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StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan-.

Premature Rupture of Membranes

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Last Update: July 17, 2023.

Continuing Education Activity

Premature rupture of membranes (PROM) is the rupture of gestational membranes prior to the onset of labor. When membrane rupture occurs before 37 weeks of gestation, it is referred to as preterm PROM (PPROM). This activity reviews the evaluation and management of premature rupture of membranes and highlights the role of the interprofessional team in identifying and treating this condition.

Objectives:

- Identify the etiologies of premature rupture of membranes.
- Describe the presentation or premature rupture of membranes.
- Review the appropriate management of premature rupture of membranes.
- Explain the effect of precise utilization of terminology by interprofessional teams on patient care.

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Introduction

Prelabor rupture of membranes (PROM) is defined as rupture of membranes before the onset of labor. When membrane rupture occurs before labor and before 37 weeks of gestation, it is referred to as preterm PROM (PPROM).

Etiology

There is a wide array of mechanisms that cause prelabor rupture of membranes. It can result from a physiologic weakening of the membranes combined with the forces caused by uterine contractions. Intramniotic infection is commonly associated with PPROM. The major risk factors for PPROM include a history of PPROM, short cervical length, second or third trimester vaginal bleeding, uterine overdistension, nutritional deficiencies of copper and ascorbic acid, connective tissue disorders, low body mass index, low socioeconomic status, cigarette smoking, and illicit drug use. Despite a variety of etiologies, often there is no obvious cause that is identified in a patient who presents with PROM.

Epidemiology

At term, PROM complicates approximately 8% of pregnancies. Preterm PROM complicates about 1% of deliveries overall, and it is twofold more common in African Americans.

Pathophysiology

Rupture of membranes results from a variety of factors that ultimately lead to accelerated membrane weakening. This is caused by an increase in local cytokines, an imbalance in the interaction between matrix metalloproteinases and tissue inhibitors of matrix metalloproteinases, increased collagenase and protease activity, and other factors that can cause increased intrauterine pressure.

History and Physical

A thorough history should be performed for all patients complaining of leakage of fluid. This includes a history of present illness, obstetrical history, gynecologic history, medical history, surgical history, social history, and family history. When obtaining the history of present illness, it is important to inquire about contractions, fetal movement, time of possible rupture, amount of fluid, color and odor of fluid, vaginal bleeding, pain, recent sexual encounters, recent trauma, and recent physical activity.

Physical exam should be performed in a way that minimizes the risk of infection. A sterile speculum exam should always be performed. During the speculum exam, patient should be inspected for any signs of cervicitis, umbilical cord prolapse, vaginal bleeding, or fetal prolapse. Digital exam should be avoided unless delivery appears imminent or patient appears to be in active labor [1]. The cervix should be examined during sterile speculum exam to assess cervical dilatation and effacement. If necessary, cultures should be obtained at the time of sterile speculum exam. Visualization of amniotic fluid passing from the cervical canal and pooling in the vagina will typically confirm a diagnosis of membrane rupture.

Evaluation

When examining amniotic fluid under a microscope, arborization, or ferning, will be identified. A pH test can be performed of vaginal fluid. Amniotic fluid typically has a pH of 7.1-7.3, while normal vaginal secretions have a pH of 4.5-6.0. Causes of false positive pH tests include presence of blood or semen, alkaline antiseptics, or bacterial vaginosis. False-negative results may occur with prolonged rupture of membranes. It can sometimes be difficult to definitively diagnose PROM based on the above evaluation. There are additional tests that may aid in the diagnosis. Ultrasound should be performed to evaluate amniotic fluid index. Fetal fibronectin is a sensitive but nonspecific test for rupture of membranes. In addition, there are several commercially available tests for amniotic proteins which report high sensitivity for diagnosis of rupture of membranes [2]. If after a full evaluation the diagnosis still remains unclear, ultrasound-guided instillation of indigo carmine dye can be used to determine if membrane rupture has occurred by evaluating if the dyed fluid has passed through the vagina (using a tampon or pad). If the tampon or pad is stained blue from the dye, rupture of membranes is confirmed.

Treatment / Management

Management of patients with prelabor rupture of membranes is determined by gestational age.

