

MOTHERISK UPDATE

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Electric shock during pregnancy

ABSTRACT

QUESTION A 24-year-old patient of mine, who was 23 weeks pregnant at the time, suffered a minor electric shock while using her hair dryer. She said she felt the current in her right hand and she was wearing shoes. She was observed in an emergency room for several hours and then discharged home. Is her pregnancy or fetus at risk now or later in the pregnancy?

ANSWER There are conflicting reports on how harmful electric shock is to a fetus. The clinical spectrum of electrical injury ranges from a transient unpleasant sensation felt by a mother and no effect on her fetus to fetal death either immediately or few days later. Several factors, such as the magnitude of the current and the duration of contact, are thought to affect outcome. In this case, it appears the current did not travel through her abdomen. Recommendations for fetal monitoring after electrocution have been published.

RÉSUMÉ

QUESTION Une de mes patientes, âgée de 24 ans, a subi un choc électrique mineur alors qu'elle était enceinte de 23 semaines en utilisant son séchoir à cheveux. Elle a dit avoir senti le courant dans sa main droite et elle portait des chaussures. Elle a été sous observation à l'urgence pendant quelques heures pour ensuite recevoir son congé. Sa grossesse ou son fœtus sont-ils à risque maintenant ou plus tard durant la grossesse?

RÉPONSE Il existe des rapports conflictuels sur les dommages causés à un fœtus par un choc électrique. Le spectre clinique des blessures électriques varie d'une sensation désagréable transitoire ressentie par la mère sans qu'il n'y ait d'effet sur le fœtus à une mort fœtale immédiate ou quelques jours plus tard. Divers facteurs, comme la magnitude du courant et la durée de contact, sont susceptibles d'influencer l'issue. Dans le cas présent, il semble que le courant ne soit pas passé par son abdomen. Des recommandations ont été publiées à l'effet de procéder à un monitoring fœtal après une électrocution.

Injuries from electric shock account for about 1000 deaths annually in the United States and comprise about 5% of admissions to burn centres. Electrocution is the fifth leading cause of fatal occupational injuries in the United States; 1% of household accidental deaths are caused by electrical injuries. More than 60% of reported electrical injuries are due to electrocution with 110- or 220-V current and most commonly result from failure to ground tools or appliances properly or from using electrical devices near water.¹

The spectrum of clinical injury from accidental electrical shock ranges from a transient unpleasant sensation after exposure to low-intensity current to sudden death due to cardiac arrest. Clinical manifestations are sometimes seen

immediately after contact, but might not become apparent until several hours after injury.¹

Several case reports²⁻⁹ and small case series¹⁰⁻¹² of serious complications, including fetal death, following electric shock have been published. Due to publication bias, reports of adverse outcomes are more often published than reports of normal outcomes. Hence, the literature does not reflect the usual outcome of contact with low-voltage current.

Rees¹⁰ reviewed the cases of four women who

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experienced electric shock during pregnancy. All four fetuses died: one due to spontaneous abortion in the first trimester; two ceased moving immediately after the injury and were aborted, and one died 3 days after delivery with burn marks on his body. Fatovich¹¹ reviewed a series of 15 victims of electric shock during pregnancy published in the English literature. The fetuses died in 73% of cases, and there was only one normal pregnancy outcome. Leiberman et al¹² reported on six pregnant women who suffered electric shock at home. In all cases, the current went from the hand to the foot, probably through the uterus, and all of the women felt fine after the incident. Three fetuses were still-born, two within a week of the electric shock and one after 12 weeks. All had severe intrauterine growth retardation.

One prospective cohort study of pregnant women who experienced electric shock was published by the Motherisk Program.¹³ Our results somewhat contradict previous findings. Of 31 pregnant women who called us, 28 were exposed to electric shock while using home appliances. Twenty-eight of these women delivered healthy newborns. One baby had a ventricular septal defect that closed spontaneously during early childhood, and two women had spontaneous abortions, one temporally related to the accidental injury, the other probably not associated with it. We found no differences in mean birth weight, gestational age at delivery, rates of cesarean section, or neonatal distress between electric-shock and control groups.

Risk factors

Some risk factors for unfavourable outcomes of pregnancy can be gathered from the cases in the literature. The magnitude of the current causing the electrocution is clearly a risk factor. High-voltage electric shock (eg,

from an electrified fence) that passed through the uterus resulted in fetal death.⁸ Lower voltages, such as the 110-V systems used in North America and the 220-V systems used mainly in Europe, caused fewer problems.¹³

The pathway along which the current traveled probably has the greatest effect on the outcome of pregnancy.¹³ The passage of current from hand to foot through the uterus could cause sudden contraction of the uterus. Amniotic fluid transmits current effectively,⁸ and this could increase risk of spontaneous abortions and fetal burns or death. Another confirmation of this is the relatively benign effects on fetuses of the electroconvulsive therapy (ECT) used to treat depression and psychosis during all three trimesters of pregnancy.¹⁴ During ECT, the current does not travel through the uterus.

Possible blunt trauma to the uterus after loss of consciousness and a fall is also of concern and illustrates the need to monitor both mother and fetus. Duration of current flow in the body, body weight,¹² and being wet during the electrical injury¹³ are also risk factors for more severe adverse outcomes.

Surveillance

Although fetal^{11,12,15} and obstetric¹¹ surveillance are recommended following electrical injury, there is no evidence that any form of monitoring or treatment has a direct effect on outcome. Recommendations for fetal monitoring after electric shock have been published.¹⁶ Before 20 weeks' gestation, no monitoring is needed. During the second half of pregnancy, fetal echocardiography is recommended if not performed earlier, and maternal electrocardiography (ECG) and fetal heart rate and uterine activity monitoring are recommended for 24 hours if the injury involved loss of consciousness, abnormal maternal ECG results, or known maternal cardiovascular illness. Any mechanical

injury to the mother (ie, a fall) is an indication for 4 hours' fetal and uterine monitoring.

Pregnant women suffering electric shock from low-voltage current, especially the 110-V current used in North America, which did not pass through the uterus and had no or minor adverse effects on the mother, would likely have no immediate effect on a fetus. Nonetheless, the effect of electrical injury on the outcome of pregnancy is still controversial, and only larger prospective observational studies could give us a better understanding of expected outcomes and requirements for monitoring.

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