

Preterm prelabor rupture of membranes after first-trimester chorionic villus sampling: A case report and review of the literature

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ABSTRACT

Rupture of membranes in the first trimester is extremely rare. Generally at this gestational age, rupture is a complication of invasive genetic testing. Little is known about the complications or sequelae of such an occurrence and therefore the management options are limited.

This article reports the case of a 35-year-old woman who had rupture of membranes after chorionic villus sampling in the first trimester; it describes her pregnancy course and eventual positive outcome. Regardless of gestational age at time of fluid loss, treatment options are limited. This article reviews the evidence regarding first-trimester rupture and the outcomes of expectant management.

1. Introduction

Iatrogenic preterm prelabor rupture of membranes (PPROM) before 14 weeks of gestation is rare; the rate is likely 0.004–0.5% [1,2,3]. The most common reason for it is a complication after a procedure. There are limited data on the management of rupture and on the eventual outcomes in terms of neonatal morbidity and mortality. In such instances, over one-third of patients choose elective abortion after being counseled on the risks of infection and periviable delivery with poor prenatal outcomes [4]. A case can be made for expectant management for the first week after PPRM is confirmed, as long as there are no signs of infection. After the first week, treatment options are not optimal [3]. After reporting a case, this article goes on to review the evidence regarding first-trimester rupture and management options.

2. Case Presentation

A 35-year-old woman, P2012, at 13 weeks and 3 days dated by a 6-week ultrasound scan, presented with complaints of leakage of fluid after undergoing chorionic villus sampling (CVS). She had a history of one elective abortion with dilation and curettage, one full-term vaginal delivery and one primary low transverse cesarean section. Both of her previous labors were induced at 37 weeks secondary to intrahepatic cholestasis of pregnancy. Her initial prenatal laboratory results were all

within normal limits and her past medical, family and social history were otherwise uncomplicated.

Given the patient's age, she underwent noninvasive prenatal testing, but this twice proved inconclusive due to a low fetal fraction, and therefore she elected for diagnostic testing. Transcervical CVS was performed using continuous ultrasound guidance with a Cook catheter. A single catheter pass was performed and 40 mg villi were obtained without complication. The maximum vertical pocket (MVP) at the time of CVS was noted to be 3.2 cm. However, six hours after the procedure, the patient noted leakage of fluid. She denied contractions or vaginal bleeding. Vital signs were stable and the abdominal examination was unremarkable. Sterile speculum examination revealed pooling, ferning, and a positive nitrazine test and a transabdominal ultrasound scan showed a MVP of 0.9 cm, consistent with oligohydramnios (Figs. 1 and 2), with fetal heart rate of 153 bpm. Lab evaluation at that time revealed a normal WBC of 5.7 with a normal WBC differential. The patient was admitted for observation and counseling.

The patient was informed of her options, which included termination of the pregnancy versus expectant management. Discussion included risks of bleeding, infection, the uncertain prognosis for continuation of pregnancy, and potential fetal sequelae, including pulmonary hypoplasia, cord compression, infection and orthopedic deformities. She elected for expectant management, and was discharged with precautions. The patient returned after three days for evaluation and reported no further

