ORO-ENDOTRACHEAL INTUBATION IN THE RAT

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SUMMARY

A method of endotracheal intubation without tracheostomy in the rat is described. It involves the use of a very small laryngoscope for direct vision, and the use of a Seldinger guide wire technique for placing a nylon cannula between the vocal cords into the trachea. Deep surgical anaesthesia with positive pressure respiration and halothane/oxygen can be maintained for over 5 hours with recovery to righting reflex within 30 min of stopping the halothane.

With this in mind, an attempt was made to develop a system of oro-endotracheal intubation and ventilation that would be atraumatic and thus allow prolonged use with total heparinization; in addition, it should permit bronchial suction, rapid removal and replacement of the endotracheal tube when necessary, and should have sufficient ventilatory reserve capacity to correct some of the gas exchange problems that might occur as a result of cardiothoracic surgery.

METHOD

Wistar rats of approximately 250 g were used. An attempt to develop an endotracheal tube with an inflatable cuff was soon abandoned as the lumen/cuff ratio was unrealistic and the deflated cuff made insertion extremely difficult; the resulting damage to the mucosa rendered subsequent heparinization disastrous.

The method finally evolved was to use a Portex type nylon intravenous cannula (6 FG, 2.10 mm o.d. yellow) with the tube reduced to 6 cm in length and cut with a chisel-shaped tip. A miniature laryngoscope (fig. 2) was made from a nasal speculum with a small light* attached to the inner side with epoxy adhesive. However, even with the excellent exposure created by the laryngoscope it was still often difficult to intubate without invoking excess mucus and a little damage to the cords. This problem was resolved by adapting the Seldinger vessel cannulation technique to intubation (fig. 3), in which a blunt-ended spiral wire was inserted under direct vision through the cords, after which the nylon endotracheal tube was passed over the wire and between the cords without difficulty. The wire was then removed and...
Fig. 1. Diagram of technique of endotracheal intubation procedure. Animal on its back.
(1) View of cords obtained with laryngoscope (upper blade with light illuminating pharynx).
(2) Guide wire passed between cords.
(3) Endotracheal tube being passed over wire and about to separate the cords.
(4) Tube in position, wire removed, and Luer fitting (nearest camera) ready for attaching to ventilator.
ENDOTRACHEAL INTUBATION IN THE RAT

Fig. 2. (Top) Miniature laryngoscope made from nasal speculum. (Middle) Endotracheal tube made from nylon intravenous cannula (Portex type—yellow, 6FG, o.d. 2.10 mm, 6 cm long shaft). (Bottom) Short length (approx. 20 cm) of Seldinger spiral wound guide wire.

Fig. 3. Diagram of technique of endotracheal intubation in the rat.
(A) Seldinger guide wire passed between cords.
(B) Chisel-tipped endotracheal tube passed over guide wire and about to separate the cords; the chisel-tip axis at right angles to the cords.
(C) Endotracheal tube through cords and guide wire removed to connect Luer fitting of tube to respirator.

that the endotracheal tube can be simply and rapidly changed in a blind manner without the use of the laryngoscope, merely by passing the wire down the tube, removing the tube, and threading a new tube over the wire. In practice, this is rarely necessary since the tube can be used, even in the absence of atropine, for several hours without blocking.

Ventilation was carried out with a Palmer respirator at a rate of 72 b.p.m. and a tidal volume of 3-5 ml. Halothane and oxygen was used both for induction (with a cowl) and maintenance of anaesthesia. The anaesthetic apparatus was a modified version of that described by Parbrook (1966). The efficiency of the ventilation was demonstrated by arterial Po2 values as high as 500 mm Hg and PCO2 values as low as 11 mm Hg. Deep surgical anaesthesia could be maintained for over 5 hours with prompt recovery to a righting reflex within 30 min of stopping the halothane.

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REFERENCES


ORS-ENDOTRACHEALE INTUBATION DER RATTE

ZUSAMMENFASSUNG


INTUBATION ORO-ENDOTRACHEALE SANS TRACHEOSTOMIE CHEZ LE RAT

SOMMAIRE

Une méthode d'intubation endotracheale sans trachéostomie chez le rat est décrite. Elle comprend l'emploi d'un très petit laryngoscope pour vision directe, et l'utilisation d'une technique de fil Seldinger comme guide pour la mise en place d'une canule en nylon entre les cordes vocales dans la trachée. Une anesthésie chirurgicale profonde avec respiration sous pression positive et halothane/oxygène peut être maintenue pendant plus de 5 heures avec rétablissement du reflexe de redressement dans les 30 minutes après l'arrêt de l'administration d'halothane.

ORS-ENDOTRAQUEAL INTUBATION EN LA RATA

RESUMEN

Es descrito un método de intubación endotraqueal sin traqueostomía en la rata. Consiste en el uso de un laringoscopio muy pequeño para la visión directa y el uso de la técnica con un alambre guía de Seldinger para colocar una cánula de nilón entre las cuerdas vocales dentro de la tráquea. Se puede mantener durante más de 5 horas una profunda anestesia quirúrgica con respiración con presión positiva y halotano/oxígeno con recuperación del reflejo de enderezamiento dentro de los 30 minutos después de suspender la anestesia.

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