

Communication

THE ROLE OF AMNIOINFUSION IN PRETERM PREMATURERUPTURE OF MEMBRANES (PPROM)

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ABSTRACT

Preterm premature rupture of membranes (PPROM), defined as rupture of fetal membranes prior to 28 weeks of gestation, complicates approximately 0.4% – 0.7% of all pregnancies. This condition is associated with a very high neonatal mortality rate as well as an increased risk of long- and short-term severe neonatal morbidity. The causes of the PPRM are multifactorial. Altered membrane morphology including marked swelling and disruption of the collagen network which is seen with PPRM can be triggered by bacterial products or/and pro-inflammatory cytokines. Activation of matrix metalloproteinase's (MMP) have been implicated in the mechanism of PPRM.

Keywords: preterm premature rupture of membranes, matrix metalloproteinase.

INTRODUCTION

Recently, additional treatment with amnioinfusion (AI) emerged as an option to prolong the latency period after the PPRM. As we know, amniotic fluid (AF) is a dynamic medium that plays a significant role in fetal well-being. It is production and amount varies with gestational age. It plays a vital role in fetal life as it contains antimicrobial factors, growth factors and it help the fetal lung to grow and expand. Amnioinfusion can be done antenatally and during labour. Amnioinfusion can be performed either transabdominally or transvaginal infusion of saline or other physiological fluid, with or without antibiotics into the amniotic cavity. Amnioinfusion with antibiotics has been used to treat established amnionitis. Two techniques for amnioinfusion exist, as mentioned above, transabdominal and transcervical. Both use saline or ringers lactate under sterile conditions. The transabdominal technique is used when membranes are intact or ruptured. A needle is used under ultrasound guidance and is considered safe in women without HIV or hepatitis B infection. The transcervical technique is used in women with ruptured membranes. A catheter is introduced through the cervix below and advanced to above the presenting part into the uterine cavity. In each case, a bolus of 300 mL is usually first infused followed by an additional 20 mL to 30 mL/hour titration and the effect observed or measured.

Aminioinfusion can be used for diagnostic purposes to enable better visualization of the fetus as liquor is very important acoustic widow for better fetal examination. Amnioinfusion have some therapeutic benefits in conditions like early premature rupture of membrane and may help cases of external cephalic version for breech presentation at term. Amnioinfusion has been shown to reduce the incidence of variable deceleration due to cord compression, reduces the risk of meconium aspiration and it will help reduce Caesarean delivery. Amnioinfusion also used in a febrile parturients as an irrigating or diluting measure in pregnancies complicated by preterm

prelabour rupture of the membranes and amnionitis resulted in a reduced incidence of postpartum endometritis and febrile morbidity. Several investigations have shown that amnioinfusion prolonged the latency period in mid-trimester PPRM, improved perinatal survival, increased blood flow in the fetal ductus venosus and umbilical artery, and decreased rates of pulmonary hypoplasia. In 2014, Homfrey et al, published a meta-analysis that included five randomized controlled trials. The participants included women with PPRM in the third trimester who received isotonic fluid either transcervically or transabdominally compared to no amnioinfusion. The results for method of infusion were separately analyzed. The findings in the transcervical amnioinfusion studies showed improved fetal umbilical artery pH and decreased incidence of variable decelerations. There were improved neonatal and maternal outcomes; decreased neonatal death, neonatal infection, and pulmonary hypoplasia. Maternal outcomes also improved with a decrease in puerperal sepsis and a less likelihood of delivering within seven days of rupture of membranes. Also, the latency between PPRM and delivery became significantly longer following amnioinfusion. This is of primary importance because a one week increment increases the neonatal survival rate by 10% to 20% at perivable gestational ages. Therefore, pregnancy prolongation by amnioinfusion is expected to reduce gestational age-dependent morbidity and may result in improvement of long-term prognosis.

