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1 Short Report

2 Management of fetal death with placenta previa

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13 Short title; fetal death with placenta previa

1 Abstract

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3 Management of second- and third-trimester fetal death in the presence of placenta previa is a
4 dilemma for obstetricians. We herein describe a case of fetal death occurring at 23 weeks'
5 gestation in the presence of placenta previa. Three weeks of expectant management failed to
6 reduce uteroplacental blood perfusion evaluated with pulsatility index of the uterine artery.
7 Labor was then induced with gemeprost vaginal pessary following overnight laminaria
8 pretreatment. Vaginal delivery was achieved with total blood loss of 1900 ml. Homologous
9 blood transfusion was obviated owing to autologous blood that had been stored during the
10 waiting period.

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12 Keywords; labor induction, laminaria, MRI, pulsatility index, expectant management

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1 Introduction

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3 Placenta previa, which is defined as the placenta encroaching upon internal cervical os, is
4 one of the most important causes of obstetric hemorrhage. Placenta previa persisting until the
5 time of delivery generally requires cesarean section to prevent uncontrollable maternal
6 hemorrhage and fetal deterioration that could be caused by partial placental abruption
7 accompanying cervical dilation.

8 Fetal death can occur at any time during pregnancy. Although dilation and evacuation
9 (D&E) is a common practice for a second-trimester termination of pregnancy in the United
10 States [1], this procedure is not usually performed in Japan. Moreover, in case of fetal demise,
11 damage to the dead fetus, which is more or less unavoidable with D&E, should be minimized
12 for the postmortem autopsy to elucidate the cause of fetal demise. Cesarean section carries
13 significant maternal risks especially in the second trimester without any benefit for the dead
14 fetus [2]. In these respects, labor induction is usually selected for second- and third-trimester
15 fetal demise in Japan.

16 Management of second- or third-trimester fetal death in the presence of placenta previa is a
17 dilemma for obstetricians, since labor induction could cause intractable hemorrhage from
18 abruption of the placenta covering the internal os. Here, we describe a case of fetal death
19 occurring at 23 weeks' gestation in the presence of placenta previa. Labor induction after 3
20 weeks of expectant management brought about blood loss reaching 1900 ml. We review
21 similar cases reported in the past literatures to discuss possible measures to reduce intrapartum
22 blood loss in this particular condition.

23

1 Case report

2
3 A 37-year-old primigravida, who had a history of laparoscopic excision of endometriosis,
4 became pregnant after in vitro fertilization and embryo transfer. She consulted the clinic for
5 small amount of painless vaginal bleeding at 23⁺⁰ weeks' gestation. Ultrasonography (USG)
6 showed fetal cardiac arrest with the placenta completely covering the internal cervical os and
7 she was referred to our hospital. At her first examination, vaginal bleeding had already
8 subsided and she was hemodynamically stable with hemoglobin level of 11.9 g/dl. USG
9 confirmed the fetal demise accompanying complete placenta previa. Magnetic resonance
10 image (MRI) taken on the next day showed that the anterior placental edge overlapped the
11 internal cervical os by approximately 3 cm with the posterior uterine wall in the retroplacental
12 area containing adenomyosis (Figure 1A).

13 We chose expectant management, anticipating possible reduction of the uteroplacental blood
14 perfusion and giving a time for autologous blood storage in preparation for hemorrhage at
15 delivery. Maternal serum hCG, which reflects number of viable placental villi, and pulsatility
16 index of bilateral uterine artery, which theoretically should be inversely correlated with the
17 uteroplacental blood perfusion, were examined every 3 or 4 days. Although the maternal
18 serum hCG level was gradually declined, pulsatility index of bilateral uterine artery was not
19 significantly changed. Follow-up MRI taken at 14 days after the fetal demise showed
20 significant gadolinium enhancement in the placenta (Figure 1B). Considering maternal
21 psychological stress of harboring dead fetus for prolonged period, we decided to induce labor
22 at 21 days after the fetal demise. No sign of maternal coagulation disorder or intrauterine
23 infection had been noted and 800 ml of autologous blood had been stored. The patient was
24 thoroughly informed that emergency uterine artery embolization or hemostatic laparotomy
25 would be required in case of intractable hemorrhage.

