

# An iatrogenic preterm premature rupture of the membranes: a case report treated by amniopatch

## Abstract

Amniotic cavity contains amniotic fluid which plays an important role to guarantee fetal movements (essential for the skeletal development), fetal chest and lungs development and to protect against umbilical cord compression, fetal trauma and infections. *Premature rupture of membranes (PROM) is the rupture of the chorioamniotic membrane before the onset of labor (1)*. It complicates approximately 2% of pregnancies and it determines a significantly increasing of neonatal morbidity and mortality because in the 40% of cases it causes preterm delivery. The management of PPRM requires a careful evaluation of benefits of prolongation of the pregnancy and risks of intra-amniotic infection, in order to minimize maternal and fetal complications. There are a few possibilities: expectant management, amnioinfusion, sealing techniques; termination of pregnancy is proposed to women in case of high risks of maternal sepsis and very poor fetal outcome. In this paper we report the case of a woman with iatrogenic PPRM post amniocentesis at 17<sup>th</sup> week of gestation treated by amniopatch. At the end of the procedure maternal and fetal conditions were good and amniotic fluid was restored. The procedure was repeated twice and the patient gave birth at 32 weeks. Currently, due to the lack of evidence in the scientific literature, there is no evidence of the superiority of a therapeutic option over the others. The management of PPRM should be based on the clinical evaluation of the specific case. We suggest considering transabdominal sealing technique when the expectant management failed.

**Keywords:** pProm, amnioinfusion, amniocentesis, amniopatch, preterm delivery, fetal therapy

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**Abbreviation:** iPProm, Iatrogenic PPRM

## Introduction

Amniotic membranes consist of five layers: an inner amniotic epithelial layer (which is nearest the fetus and is formed by collagen type III and IV), a basement membrane, a compact membrane (formed by collagen type I and III), a fibroblast layer (which consists of macrophages and mesenchymal cells) and the intermediate layer that contains collagen type III, glycoproteins, proteoglycans and is connected to the corion.<sup>1</sup>

Amniotic cavity contains amniotic fluid which plays an important role to guarantee fetal movements (essential for the skeletal development), fetal chest and lungs development and to protect against umbilical cord compression, fetal trauma and infections.

*Premature rupture of membranes (PROM) is the rupture of the chorioamniotic membrane before the onset of labor (2)*. The definition of preterm PROM (PPROM) implies the case in which the membranes rupture occurs before 37 weeks of gestation. It complicates approximately 2% of pregnancies and it determines a significantly increasing of neonatal morbidity and mortality because in the 40% of cases it causes preterm delivery.<sup>2</sup>

## Etiology

The etiology of PPRM is multifactorial. There are many conditions recognized as risk factors, such as: history of PPRM in a previous pregnancy, smoking, low socioeconomic status, short cervical length, low BMI, bleeding during pregnancy.<sup>3</sup> *Spontaneous PPRM* is generally associated with ascending infections from the lower genital tract that are responsible of the production of inflammatory mediators who weaken fetal membranes. It has also supposed that a mechanical

stretch, caused by preterm uterine contractions or over distension of fetal membranes in case of polyhydramnios, can increase the risk of PPRM.<sup>4</sup> *Iatrogenic PPRM* occurs after medical interventions like invasive fetal testing (chorionic villus sampling, amniocentesis that provoke membranes rupture in 1-3% of cases) and fetal surgery cases (such as interventions for congenital diaphragmatic hernia, lower urinary tract obstruction) that can determine risk of membrane rupture in relation with gestational age of fetus at the time of the surgery, kind of procedure performed (the risk is very low, about 3% in amniocentesis and CVS), type of cannulae used and duration of the procedure.<sup>5</sup>

## Diagnosis of pPPROM

Patients generally describe a “gush” of fluid. On the objective valuation there is a report of watery leakage from the vagina, confirmed by a direct leakage from the cervical canal or a fluid accumulation in the posterior vaginal fornix with speculum examination. In case of diagnostic doubts, it's possible to use Nitrazine tests, which is essential to distinguish amniotic fluid from vaginal secretions or urine: the first is alkaline (pH above 8); urine has a pH <6.0 and vaginal secretions between 4.4 and 6.0.<sup>6</sup> Ultrasound examination can be helpful in the diagnosis of pPPROM as well as the choice of a correct management. A report of oligo or anhydramnion with deepest vertical amniotic pocket <2cm it's generally associated with worst fetal outcome (pulmonary hypoplasia ecc).

