Ischemic preconditioning does not prevent placental dysfunction induced by fetal cardiac bypass

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May 16, 2022

Abstract

Background: Remote ischemic preconditioning (rIPC) has been applied to attenuate tissue injury. We tested the hypothesis that rIPC applied to fetal lambs undergoing cardiac bypass (CB) reduces fetal systemic inflammation and placental dysfunction. **Methods**: Eighteen fetal lambs were divided into 3 groups: sham, CB control, and CB rIPC. CB rIPC fetuses had a hindlimb tourniquet applied to occlude blood flow for 4 cycles of a 5-minute period, followed by a 2-minute reperfusion period. Both study groups underwent 30 minutes of normothermic CB. Fetal inflammatory markers, gas exchange, and placental and fetal lung morphological changes were assessed. **Results**: The CB rIPC group achieved higher bypass flow rates ($p<.001$). After CB start, both study groups developed significant decreases in PaO2, mixed acidosis and increased lactate levels ($p<.0004$). No significant differences on tissular edema were observed on fetal lungs and placenta ($p>.391$). Expression of toll-like receptor-4 and ICAM-1 in the placenta and fetal lungs did not differ among the 3 groups, as well as with VCAM-1 of fetal lungs ($p>.225$). Placental VCAM-1 expression was lower in the rIPC group ($p<.05$). Fetal interleukin-1 (IL-1) and thromboxane A2 (TXA2) levels were lower at 60 minutes post-CB in the CB rIPC group ($p<.05$). There was no significant differences in TNF-α, PGE2, IL-6 and IL-10 plasma levels of the three groups at 60-minute post-bypass ($p>.133$). **Conclusion**: Although rIPC allowed for increased blood flow during fetal CB and decreased in IL-1 and TXA2 levels and placental VCAM-1, it did not prevent placental dysfunction in fetal lambs undergoing CB.

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