Use of the GaAlAs Diode Laser in an Equine General Surgery Practice

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The gallium aluminum arsenide (GaAlAs) diode laser is a portable and convenient alternative to the Nd:YAG laser for contact laser surgery in equine practice. This laser can be used in the field and has no special power or cooling requirements. Author's address: New Jersey Equine Clinic, 384 Millstone Rd., Clarksburg, NJ 08510. © 1997 AAEP.

1. Introduction

The CO₂ and Nd:YAG lasers have served equine surgeons for many years at two complementary wavelengths.¹⁻³ The widespread use of these lasers has been limited by cost, the requirement for advanced technical training, and their size, weight, and lack of portability, which restricted their use to a hospital or clinic setting. The GaAlAs diode laser is a relatively new laser that provides the capability for transendoscopic and open contact laser surgery in a portable and convenient package.⁴ This report describes the clinical application of the GaAlAs diode laser in an equine general surgery practice.

2. Materials and Method

The GaAlAs diode laser⁵ is a semiconductor laser that emits light in the near-infrared range of the electromagnetic spectrum at 810 nm ± 25 nm. This laser is air cooled, compact (24 cm × 38 cm × 11 cm), weighs 7 kg, and operates with line voltage in the range of 100–240 V, 50–60 Hz. This diode laser is microprocessor controlled and was used in this study in conjunction with a conventional Nd:YAG 800-µm-diameter flexible fiber-optic contact delivery system.⁶ The power output of this laser is from 0.5 to 20 W and uses continuous, single pulse, and repeat pulse modes. The surgical technique for this laser was the same as that used for Nd:YAG contact surgery. For transendoscopic procedures, the fiber was passed through the biopsy channel of the endoscope. For general surgical applications, the fiber was used in conjunction with a general surgical handpiece. Laser safety precautions appropriate for near-infrared wavelengths were followed in all cases.

3. Results

Twenty-two operations were performed with the GaAlAs diode laser, including ten general surgery procedures, nine transendoscopic procedures of the upper airway, one transendoscopic intrauterine procedure, and two cutaneous tumor removals. The GaAlAs diode laser and a flexible contact fiber delivery system were used for both transendoscopic and general surgical dissection. Contact dissection was performed with moderate hemostasis, using 12–20 W of continuous power. Noncontact coagulation of blood vessels was easily accomplished with these powers. A histopathologic examination of surgical specimens indicated that the diode laser...
exerts a thermal effect upon tissue that is similar to that produced by the Nd:YAG and CO₂ lasers. The mean width of coagulated tissue at the margin of surgical specimens was 0.25 ± 0.05 mm (range 0.20–0.33 mm). At maximum output, this laser did not generate an adequate power density for the noncontact vaporization of tissue.

4. Discussion

The GaAlAs diode laser is an effective and convenient alternative to the Nd:YAG laser for contact dissection in equine general surgery. The flexible contact fiber delivery system provides for both transendoscopic and open general surgical applications. This laser is user friendly and portable, offering equine surgeons a unique and versatile general surgical instrument. The portability of the diode laser will enable veterinarians to perform selected laser-assisted surgical procedures in the stable. Whether the laser is used in a hospital or stable environment, appropriate laser safety procedures must be strictly observed in order to prevent accidental injury to the patient or attendants. The current power limitations of this laser restrict its use to contact dissection and hemostasis.

References and Footnotes


bSharplase frosted conical 800-µm bare continuous wave Nd:YAG disposable fiber delivery system, Sharplan Lasers Inc., Allendale, NJ 07401.