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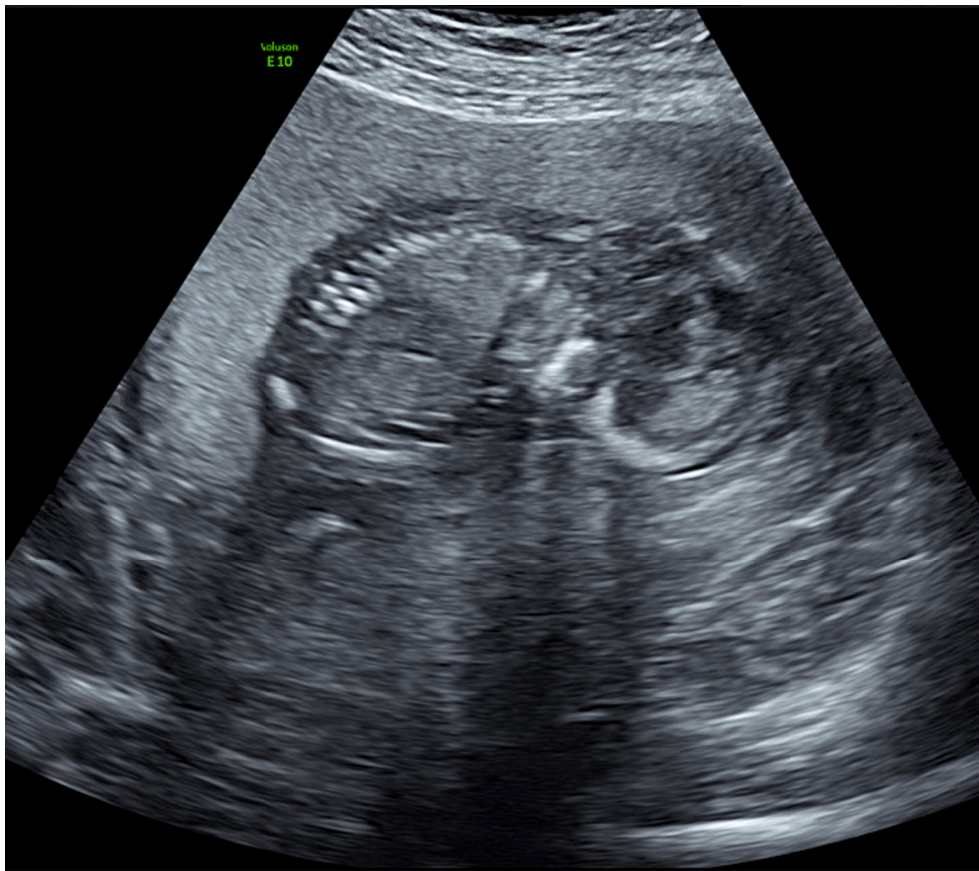


Fig. 1. Confirmation of oligohydramnios after chorionic villus sampling procedure.

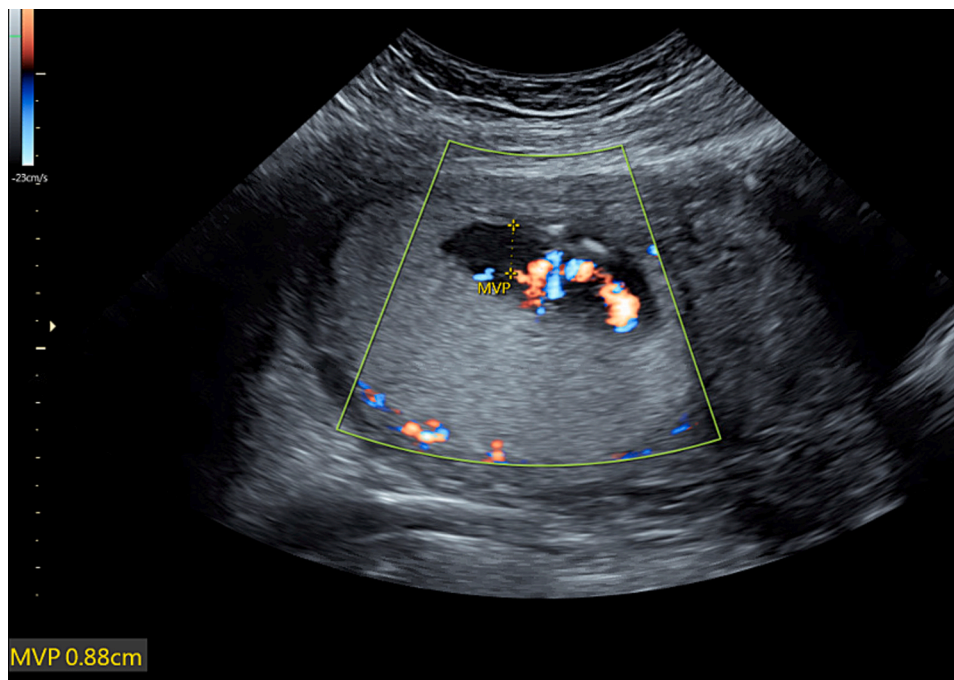


Fig. 2. Maximum vertical pocket with oligohydramnios after chorionic villus sampling.

