Abstract

Background: Stray energy transfer from monopolar instruments during laparoscopic surgery is a recognized cause of potentially catastrophic complications. There are limited data on stray energy injuries in robotic surgery. We sought to characterize stray energy injury in the form of superficial burns to the skin surrounding laparoscopic and robotic trocar sites. Our hypothesis was that stray energy burns will occur at all laparoscopic and robotic port sites.

Methods: We conducted a prospective, randomized controlled trial of patients undergoing elective unilateral inguinal hernia repair at a VAMC over a 4-year period. Surgery was performed via transabdominal preperitoneal approach either laparoscopic-assisted (TAPP) or robotic-assisted (rTAPP). A monopolar scissor was used to deliver energy at 30W coagulation for all cases. At completion of the procedure, skin biopsies were taken from all the port sites. A picro-Sirius red stain was utilized to identify thermal injury by a blinded pathologist.

Results: Over half (54%, 59/108) of all samples demonstrated thermal injury to the skin. In the laparoscopic group, 49% (25/51) samples showed thermal injury vs. 60% (34/57) in the robotic group ($p = 0.548$). The camera port was the most frequently involved with 68% (13/19) rTAPP samples showing injury vs. 47% (8/17) in the TAPP group ($p = 0.503$). There was no difference in the rate of injury at the working port site (rTAPP 53%, 10/19 vs. TAPP 47%, 8/17; $p = 0.991$) or the assistant port site (rTAPP 58%, 11/19 vs. TAPP 53%, 9/17; $p = 0.873$).

Conclusions: Stray energy causes thermal injury to the skin at port sites in the majority robotic laparoscopic TAPP inguinal hernia repairs. There is no difference in stray energy transfer between the laparoscopic and robotic platform. This is the first study to confirm in-vivo transfer of stray energy during robotic surgical procedures. More study is needed to determine the clinical significance of these thermal injuries