TRACHEAL TUBE CUFF INFLATION AS AN AID TO BLIND NASOTRACHEAL INTUBATION

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SUMMARY

We have assessed the efficacy of tracheal tube cuff inflation in the oropharynx as an aid to blind nasotracheal intubation in 20 ASA I and II patients undergoing elective oral surgery. The trachea was intubated once using the technique of tracheal tube cuff inflation in the oropharynx and once keeping the tracheal tube cuff deflated throughout the manoeuvre. With the cuff deflated, intubation was successful in nine of 20 (45%) patients; in eight of 20 (40%) it was successful on the first attempt. With the tracheal tube cuff inflated, intubation was successful in 19 of 20 patients (95%), 15 of 20 (75%) of these on the first attempt. The success rates were significantly different (P < 0.01). Times to intubate were not significantly different (P > 0.05). We conclude that, in normal patients, tracheal tube cuff inflation in the oropharynx increases the success rate of blind nasotracheal intubation. (Br. J. Anaesth. 1993; 70: 691-693)

KEY WORDS

Intubation: blind nasotracheal.

Blind nasotracheal intubation is a useful technique, although malpositioning results in variable success rates. Several manoeuvres have been described in order to avoid this problem. Inflation of the tracheal tube cuff has been described in a case report as an aid to blind nasotracheal intubation [1], although its efficacy has not been assessed formally. This prospective, randomized study was designed to determine if tracheal tube cuff inflation in the oropharynx improves the success rate of blind nasotracheal intubation in normal, paralysed patients.

METHODS AND RESULTS

After Institutional Review Board approval, informed consent was obtained from 20 ASA I and II patients scheduled to undergo elective oral surgery requiring nasotracheal intubation. Patients with airway abnormalities such as tracheal deviation were excluded.

After premedication with ranitidine 150 mg and sodium citrate 30 ml orally, and after preoxygenation for 3 min, anaesthesia was induced with thioentalone 5 mg kg⁻¹ and fentanyl 2 μg kg⁻¹ i.v. Neuromuscular block was produced with vecuronium 0.1 mg kg⁻¹ and monitored using a peripheral nerve stimulator. Additional intraoperative monitoring consisted of electrocardiography, capnography, finger pulse oximetry and non-invasive automated arterial pressure measurement. Arterial pressure was recorded at 1-min intervals.

The patient's lungs were ventilated with 1% isoflurane in oxygen using a face mask until complete muscle paralysis was demonstrated using the nerve stimulator. Patients were positioned supine with the head placed in the "sniffing" position before intubation. A size 7.0- or 8.0-mm polyvinylchloride cuffed tracheal tube was selected according to the patient's weight. The distance from the nostril to the oropharynx was estimated by aligning the tracheal tube against the side of the patient's face before intubation. The tracheal tube was then introduced via the right nostril and advanced until there was a loss of resistance and the tip was positioned in the oropharynx.

The trachea was intubated blindly by a junior resident, once using the technique of cuff inflation and once keeping the cuff deflated throughout the manoeuvre. The order of intubation was determined using a table of random numbers. The times taken to intubate the trachea and the number of attempts and failures were recorded for each procedure.

The tracheal tube cuff was inflated in the oropharynx using 15 ml of air [1] and then advanced gently by the anaesthetist until slight resistance was felt as the inflated cuff made contact with the vocal cords. At that time it was deflated and the tracheal tube advanced into the trachea, whereupon the cuff was reinflated (fig. 1).

The time taken to intubate the trachea was measured from the moment the anaesthetist held the tracheal tube with its tip already positioned in the oropharynx, until correct tracheal placement was confirmed by an end-tidal carbon dioxide partial pressure greater than 3.3 kPa.

After satisfactory insertion of the tracheal tube, the patient's lungs were ventilated manually for 1 min. The tube was then withdrawn to its pharyngeal position and the same anaesthetist intubated the trachea using the second technique.
FIG. 1. Technique of tracheal tube (TT) cuff inflation in the oropharynx for blind nasotracheal intubation. a: The tip of the TT is positioned in the oropharynx. b: The cuff is inflated using 15 ml of air and the TT is advanced until the cuff contacts the vocal cords. c: The cuff is deflated and the TT is advanced into the trachea.

A maximum of three attempts was allowed for each intubation. If at any time the arterial oxygen saturation decreased to less than 90% or if cardiovascular variables changed more than 20% from baseline values, the procedure was abandoned, the patient excluded from the study and intubation performed using direct laryngoscopy. If the first procedure failed three times, the second procedure was performed. If the second procedure failed three times, the trachea was intubated using direct laryngoscopy.

Data were expressed as mean (SD) and analysed using the chi-square and paired Student’s t tests as appropriate. P < 0.05 was considered significant.

Two of the patients were female and 18 male. Their ages ranged from 18 to 60 yr (mean 34 yr), their weights from 57 to 92 kg (mean 72 kg). Intubation was successful in nine of 20 patients (45%) when the tracheal tube cuff was kept deflated throughout, and in 19 of 20 patients (95%) using the technique of tracheal tube cuff inflation in the oropharynx. This difference in success rates was statistically significant (P < 0.01). Intubation was unsuccessful in one patient using both techniques. Mean times to intubate were 22.3 (10.9) s with the cuff deflated and 26.2 (15.0) s with the cuff inflated. This difference was not statistically significant (P > 0.05). Success on the first attempt at intubation occurred in eight of 20 subjects (40%) with the cuff deflated, but in 15 of 20 subjects (75%) when the tracheal tube cuff was inflated in the oropharynx.

COMMENT

Blind nasotracheal intubation was first described by Magill in spontaneously breathing patients using breath sounds as a guide to placement [2], and still remains a useful technique. In certain circumstances, such as pharyngeal bleeding, it may be preferable to fibreoptic intubation [3]. However, misplacement of the tracheal tube is a problem. It may become positioned in the oesophagus, on the anterior commissure of the larynx, in the vallecula or in the pyriform fossa. Techniques for aiding correct placement other than listening for breath sounds include flexion, extension or rotation of the neck, rotation of the tracheal tube and digital manipulation of the larynx [4]. Also, a fibreoptic bronchoscope may be passed through the tube [5].

We have shown that tracheal tube cuff inflation in the oropharynx is effective in improving the success rate of blind nasotracheal intubation in paralysed patients.

In the presence of normal pharyngeal anatomy, inflation of the tracheal tube cuff in the oropharynx is assumed to centre the tip of the tube and to direct it anteriorly towards the larynx. As a result, misplacement of the tracheal tube into the oesophagus or pyriform fossa may be avoided. Cuff inflation in the oropharynx could theoretically traumatize the upper respiratory tract. We did not perform postoperative laryngoscopy, but believe that cuff inflation would cause less trauma than multiple attempts at intubation. This technique does not require any additional equipment or manipulation of the head or neck and may be useful in cases of cervical spine trauma or immobility. It remains to be established if this technique improves the success rate of blind nasotracheal intubation in cases of difficult intubation. Further controlled studies in this area would be valuable.

REFERENCES