
Complications caused by extramembranous placement of intrauterine pressure catheters

Brent K. Lind, MD
American Fork, Utah

A case report is described in which the inadvertent placement of a standard intrauterine pressure catheter in a laboring woman caused partial abruptio placentae and disseminated intravascular coagulation. Altering catheter placement technique and giving attention to aspects of placement can help avoid mishaps, and awareness of possible complications can lead to earlier diagnosis with increased appropriate intervention. (Am J Obstet Gynecol 1999;180:1034-5.)

Key words: Extramembranous, extraovular placement, intrauterine pressure catheter (IUPC), intrauterine pressure

The case reported here illustrates a serious complication of intrauterine pressure catheter placement, that of abruptio placentae and disseminated intravascular coagulation. It also has important implications for safe intrauterine pressure catheter placement.

Case report

A 24-year-old, white, primigravid woman had an uncomplicated antepartum course and was seen 4 hours after spontaneous amniotomy. The cervix was dilated to 3-4 cm, and effective epidural anesthesia was in place 60 minutes later. Vital signs remained stable; 2 hours later the cervix was dilated to 5 cm. A scalp lead and fluid-filled intrauterine pressure catheter (model 705-000; Quest Medical, Inc, Allen, Texas) were placed. Four minutes later the fetal heart tones dropped below the previous reactive baseline tracing of 125/min-135/min to <120/min. Seven and then 8 minutes after catheter placement, the fetal heart tones were <90/min and <65/min, respectively. Fetal bradycardia persisted as the patient was transferred to an operating suite and preparations were made for emergency cesarean section. After an obstetric consult

was called, the intrauterine pressure catheter was removed and was found to have 6 in of blood clot in its lumen tip. Preparations for operative delivery were in progress, and fetal bradycardia persisted. Repeat abdominal and vaginal examination found no hypertonus or pro-lapsed umbilical cord. Fetal heart tones began to recover and were >120/min 19 minutes from catheter placement but then again dropped below 90/min. A hypertonic uterus was found. A 3400-g male neonate was delivered with Apgar scores of 8 and 9 at 1 and 5 minutes, respectively. A small marginal abruptio placentae was discovered on inspection of the placenta. Cord blood pH values were 7.11 and 7.07, respectively, for venous and arterial samples. In the recovery room profuse bleeding from the wound resulted in return to the operating room, where diffuse bleeding of the abdominal incision was found. Abnormal coagulation parameters returned as the procedure ended. Four units of packed red blood cells, 6 U of fresh-frozen plasma, and 2 U of platelets were used to reverse the coagulopathy involving red blood cell, platelet, fibrinogen, D-dimer, and prothrombin time abnormalities. These were reversed in <24 hours after the abruptio placentae. Mother and neonate were discharged home on the fourth postoperative day.

Comment

Timely diagnosis allowed earlier surgical and medical intervention, thus decreasing the maternal and fetal morbidity. The onset of fetal heart rate abnormalities with placement of the intrauterine pressure catheter was alarming and resulted in relocating the patient to the op-

From the Department of Obstetrics and Gynecology, American Fork Hospital.

Received for publication March 2, 1998; revised August 23, 1998; accepted September 14, 1998.

Reprint requests: Brent K Lind, MD, American Fork Hospital, Department of Obstetrics and Gynecology, 170 North 1100 East, A American Fork, UT 84003.

*Copyright © 1999 by Mosby, Inc.
0002-9378/99 \$8.00 + 0 6/1/94473*

erating suite and drawing a sample for a complete blood count and a "clot tube to hold." That blood was later used to cross-match blood for transfusion. When the intrauterine pressure catheter was removed from the vagina, 6 in of clotted blood was noted in the catheter tip. This suggested an extramembranous (outside the membranes) catheter placement into the decidua with an increased risk of abruptio placentae from perforation or dissection of the placenta. This abruptio placentae can cause either fetal distress or disseminated intravascular coagulation, or both.

When an intrauterine pressure catheter is placed, it is "assumed" that the catheter is within the amniotic cavity containing the fetus. Little consideration is given to possible placement between the uterine wall and the amniotic-chorionic membranes. When extramembranous catheter placement occurs, uterine perforation, abruptio placentae, placental perforation (contact, collision, and dissection), complicated amnioinfusion, and artifactual uterine contraction waveforms can and do occur. The complications of intrauterine pressure catheter insertion are documented and include placental perforation,¹ fetal vessel laceration, abruptio placentae, uterine rupture, and amnionitis. Some authors have suggested patient selection and proper technique to minimize abruptio placentae when intrauterine pressure catheters are placed. The complications associated with amnioinfusion are amnionitis, hypertonus, uterine rupture, fetal heart rate abnormalities, and others.² Many of these complications may be related to extramembranously placed catheters.

Intrauterine pressure catheters are placed in 10%-20% of US domestic births (400,000-800,000 placements). No article as yet has quantitated the percentage of extramembranous placements or addressed changes in technique to decrease this occurrence and the resulting sequelae illustrated in this case. However, at the Forty-sixth Annual Clinical Meeting of The American College of Obstetricians and Gynecologists,³ a poster session was presented. The results of that poster were that an extramembranous intrauterine pressure catheter placement rate between 14% and 38% was found in a sample population of 73 patients and with the use of 3 different brands of intrauterine pressure catheters. The percentage

of intraamniotic placements was found to increase when amniotic fluid return was looked for on insertion of the catheter. Fortunately, this case had a favorable outcome, despite the extraamniotic placement and abruptio placentae.

We have now altered our technique in placing intrauterine pressure catheters by advancing all catheters in a dry state and looking for amniotic fluid coming out the port or flowing up the transparent catheter as suggested by Trudinger and Pryse-Davies.¹ This visually assures us that the tip is in the amniotic space. Obviously, a backflow of blood is alarming and a lack of fluid return is not reassuring although compatible with amniotic cavity placement. When continued flow of fluid is seen, it can be certain that the catheter is in the amniotic space. We are currently studying catheter placement techniques so that we can quantitate inadvertently positioned catheters to alert other physicians to this problem and decrease the risk of maternal and fetal complications caused by extramembranous catheter placement.

In conclusion, intrauterine pressure catheter placement can result in inaccurate pressure tracings, fetal heart rate abnormalities, uterine perforation, abruptio placentae, disseminated intravascular coagulation, and amnioinfusion complications when the catheter tip is placed outside the amniotic membranes. Intraamniotic sac placement can be achieved more frequently with small changes in placement technique, thus making catheter use safer and more effective in pressure monitoring.

REFERENCES

1. Trudinger BJ, Pryse-Davies J. Fetal hazards of the intrauterine pressure catheter: five case reports. *Br J Obstet Gynaecol* 1978;85:567-72.
2. Wenstrom K, Andrews WW, Maher JE. Amnioinfusion survey: prevalence, protocols, and complications. *Obstet Gynecol* 1995;82:572-6.
3. Lind B. The frequency of extramembranous placement of intrauterine pressure catheters. In: *Proceedings of the Forty-sixth Annual Clinical Meeting of The American College of Obstetricians and Gynecologists; Poster Session: 1998 May 9-13: New Orleans, Louisiana. Washington: The College; 1998.*