leakage or cramping. She was afebrile and without uterine tenderness. On repeat examination, the MVP had improved to 1.67 cm (Fig. 3). The patient was then seen serially for physical and sonographic evaluation at gradually increasing intervals. At each of her visits, the patient denied

leakage of fluid, vital signs and physical examination were unremarkable, and MVP steadily increased, reaching normal values at one week from initial presentation. No fetal anomalies were noted on the anatomy screen at 16 weeks. During the remainder of her pregnancy, the patient

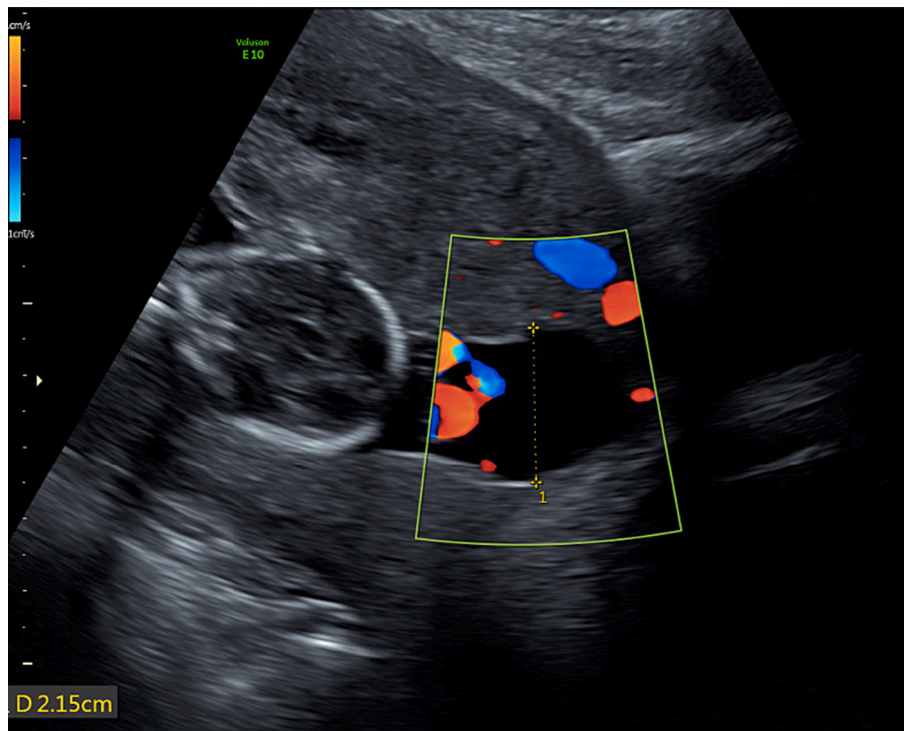


Fig. 3. Maximum vertical pocket with spontaneous reaccumulation of fluid 5 days post-procedure.

had reassuring antepartum testing, but developed intrahepatic cholestasis of pregnancy and labor was induced at 36 weeks of gestation. She delivered a healthy girl vaginally with APGAR scores of 9 and 9 at 1 and 5 min respectively and birth weight of 2690 g (5lb15oz) and had an uncomplicated postpartum course. The patient and baby were discharged together.

3. Discussion

The literature does not usually differentiate between first- and second-trimester rupture of membranes. One limitation of this report is that much of the discussion is extrapolated from data regarding second-trimester PROM. Some differences have been found in terms of iatrogenic and spontaneous rupture. Spontaneous PPRM in the second trimester can have multiple etiologies such as intraamniotic infection, vaginal bleeding, cervical insufficiency and other risk factors, including cigarette smoking, low body mass index, and drug use [5]. It is theorized that iatrogenic PPRM has a better outcome because the pathology that otherwise leads to spontaneous rupture is not present in an iatrogenic case [6,7]. The data shows that, compared with spontaneous PROM, cases of iatrogenic rupture have an increased gestational age at birth, more frequent resealing [7], and higher survival rates [6,7].