26 The day before induction, laminaria was inserted and left in the cervix overnight to obtain
27 adequate cervical ripening. No remarkable bleeding was encountered during this preparatory
28 step. Conforming to Japanese standard protocol, 1 mg of gemeprost vaginal pessary
29 (prostaglandin E1 derivative) was planned to administer every 3 hours until evacuation of the
30 conceptus. Time course of the delivery is summarized in Figure 2. When the laminaria was
31 removed and a first dose of gemeprost was vaginally inserted, the internal cervical os was
32 dilated to 2 cm. Active vaginal bleeding developed immediately afterwards with

1 accumulative blood loss reaching 820 ml in 1.5 hours. Iodoform-soaked gauze was packed
2 into the vagina for hemostasis. When the gauze was removed to administer a second dose of
3 gemeprost 3 hours after the first dose, active bleeding was still continued from the cervix and
4 accumulative blood loss reached nearly 1500ml. Since the cervical dilation reached 3 cm and
5 the internal cervical os became in close vicinity to the anterior fetal membrane, balloon
6 catheter filled with 200 ml of sterile water was inserted along the anterior uterine wall into the
7 uterine cavity. Downward traction of the balloon catheter successfully ceased the bleeding by
8 compressing detached placental surface against the posterior cervical wall (Figure 2, lower
9 rightmost illustration). Effective uterine contraction was commenced soon after
10 administration of the second dose of gemeprost. The balloon catheter was spontaneously
11 expelled from the dilated cervix, but uterine bleeding did not recur. A membrane-wrapped
12 stillborn baby (330 g) and placenta (140 g) was delivered en bloc. Total blood loss finally
13 reached 1900 ml, but homologous blood transfusion was safely obviated by autologous blood
14 transfusion. The baby was severely macerated but no external malformation was detected.
15 The parents declined to have the autopsy. Hypercoiling of the umbilical cord was noted and
16 could be a primary cause of fetal demise. Her postpartum course was uneventful and she was
17 discharged 4 days after the delivery.

18

1 Discussion

2
3 According to our pubmed search, there have been only four reported cases of second- and
4 third-trimester fetal demise complicated with placenta previa [3, 4]. Vaginal delivery was
5 successfully fulfilled in three of these cases at 21, 23, and 33 weeks' gestations with
6 intrapartum blood losses of less than 500 ml. In the remaining case, cesarean section was
7 performed at 26 weeks' gestation for history of two previous cesarean sections, leading to
8 intraoperative blood loss of 1500ml. These experiences suggest that vaginal delivery is a
9 relatively safe option and cesarean section should be reserved as a last resort for second- and
10 third-trimester fetal demise complicated with placenta previa.

11 In the present case, however, attempt of vaginal delivery resulted in massive hemorrhage
12 reaching 1900 ml. The cervix was mechanically dilated with laminaria before the induction
13 of labor and most of the hemorrhage occurred soon after its removal until placement of
14 intrauterine balloon catheter. Vaginal packing of the gauze failed to cease the bleeding,
15 probably because it only pushed up the whole uterus without effective compression against the
16 detached placental surface. In contrast, placement of intrauterine balloon catheter led to
17 complete hemostasis by compressing the detached placental surface against the cervical wall
18 from inside the uterus. Although the balloon catheter was spontaneously expelled from the
19 dilated cervix after effective uterine contraction was commenced, active bleeding did not recur.
20 We attributed this to the compression subsequently exerted by the descending forebag.
21 Therefore, cervical dilation without effective uterine contraction, which causes partial placental
22 separation in the absence of compression by fetal membrane or fetal part, is considered to be a
23 primary cause of excessive bleeding encountered in the present case. In fact, no mechanical
24 cervical dilation was utilized before labor induction in the past three cases. Although cervical
25 preparation with laminaria was reported to reduce the induction-to-delivery interval [5], we
26 recommend that laminaria should not be used in case of placenta previa. Leaving laminaria in
27 cervical canal until the onset of effective uterine contraction may obviate massive bleeding
28 from the separated placenta, but this could carry high risk of uterine rupture.

