Versatile applications of BeamPath® CO_2 laser in robotic-assisted gynecological laparoscopic surgeries

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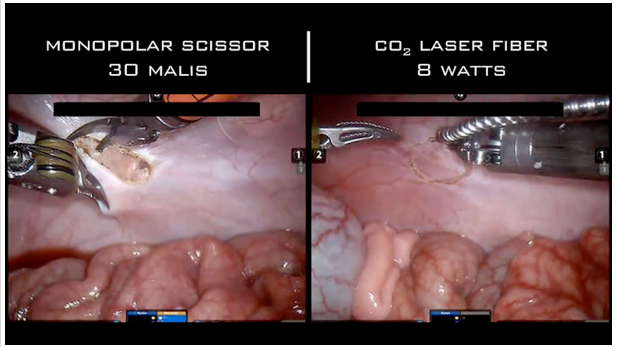
STUDY OBJECTIVE

Although the benefits of CO_2 lasers in gynecologic procedures are well understood, the cumbersome nature of the traditional design has limited its applicability in robotic-assisted laparoscopic procedures. The recent availability of the BeamPath® CO_2 laser fiber, however, may allow surgeons to precisely deliver the energy to the most intricate surgical areas. The objective of this study was to assess the utility of this instrument in robotic-assisted endometriosis procedures.

41ST AAGL GLOBAL CONGRESS ON MINIMALLY INVASIVE GYNECOLOGY

CAESARS PALACE • LAS VEGAS, NEVADA • NOV. 5-9, 2012

VIDEO: CO_2 LASER FIBER TECHNOLOGY



The precision of the CO_2 laser fiber in a robot-assisted application is shown here in a porcine model. The CO_2 laser causes noticeably less thermal damage than the monopolar.

DESIGN

The utility of the CO_2 laser fiber was evaluated in a series of robotic-assisted endometriosis procedures. Techniques for cutting, vaporization, fulguration, and coagulation were characterized.

SETTING

Community-based, teaching urban hospital with advanced laparoscopic and robotic technology.

PATIENTS

Five patients undergoing robotic-assisted laparoscopic surgeries for the treatment of endometriosis.

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MEASUREMENTS & MAIN RESULTS

The CO_2 BeamPath® fiber system was successfully utilized to treat patients with different stages of endometriosis. Unlike traditional CO_2 laser systems, the BeamPath® is able to be delivered through the robotic surgical platform through an instrument that attaches to the standard needle driver arm. Furthermore, the CO_2 laser fiber features a divergent beam that allows the surgeon to vary the depth of tissue penetration by changing the distance from the tissue. The divergent beam enables versatility between four different modes of laser interaction: cutting, vaporization, fulguration, and coagulation (see Figures 1 and 2). Additional range in penetration depth can be achieved by changing the laser power setting. Each mode of laser tissue interaction is demonstrated using a representative video clip.

FIGURES

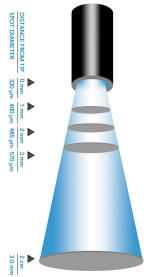


Figure 1: As the distance from the tissue increases, there is an increase in spot size and a corresponding decrease in power density.

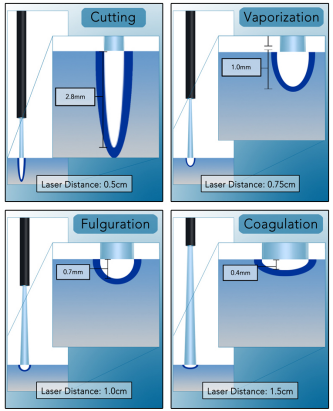
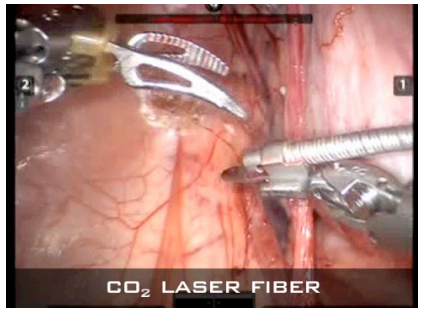


Figure 2: The divergent beam enables the surgeon to control tissue interaction by altering the distance from the tissue. Calculation based on 8W power setting and 1s dwell time with GYN-L laser fiber (McKenzie AL, Phys. Med. Biol., 1983, 28(8):905-12.

VIDEO: VERSATILITY OF TISSUE INTERACTION



CONCLUSIONS

Laser technology used in robotic gynecologic procedures is safe, precise and versatile technique which provides additional options for surgeons. Adequate knowledge of various laser applications is imperative to enable this precise and sophisticates technology to treat more challenging disorders.