

Thermal Effect of J-Plasma[®] Energy in a Porcine Tissue Model: Implications for Minimally Invasive Surgery

Jasmine D Pedroso ¹, Melissa M Gutierrez ¹, K Warren Volker ¹, David L Howard ¹

Affiliations + expand

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Abstract

Objective: To evaluate tissue effect of J-Plasma[®] (Bovie Medical Corporation, Clearwater, Florida) in porcine liver, kidney, muscle, ovarian, and uterine tissue blocks.

Design: Prospective study utilizing porcine tissue blocks to evaluate the thermal spread of J-Plasma[®] device on liver, kidney, muscle, ovarian, and uterine tissue at various power settings, gas flow, and exposure times.

Materials and methods: J-Plasma[®] helium was used in porcine liver, kidney, and muscle tissue at 20%, 50%, and 100% power, and 1 L/min, 3 L/min, and 5 L/min gas flow at one, five, and 10-second intervals. J-Plasma[®] was then used in ovarian and uterine tissue at maximum power and gas flow settings in intervals of one, five, 10, and 30 seconds. Histologic evaluation of each tissue was then performed to measure thermal spread.

Results: Regardless of tissue type, increased power setting, gas flow rate, and exposure time correlated with greater depth of thermal spread in liver, kidney, and muscle tissue. J-Plasma[®] did not exceed 2 mm thermal spread on liver, kidney, muscle, ovarian, and uterine tissue, even at a maximum setting of 100% power and 5 L/min gas flow after five seconds. Prolonged exposure to J-Plasma[®] of up to 30 seconds resulted in increased length and width of thermal spread of up to 12 mm, but did not result in significantly increased depth at 2.84 mm.

Conclusions: The J-Plasma[®] helium device has minimal lateral and depth of thermal spread in a variety of tissue types and can likely be used for a multitude of gynecologic surgical procedures. However, further studies are needed to demonstrate device safety in a clinical setting.

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