Acaia et al. (2013) were able to distinguish four predictive factors for neonatal survival in the second trimester. They showed that iatrogenic PPRM was more likely to have a positive outcome [4]. They also found that C-reactive protein (CRP) was a marker for intrauterine inflammation and was associated with poorer outcomes [4]. These predictors were likely due to the pathophysiology behind the rupture; however, even after controlling for iatrogenic vs spontaneous PPRM, inflammatory mediators were still associated with survival [4]. Oligohydramnios (largest vertical pocket <2 cm) was a negative predictive factor, likely contributing to perinatal mortality for pulmonary hypoplasia [4,8] and other sequelae from low fluid volume [6,8]. Inference for these factors can be made to apply to rupture in the first trimester. In this case, factors for the pathophysiology of spontaneous rupture and inflammation were absent. Secondly, a reaccumulation of fluid was

noted over the next few weeks of the pregnancy. These were all positive predictors in the eventual pregnancy course and positive factors in favor of expectant management.

Treatment options are limited by insufficient data. Beyond expectant management or elective termination, not many options are available. One strength of the case report presented is that the patient was motivated and compliant with follow-up care. Deprest et al. (2011) have studied rupture in the second trimester and have concluded that expectant management, bedrest and antibiotic prophylaxis are reasonable for a week after rupture [9]. If the patient has persistent oligohydramnios or leakage after that time, experimental therapies for iatrogenic rupture have been investigated [3,9]. Although the different methods have been met with some success, they have not been compared and periprocedural fetal loss is possible. The live birth rates and neonatal survival for these procedures are limited and further data are needed to support their use [3,9].

There is almost no data in general with regard to neonatal morbidity and mortality after first trimester or PPRM at under 24 weeks of gestation. However, when examining evidence from early amniocentesis studies, it is possible to infer risk for talipes equinovarus [10] in addition to fetal demise [10]. These studies were intended to assess the safety of early amniocentesis (<13 weeks) in comparison with midtrimester amniocentesis (14–16 weeks). Researchers found an increased incidence of fetal loss (7.6% vs 5.9% $p = 0.012$) as well as an increased risk for talipes equinovarus in the early amniocentesis group (1.3% vs 0.1% $p = 0.0001$) [10]. This association regarding limb deformities has carried over with regard to complications from CVS; however, anomalies, transverse digital deficiencies in particular, increase in significance with sampling prior to 9–11 weeks of gestation [11] and is comparable to the incidence in the population at large [12]. Therefore, the question remains of whether limb abnormalities are in fact secondary to transient fluid loss or if they are attributable only as a correlation.

4. Conclusion

In the case presented, first-trimester PPRM resulted in a

normalization of fluid levels within a week of rupture. The patient went on to have a normal pregnancy, indicating that the protective mechanisms in the membrane and for the pregnancy are able to withstand early PPROM. Through the literature presented and confirmed by the case study, it is reasonable to expectantly manage a patient who has had PPROM following CVS. Factors such as patient compliance, availability for follow-up and resources for close follow-up must be weighed when considering this course of action. Further research is needed to fully understand the limits of membrane stability in the first trimester and the mechanisms behind the continuation of pregnancy. Intrinsic healing capabilities require further research and it is still unclear what providers can do to aid that process while limiting the risk to the mother and developing fetus.

Contributors

Jacqueline Early contributed conception of the case report, acquiring and interpreting the data, drafting the manuscript, undertaking the literature review and revising the article critically for important intellectual content.

Pedro Arrabal contributed to patient care, conception of the case report, acquiring and interpreting the data, drafting the manuscript, undertaking the literature review and revising the article critically for important intellectual content.

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Conflict of interest statement

The authors declare that they have no conflict of interest regarding

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