

TONSILLECTOMY TECHNIQUE AND DEGREE OF THERMAL INJURY

Jennifer D. McLevy, Steven P. Tinling, PhD. (1) Craig W. Senders, M.D. (1)

1) Department of Otolaryngology, University of California - Davis

Hypothesis:

Thermal injury will significantly vary by tonsillectomy technique.

Purpose:

Many techniques have been developed to minimize bleeding and post-operative pain associated with tonsillectomy. Tissue thermal injury is postulated as a contributor to post-operative pain. We hypothesize that heat load and depth of histopathology will vary as a function of five different tonsillectomy techniques.

Methods:

We used monopolar cautery (M), bipolar cautery (B), coblation (C), thermal welding (W), and plasma knife (P) to section latissimus dorsi muscle in a live porcine model. Strips 1 centimeter (cm) wide by 0.5cm deep were sectioned at 5cm intervals. Thermal tissue images were recorded with each cut. The tissue was then harvested, fixed, sectioned and measured histomorphometrically. Change in surface temperature with time and thermal injury degree (depth of surface necrosis, depth of collagen denaturation, and edema zone length) were then quantified.

Results: All data is listed respective to the following treatment order: M, B, C, W, and P.

Thermal Data: Maximum tissue surface temperatures were respectively: 108, 104, 100, 97, and 114 degrees Fahrenheit (°F) and by 20 seconds they were respectively: 94, 98, 98, 90, 95 °F.

Histopathology: The average depth of 1) surface necrosis was 0.09, 0.16, 0.01, 0.02 and 0.025 millimeters (mm), 2). The average depth of collagen denaturation was 1.5, 2.9, 0.3, 0.6, and 1.7 mm. The average edema zone length was 0.4, 0.7, 0.5, 0.2, and 0.5 mm.

Conclusion: There appear to be significant thermal injury differences by tonsillectomy technique in heat load, heat dissipation and histopathology measures.