## Maternal and fetal outcome

PPROM complications include *chorioamnionitis*, infection of fetal membranes found in up to 36% of women with PPRM that implicates fever, maternal and fetal tachycardia, elevated maternal WBC and it is associated with an increasing risk of neonatal mortality, preterm delivery, fetal chronic lung disease and respiratory distress syndrome, neonatal sepsis, periventricular leukomalacia, intraventricular

haemorrhage, cerebral palsy and retinopathy in live born infants. PPROM followed by prolonged oligo/anhydramnion can be associated with severe pulmonary hypoplasia or bronchopulmonary dysplasia with a perinatal mortality up to 80%.<sup>7</sup> There are significant evidences that perinatal outcomes in pregnancies with iatrogenic PPROM are better than spontaneous ones.<sup>8</sup>

### PProm management

The choice of a correct management of PPROM requires a careful evaluation of benefits of prolongation of the pregnancy and risks of intra-amniotic infection, in order to minimize maternal and fetal complications.

**Expectant management:** It's applied to prolong pregnancy and includes: monitoring of initial clinical and laboratory signs of infections, use of broad spectrum antibiotics (to prevent choriamnionitis), corticosteroids between 24+0 e 34+0 weeks of gestation for fetal lung maturity (single injection of betamethasone 12mg IV/IM or dexamethasone 6mg IV/IM for every 12h for two consecutive days), tocolytic agents (atosiban, CCB, magnesium sulfate, fenoterolhydrobromid, Prostaglandin inhibitors), eventually use of magnesium sulfate for fetal neuroprotection before 32 weeks of gestation.

**Amnioinfusion:** In case of PPROM whit anhydramnion it's possible to use this invasive procedure that consist of under guided ultrasonography controlled infusion of a hypo-osmotic saline solution (similar to natural amniotic fluid) in amniotic cavity. Serial transabdominal amnioinfusion seems to improve neonatal outcome by prolongation of pregnancy.<sup>9</sup> This technique has a very low success rate and seems to be more useful to restore fluid near term to reduce cord compression or when we need to prolong pregnancy for 24-48 hours in order to perform lung maturation with steroids.

**Sealing techniques:** They include collagen/gelatin/fibrin/platelets plugs administrated by transabdominal or intracervical way to restore a mechanical barrier against infections and to allow the re-accumulation of amniotic fluid. Quintero was the first who reported case using an amniopatch technique in 1996. It consisted of infusing a platelet concentrate and cryoprecipitate (which stabilizes the first one) by a 20 gauge needle placed into the amniotic cavity, which form a plug as a result of platelet activation and formation of an aggregate.<sup>8</sup> Actually it represents a valid therapeutic option in case of iPPROM, better than in sPPROM. The reason for this is unclear and it may depends on the different etiology, the location and the extent of the rupture site.<sup>4</sup> Therefore these techniques are probably in of the best approach to treat iPROM before 24 weeks.

**Termination of pregnancy:** This procedure is generally proposed to women when there are very high risks of maternal sepsis and very poor fetal outcome.<sup>8</sup>

## Discussion

### Case report of ipPROM treated by amniopatch

In this paper we report the case of S.P., a 40-year-old woman admitted to the *Policlinico G.Rodolico - Catania* in September 2017 for iPPROM post amniocentesis at 17<sup>th</sup> week of gestation (performed for a positive I trimester screening test). After two weeks of expectant management there was no evidence of improvement of the clinical conditions, with persistence of oligohydramnios with a maximum pocket of amniotic fluid of 2.1cm; the patient was consulted about the possible options: termination of pregnancy or sealing procedure

by amnioinfusion plus amniopatch. She opted for amniopatch. The procedure was performed according to Quintero technique: a 20 gauge needle was introduced under ultrasound guide and we alternative administrated 30 cc of saline, 60cc of platelets and 80cc of fresh plasma. At the end of the procedure maternal and fetal conditions were good and there was a maximum pocket of amniotic fluid of 6.7cm, maintained in the following weeks without evidence of fluid loss. The patient was discharged after 15 days with good clinical conditions. At 23 weeks she was readmitted because of a massive fluid loss. A second amniopatch procedure was then successfully performed. At 32 weeks gestation she presented with regular contractions and she delivered a female baby of 1980gr. The baby was discharged in good clinical conditions after 27 days in NICV.

## Conclusion

Currently, maybe due to the lack of evidence in the scientific literature, there is no evidence of the superiority of a therapeutic option over the others in pPROM treatment. The management should be based on the evaluation of the specific case, taking into consideration several factors including etiology, gestational age, AFI, persistent loss of amniotic fluid and the risk of onset of chorioamnionitis. We suggest considering transabdominal sealing technique when the expectant management failed.

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None.

## Conflict of interest

The authors declare that they have no conflict of interest.

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