MedicalXpress

Bacteria linked to water breaking prematurely during pregnancy

January 8 2014

A high presence of bacteria at the site where fetal membranes rupture may be the key to understanding why some pregnant women experience their "water breaking" prematurely, researchers at Duke Medicine report.

The findings, published online Jan. 8, 2014, in the journal *PLOS ONE*, suggest that the bacterial presence is associated with thinning of the fetal membranes. More research is needed to understand whether bacterial presence is a cause or consequence of fetal membrane weakening.

"Complications of preterm births can have long-term health effects for both mothers and children," said study author Amy P. Murtha, M.D., associate professor of obstetrics and gynecology at Duke University School of Medicine. "Our research focuses on why the fetal membranes, or water sac, break early in some women, with the overall goal of better understanding the mechanisms of preterm membrane rupture."

Composed of two fetal cell layers, the amnion and chorion, fetal membranes play an important role in maintaining pregnancy through gestation. Nearly one-third of all early deliveries are associated with the water breaking in what's known as preterm premature rupture of membranes, or PPROM.

Previous research from Murtha and her colleagues demonstrated that the chorion has more cell death when infection is present, and that this cell layer may be thinner in women who experience PPROM. Among

PPROM patients with infection in the fetal membranes (chorioamnionitis), the cell death within the chorion layer was highest, suggesting that infection may play a role in causing PPROM.

In the current study, the researchers prospectively examined chorion membrane samples to identify a pattern of bacterial presence and association with chorion thinning. They collected membrane samples from a total of 48 women—including PPROM, preterm and term patients—after they gave birth. The researchers measured chorion thinning and bacterial presence in membrane samples collected from both near and far from the rupture site.

In all women, the chorion membrane was thinner at the rupture site than at the distant site. However, chorion thinning was greatest among PPROM patients and was not isolated to the rupture site, as the researchers observed a global chorion thinning even distant from where the membrane ruptured.

The researchers then looked to see if bacteria were present in the membranes and whether bacteria levels correlated with the thinning of the cell layers in the membranes. Interestingly, bacteria were present in all fetal membranes, refuting the traditional understanding that fetal membranes are sterile environments. The amount of bacteria present at the rupture site was higher, which the researchers were not surprised to find.

Among PPROM subjects, bacteria counts were highest compared to all other groups at both the rupture site and distant from the rupture site. Among all subjects, bacterial counts were inversely correlated with chorion thinning: the more bacteria present, the thinner the chorion.

It is unknown if this is a causal relationship, but the link between high bacterial presence at the membrane rupture site provides insight into

possible mechanisms behind PPROM.

"We still know little about changes occurring within the fetal membrane in the presence of bacteria, but our data suggest the chorion and its thinning may be the battleground for these changes," Murtha said.

The researchers are now working to identify the bacteria to determine if specific bacteria are found in PPROM patients. By identifying specific bacteria, the researchers can learn more about the role of bacterial presence, which could eventually lead to preventive treatments.

"For instance, if we think that certain bacteria are associated with premature rupturing of the membranes, we can screen for this bacteria early in pregnancy. We then might be able to treat affected women with antibiotics and reduce their risk for PPROM," Murtha said. "Our research is several steps away from this, but it gives us opportunities to explore potential targeted therapeutic interventions, which we lack in obstetrics."

Provided by Duke University Medical Center