Single amnioinfusion improved the fetal circulatory failure, and the patient delivered a healthy full-term newborn. Single amnioinfusion may be a therapeutic approach to improve the prognosis of pregnancy when second-trimester anhydramnios results from umbilical cord factors, whereas serial transabdominal amnioinfusion could restore residual amniotic fluids and thus reduce the rate of pulmonary hypoplasia, severe respiratory failure, and cardiovascular problems such as pneumothorax and persistent pulmonary hypertension of the neonate (PPHN). Furthermore, it may prevent compression of the umbilical cord and skeletal deformities, and increase time to delivery, but recent studies have denied the effects of serial TA, possibly because the amniotic fluid maintenance effect of a single TA procedure is poor. The proportion of patients maintaining a normal amniotic fluid volume after 48 h is reportedly low, with 4 of 17 patients¹⁴ reported by one study and 11 of 36 patients reported by

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another. 15 Furthermore, one study indicated that amniotic fluid leakage occurred in 17 of 36 patients 6h after amnioinfusion. 25 The same report mentioned that the perinatal prognosis of infants was good when the amniotic fluid volume was maintained even after amnioinfusion. With serial TA, which involves weekly amniotic fluid supplementation, the amniotic fluid volume cannot be maintained in many patients. Therefore, prolongation of the period from membrane rupture to delivery and improvements in the prognosis of infants has not been significant. In 2012, a study performed by the same facility reported that continuous TA was performed for 45 cases of PPROM at less than 23 weeks of gestation, with a survival rate of 60%. In 2013, a study conducted in Germany indicated that continuous TA could be safely performed for a median of 9 days (range, 4–49 days) using a subcutaneous implantation port for seven patients who developed PPROM between 14 and 26 weeks of gestation and subsequent oligoamnios.16 In 2015, the same group performed continuous TA using subcutaneous ports from week 28 of gestation because of PPROM, oligoamnios, or intrauterine infection at week 26 of gestation, and reported that pregnancy continued until week 31 of gestation.17 Although these reports indicated the potential of continuous TA to prolong the pregnancy, the details of the controlled settings remain unclear, and no specific details regarding the amniotic fluid maintenance effect, side effects, or complications have been reported.

Although there are potential benefits of this procedure it is important that before a decision is made to offer it to any patient there are no contraindications. These include chorioamnionitis (suspected or confirmed), placental abruption, uterine contractions, severe fetal heart rate abnormalities (evidence of fetal distress) and maternal immunosuppression. Besides, this procedure has associated with some complications. The most common complications reported were uterine hypertonicity (14%), abnormal fetal heart rate (9%), chorioamnionitis (4%), uterine rupture and maternal cardiac or respiratory compromise (2%) and maternal death (1%). The conclusion from the study was that the benefits of amnioinfusion were significantly more than the complications making it a safe procedure.

REFERENCES

1. Dad N, et al. What is the role of amnioinfusion in modern day obstetrics?. 2015
2. De Ruigh, A. A., et al. Child outcomes after amnioinfusion compared with no intervention in women with second-trimester rupture of membranes: a long-term follow-up study of the PROMEXIL-III trial. 2020
3. Esaki M, et al. Continuous amnioinfusion in women with PPROM at periviable gestational ages. 2018
4. Hofmeyr, G. J., & Kiiza, J. A. Amnioinfusion for chorioamnionitis. Cochrane Database of Systematic Reviews. 2016
5. Io S, et al. An experience of second-trimester anhydramnios salvaged by single amnioinfusion. 2018
6. Kohari K, et al. A Novel Approach to Serial Amnioinfusion in a Case of Premature Rupture of Membranes Near The Limit of Viability. 2018
7. Ono T, et al. Continuous amnioinfusion for treatment of mid-trimester preterm premature rupture of membrane with oligoamnios. 2019
8. Tchirikov M, et al. Mid-trimester preterm premature rupture of membranes (PPROM): etiology, diagnosis, classification, international recommendations of treatment options and outcome. 2017
9. van Kempen L.E.M, et al. Amnioinfusion Compared With No Intervention in Women With Second-Trimester Rupture of Membranes. 2019
10. Vikraman S.K, et al. Impact of antepartum diagnostic amnioinfusion on targeted ultrasound imaging of pregnancies presenting with severe oligo- and anhydramnios: Analysis of 61 cases. 2017
