Is it better to be injured when you are pregnant?

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The editorial refers to An assessment of the impact of pregnancy on trauma mortality previously printed in the January 2011 issue.

There has been much investigation into the differential effects of sex hormones on the response to injury and hemorrhage. The preponderance of experimental reports have demonstrated that the hormonal milieu, in particular, increased levels of 17\(\beta\)-estradiol and decreased testosterone, affects cell-mediated immunity and organ system tolerance of shock through complex receptor-mediated and cell-specific interactions. In contrast, clinical studies of this phenomenon cannot confirm these experimental results.

John et al\(^2\) investigate this hypothesis by analyzing injured pregnant women who were entered in the National Trauma Data Bank (NTDB) from 2001 to 2005. By comparing pregnant and non-pregnant women using a multiple regression analysis with computer matching for covariates, these authors demonstrate that pregnant women were 40% less likely to die after an injury. Importantly, no differences in outcome were observed between pregnant and nonpregnant women who had an Injury Severity Score (ISS) more than 15, severe head or abdominal injury, or hypotension on admission. This group of patients is expected to be at greatest risk for death after injury. The authors conclude, perhaps speciously, that hormonal and physiologic differences during the gestation period may impact outcomes after trauma in pregnant women. Although these results will not resolve the debate about the impact of sex hormones on mortality after injury, a closer examination of the facts offers another plausible explanation.

Pregnant patients admitted to trauma centers who were reported to the NTDB were younger, had a lower ISS with less severe head and abdominal injuries, and were more often nonwhite and insured by Medicaid or not insured at all. The mortality rate of 1.1% among pregnant patients in this study is similar to the mortality rate of 1.4% in a previous study using the NTDB.\(^3\) The only analyzed subgroup in which the rate mortality was less during pregnancy was younger patients; however, neither the age range nor the number of deaths in this category was defined. Uninsured status has been associated with increased perinatal mortality, as uninsured patients are less likely to receive proper prenatal care, but a lack of insurance has been associated inconsistently with worse outcomes in other population-based studies of injured patients.\(^4\) The computerized matching process, the details of which are also unclear, potentially corrects for any differences in these parameters.

What else may impact these results? The frequency of urine testing for \(\beta\)-human chorionic gonadotropin is not reported. One must assume that women who were not tested were classified as not pregnant, which may not be an accurate assumption. No data on other hormonal confounders (exogenous hormone use, menstrual status, oophorectomy, etc) are available. More importantly, trauma triage guidelines from the Centers for Disease Control and Prevention recommend that injured women >20 weeks in gestation be evaluated at a level 1 or 2 trauma center. Many of these women are subsequently admitted either for their injuries or at least for short-term observation and fetal monitoring. This fact skews the study population to include patients with less...
serious injuries because nonpregnant women with more minor injuries are likely to be discharged from the emergency department and will not appear in the NTDB like their pregnant counterparts.

This study has not demonstrated a clear advantage to being pregnant when you are injured. The number of pregnant women who died, particularly in the subgroups, is not stated but must be small, which suggests that a difference of 1 or 2 deaths in any group or subgroup analysis would have a major impact on the results. We are not told the cause of death in these patients, and the accuracy of ISS could not be confirmed among those who died. Head injury is the most common cause of death from trauma during pregnancy and may not correlate as well with ISS as does injury in other body areas.

What are the implications of this study? Is there a physiologic or hormonal advantage to being pregnant if you are injured, but only if you are not injured too badly? Certainly, when evaluating and treating an injured pregnant patient, one should not rest any easier or change treatment plans based on these results.

REFERENCES