

Management Of Intratracheal Fire During Laser Surgery In Veterinary Medicine

P Lierz, M Lierz, B Gustorff, P Felleiter

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Abstract

An intratracheal fire represents an unusual but nevertheless possible complication during laser surgery in the tracheobronchial system. The incidence of fire in the respiratory tract during laser surgery is stated as being between 0,4% and 1,5 %. A plan should therefore be in place to avoid this catastrophic complication, or, in the event.

INTRODUCTION

The use of lasers for surgical procedures has played a major role in modern medicine since approximately 1960₁.

Veterinary medicine also makes standard use of lasers for various organ systems. Several studies have shown the advantages of lasers for peri-anal and rectal surgery₂, as well as for onychectomies₃ and dental procedures₄. Surgical laser operations on birds include endoscopic castration₅ and removal of fungal granulomas from the respiratory tract. Lasers are especially advantageous for these procedures because of the minimal amount of trauma and blood loss₆.

As in human medicine, a fire in the operating room can lead to fatalities for both patient and physician_{7,8,9}.

Various recommendations have been suggested for avoiding complications while using lasers for medical purposes. In addition to the guidelines proposed by the American National Standards Institute₇, other publications have also described safety procedures for surgical laser use_{10,11}. These publications mainly delineate how to avoid general complications₁₂. In case of a fire, an emergency plan must exist for every surgical field using lasers. Simple guidelines have already been described for this specific emergency. However, operations involving the respiratory tract are particularly problematic, especially in birds, due to their extensive air sack system. Since these procedures are in the beginning stages not only for veterinary medicine in general, but especially for birds specifically, it is important to emphasize the risks that are already well known from experience in human medicine. In particular, the danger of intra-tracheal fire must be mentioned. If an intra-tracheal/-

bronchial fire or explosion cannot be prevented, an emergency plan must be readily available to regain control during this particular complication. Most publications concerning intra-tracheal fire are based on experience from many years of laser use in human medicine. These guidelines can be easily transferred to veterinary medicine.

DISCUSSION

An intratracheal fire represents an unusual but nevertheless possible complication during laser surgery in the tracheobronchial system_{4,5,6,13}. The incidence of fire in the respiratory tract during laser surgery is stated as being between 0,4% and 1,5 %₁₄. A plan should therefore be in place to avoid this catastrophic complication, or, in the event_{4,5}.

- Complete wrapping of the tube in film or the use of special tubes_{4,6,10} to protect the tube in case of damage caused by laser.
- In the case of fire in the respiratory tract at least two syringes filled with sodium chloride should always be at the ready to extinguish the fire.
- The patient's eyes should be covered by swabs soaked in sodium chloride. Oil - Water based ointments should be avoided as these could be set on fire by the laser beam₃.
- In the event of the tube catching fire its immediate removal is necessary. It should therefore, not be unduly secured and be easily accessible for the veterinarian₃.

- When undertaking laser surgery in the tracheobronchial system depending on the animal a PEEP from +5 to +10 cm H₂O should be chosen¹⁵. The permanent pressure inside the tube reduces the incidence of inflammation caused by the perforation of the tube⁵. During a tube explosion the positive pressure in the lung counteracts the flame or the cloud of explosive gases, preventing hot toxic gases from penetrating the lower respiratory tract¹³.
- The reduction of the inspiratory oxygen concentration to under 30 % clearly reduces the risk of inflammation or explosion in the respiratory tract^{13,14,16,17}.
- The possibility of a sudden tracheotomy during intratracheal laser surgery, in case of fire⁶.

In the case of fire, and when a total intravenous anesthetic was not administered, the supply of all anesthetic gases, including oxygen, should be cut off immediately and the tube disconnected. Highly dosed corticosteroids are recommended after the fire has been extinguished and 100 % oxygen, given by mask, should be administered¹².

The above points can help make laser surgery in the tracheobronchial system safer and also control possible complications more easily.

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Author Information

Peter Lierz, M.D.

Department of Anaesthesiology, Intensive Care and Pain Medicine, Marienkrankenhaus Soest

Michael Lierz, Dr. med vet MRCVS

Institute for Poultry Diseases, Free University of Berlin

Burkhard Gustorff, MD Prof

Dept. of Anaesthesia and Intensive Care (A), University of Vienna

Peter Felleiter, MD

Department of Intensive Care, Swiss Paraplegic Center