- Early term and term patients (37 0/7 weeks of gestation or more): proceed to delivery and Group B Streptococcus prophylaxis should be administered as indicated
- Late Preterm (34 0/7- 36 6/7 weeks of gestation): same for early term and term

- Preterm (24 0/7 – 33 6/7 weeks of gestation): expectant management, latency antibiotics, single course of corticosteroids, GBS prophylaxis as indicated
- Less than 24 weeks of gestation: patient counseling, expectant management or induction of labor, antibiotics can be considered as early as 20 0/7 weeks of gestation, GBS prophylaxis/corticosteroids/tocolysis/magnesium sulfate are not recommended before viability

Nonreassuring fetal status and chorioamnionitis are indications for delivery. If the patient presents with vaginal bleeding, there may be a concern for a placental abruption and delivery should be considered. The decision for delivery should be made based on fetal status, amount of bleeding, the stability of mother, and gestational age. In a term patient, if spontaneous labor does not occur near the time of presentation, labor should be induced.

Generally, patients with preterm PROM should be admitted to hospital with periodic assessment for infection, placental abruption, umbilical cord compression, fetal well-being, and labor. Periodic ultrasound evaluation should be performed to monitor fetal growth as well as periodic fetal heart rate monitoring. Vital signs should be monitored and a rise in maternal temperature should raise suspicion for an intrauterine infection. Serial monitoring of leukocytes and inflammatory markers have not proved to be useful in diagnosing infection as they are found to be nonspecific if there is no clinical evidence of infection. Administration of corticosteroids will also cause a transient leukocytosis.

The use of tocolytics on patients with preterm PROM is controversial. Prophylactic tocolytics may be associated with a longer latency period and a lower risk of delivery within 48 hours. However, it is also associated with a higher risk of chorioamnionitis in pregnancies before 34 weeks of gestation. No significant maternal or neonatal benefit has been shown with the use of tocolytics [3].

Antenatal corticosteroids after preterm PROM have been shown to reduce neonatal mortality, respiratory distress syndrome, necrotizing enterocolitis, and intraventricular hemorrhage. A single course of corticosteroids is recommended for all pregnant women between 24 0/7 weeks and 34 0/7 weeks of gestation if there is a risk of delivery in the next 7 days.

The administration of magnesium sulfate should be used when delivery is anticipated before 32 0/7 weeks of gestation in order to reduce the risk of cerebral palsy [4].

Antibiotics have been shown to prolong pregnancy, reduce maternal and neonatal infections, and reduce fetal morbidity. A seven day course of therapy is recommended in women with preterm PROM who are at less than 34 weeks of gestation. The recommended regimen is intravenous ampicillin (2g every 6 hours) and erythromycin (250 mg every 6 hours) for 48 hours, followed by oral amoxicillin (250 mg every 8 hours) and erythromycin base (333 mg every 8 hours). A seven day course should be completed. Amoxicillin-clavulanic acid is not recommended due to increased rates of necrotizing enterocolitis. If the patient is a candidate for GBS prophylaxis, she should receive antibiotics to prevent vertical transmission of GBS [5].

Women with a history of preterm PROM have a higher risk of recurrent PROM and preterm birth. Progesterone supplementation should be offered to reduce the risk of spontaneous preterm birth.

Differential Diagnosis

- Crohn's disease
- Lower urinary tract infection
- Rectovaginal fistula
- Urinary incontinence
- Urogenital tract trauma or surgery
- Vaginal douches
- Vaginitis
- Vesicovaginal fistula

Complications

- Infection risk in fetus and mother
- Perinatal mortality
- Respiratory distress syndrome in infant
- Intraventricular hemorrhage
- Fetal lung hypoplasia
- Risk for Cesarean section delivery

Enhancing Healthcare Team Outcomes

Prelabor rupture of membranes requires immediate attention. Accurate diagnosis and knowledge of gestational age are crucial to determining the management of the patient. Gestational age dictates management. It is imperative to monitor patients for signs and symptoms of infection. The patient must be evaluated in a clinical setting in order to determine if a rupture of membranes has occurred. A physician must always tell the patient to present to Labor & Delivery or an OB/GYN clinic for evaluation. A team approach is necessary for favorable outcomes. The OB/GYN will evaluate the patient and dictate the management, a nurse must participate in the monitoring of the patient, and pediatrics must be aware of the patient's status and treatment plan. It is important that the pediatric team is informed about the patient's course so they can be prepared for delivery of the infant. Anesthesiology must also be informed should the patient require a cesarean section or obstetric anesthesia. It is always important to discuss the wishes of the patient regarding the care of the newborn should the newborn be severely preterm.

PPROM is associated with a prenatal morbidity and mortality rate in excess of 20%, and the outcomes are primarily dependent on the gestational age at delivery. The key to reducing the adverse effects of PPROM is to make a prompt diagnosis, admission and start antibiotic coverage.[6][7] (Level V)

Review Questions

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Disclosure: Shailja Dayal declares no relevant financial relationships with ineligible companies.

Disclosure: Peter Hong declares no relevant financial relationships with ineligible companies.

Bookshelf ID: NBK532888 PMID: 30422483