Evolution offers clues to leading cause of death during childbirth

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(Medical Xpress) -- Unusual features of the human placenta may be the underlying cause of postpartum hemorrhage, the leading cause of maternal deaths during childbirth, according to evolutionary research at the University of Illinois at Chicago.

Defined as the loss of more than a pint of blood during or just after vaginal delivery, postpartum hemorrhage accounts for nearly 35 percent, or 125,000, of the 358,000 worldwide annual maternal deaths during childbirth.

Despite its prevalence, the causes of postpartum hemorrhage are unknown, says Julienne Rutherford, assistant professor of oral biology at UIC, who along with Elizabeth Abrams, assistant professor of anthropology, co-authored a theoretical synthesis published in the journal *American Anthropologist*. While common in humans, postpartum hemorrhage is rare in other mammals, including nonhuman primates.

"Understanding the underlying cause of the increased risk of postpartum hemorrhage in humans is a critical step toward discovering new treatments and eventually preventing it on a global scale," Rutherford said.

Previous studies on postpartum hemorrhage have focused on how it can be treated and on recognizing its associated risk factors, Abrams said. Less has been done to discover its cause.

In humans, the invasiveness of the placenta into the uterine wall and the subsequent takeover of maternal blood vessels appear to be greater than in nonhumans, Rutherford said. This suggests a link between placental invasiveness early in pregnancy and blood loss at delivery, when the placenta separates from the uterine wall.

Research by Abrams and Rutherford suggests that hormones produced by trophoblasts -- cells formed during the first stage of pregnancy that provide nutrients to the embryo and develop into a large part of the placenta, and that guide the interaction with the uterus -- may provide an early predictor of risk.

"Biomarkers of postpartum hemorrhage that could be used early in pregnancy would allow women to make informed decisions about their choice of birthing site and medical care based on their risk," Abrams said. This biomarker hypothesis has not yet been studied.

Many women in poor countries don't give birth in hospitals or clinics, said Abrams, who has conducted research on childbirth in the sub-Saharan countries of Malawi and Tanzania. By the time postpartum bleeding occurs, it may be too late to reach a health center.

In a normal birth, the placenta begins to separate from the uterine wall before delivery. Bleeding at the site is normally stopped by the constriction of blood vessels due to the contraction and retraction of uterine muscles. Hemorrhage can occur weeks after birth, but most deaths occur within four hours of delivery.

There are two major risk factors for postpartum hemorrhage, said Rutherford. The leading factor is uterine contractions that are too weak to stop bleeding. The cause of this is unclear, but it could delay delivery of the placenta -- which is the other known risk factor, she said. The best predictor for any woman is previous postpartum hemorrhage, "which has

disturbing implications for women in resource-poor settings," Abrams said.

Understanding how the human placenta differs from that of other primates is a new approach, and according to Abrams and Rutherford, it is one that might help explain the mechanisms underlying risk factors in humans.

Provided by University of Illinois at Chicago