29 Longer distance between the internal cervical os and the closest placental edge is associated
30 with higher risk of intrapartum hemorrhage, since larger portion of the placenta needs to be
31 separated before delivery of the fetus. In addition, the internal cervical os needs to dilate at
32 least to the same extent as this distance in order that the fetal membrane becomes accessible

1 through the cervix, which is prerequisite for the insertion of hemostatic balloon catheter into
2 the uterine cavity. Fortunately, placental overlap was only about 3 cm in the present case.
3 This enabled us to cease the placental bleeding by placement of intrauterine balloon catheter
4 without difficulty. In these respects, precise measurement of placental overlap prior to labor
5 induction is important to assess intrapartum hemorrhagic risk and to draw out hemostatic
6 strategy.

7 Blood supply to the placenta previa could be another important factor that determines the
8 extent of intrapartum hemorrhage. Theoretically, decrease in uteroplacental blood perfusion
9 should contribute to reduction of the blood loss during vaginal delivery. In two of the past
10 cases as well as in the present case, expectant management for more than two weeks was
11 introduced, anticipating possible reduction of uteroplacental blood perfusion [4]. Although
12 the prolonged expectant management yielded favorable outcome in the past two cases, changes
13 in the uteroplacental blood flow during the waiting period were not documented. On the
14 contrary to our expectation, pulsatility index of the uterine artery was fluctuated and not
15 steadily increased in the present case. Recently, Ruano et al. serially monitored uteroplacental
16 blood flow after feticide at 29 weeks' gestation [6]. They found that the pulsatility index of
17 uterine artery was almost doubled on the first day after the feticide. These findings suggest
18 that the change in uteroplacental blood flow may be different between spontaneous fetal loss
19 and feticide. Alternatively, reduction of uteroplacental blood flow may occur only in first few
20 days after fetal demise. Indeed, in Ruano's case, no additional change in pulsatility index of
21 uterine artery was detected for following 2 days until the delivery. Thus, considering
22 maternal psychological stress of carrying dead fetus for extended period, we would recommend
23 that labor induction be initiated immediately after sufficient amount of autologous blood is
24 stored in preparation for intrapartum hemorrhage.

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- 1 Declaration of Interest
- 2
- 3 We report no declaration of interest.

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1 Figure legend

2

3 Figure 1 T2-weighted magnetic resonance image (MRI) at 1 day after the fetal death (A) and
4 gadolinium -contrasted T1-weighted MRI at 14 days after the fetal death (B).

5

6 (A) Large portion of the placenta (encircled by broken line) is attached to posterior uterine wall
7 containing adenomyosis (arrow). Note that the anterior placental edge overlaps the
8 internal cervical os (arrowhead) by approximately 3 cm.

9 (B) Size of the placenta (encircled by broken line) is reduced as compared with (A). Note
10 that the placenta is enhanced to the same degree as the adenomyosis (arrow) in the uterine
11 wall.

12

13 Figure 2 Time course of the induced labor at 21 days after the fetal death

14

15 Line graph of the accumulative blood loss (upper panel) shows that active bleeding began
16 immediately after removal of the laminaria until insertion of the intrauterine balloon catheter.

17 Overnight laminaria pretreatment caused cervical dilation and partial placental separation
18 (lower leftmost illustration). Removal of the laminaria released the compression against

19 separated placental edge and bleeding ensued (lower second left illustration). On the other
20 hand, cervical dilation allowed access to the anterior fetal membrane (lower, second left

21 illustration, arrowhead), through which balloon catheter could be inserted into the uterine
22 cavity (lower second right illustration). Downward traction (lower rightmost illustration,

23 closed arrow) of the balloon catheter compressed detached placental edge against the cervical
24 wall (lower rightmost illustration, open arrow) to achieve hemostasis.

25

Figure 1



Figure 2

