 6) pancreatitis; or 7) iatrogenic causes following a groin puncture for arteriography or cardiac catheterization in which the bleeding may spread into a retroperitoneal compartment.

Although the history for this patient was not suggestive of hemorrhage because of the lack of vaginal bleeding, no evidence of an abruption on fetal ultrasonography, absence of

serious trauma, and lack of anticoagulant therapy, critical thinking “outside the box” must occur when BP is merely palpable but returns after fluid administration. Furthermore, had clinicians obtained vital signs, BP, and serial hemoglobin measurements and paid attention to the clinical status of this patient, they would have detected the clinical deterioration before she developed overt shock at the time of the cesarean section. If the FHR strips had been interpreted appropriately, a cesarean section could have been performed hours earlier, which would not only have saved the baby but pointed to the retroperitoneal hemorrhage. All three of the initial differential diagnoses—pulmonary embolism, pneumonia, and pyelonephritis—could have been ruled out very quickly. If that had been done, the patient had been better monitored, and the clinicians exercised critical thinking outside of the typical box, both lives could have been saved.

American Board of Pediatrics Neonatal-Perinatal Medicine Content Specification

- Know how to diagnose and manage maternal/fetal blood loss such as placenta previa, placenta abruption, and vasa previa.



Suggested Reading

Paus WJ. Retroperitoneal hemorrhage presenting as a ruptured ectopic pregnancy. *Ann Emerg Med.* 1987;16:1398–1400

Sherer DM, Dayal AK, Schwartz BM, et al. Extensive spontaneous retroperitoneal hemorrhage: an unusual complication of heparin anticoagulation during pregnancy. *J Matern Fetal Med.* 1999;8:196–199

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