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AWAKE FIBREOPTIC INTUBATION IN THE PATIENT AT HIGH RISK OF ASPIRATION

A. OVASSAPIAN, T. C. KREJCIE, S. J. YELICH AND M. H. M. DYKES

SUMMARY

This report describes our experiences with 129 awake oral and nasal fibreoptic intubations in 123 patients considered to be at high risk of aspiration of gastric contents. I.v. sedation was used on all but six occasions. Local anaesthesia was applied to the larynx and trachea through the working channel of the fibrescope on 85 occasions, and by transtracheal injection on 29. Rigid laryngoscopy was necessary after fibreoptic laryngoscopy failed in one patient (with a bleeding peptic ulcer) who vomited a large amount of fresh and clotted blood. No other patient regurgitated during the procedure, and no patient developed evidence of aspiration.

Aspiration of gastric contents remains an important cause of morbidity and mortality in patients requiring general anaesthesia for emergency surgery [1–3]. None of the anaesthetic techniques for preventing this complication is either completely successful or always applicable [2]. However, isolation of the trachea from the gastrointestinal tract with a cuffed tracheal tube is perhaps the best method for preventing aspiration. There are two techniques, each associated with its own hazards, used commonly for this purpose [2–4]. First, a rapid sequence induction and tracheal intubation following pre-oxygenation and cricoid pressure [4–6]; and second, intubation of the trachea in an awake patient using a rigid laryngoscope [7–9]. There do not appear to be any well controlled clinical trials comparing these two techniques.

Depending on the details of its performance, the hazards and difficulties of a rapid sequence induction and intubation include: incomplete relaxation; coughing during intubation; problems with cricoid pressure; regurgitation; cardiovascular changes; mechanical problems; difficult intubation; delayed intubation; failed intubation; cyanosis and cardiovascular collaspe [4–6, 10–12]. The hazards and difficulties of an awake rigid intubation include: any condition which results in a lack of rapport between the patient and anaesthetist; discomfort for the patient; aspiration because of either topical anaesthesia applied to larynx or heavy sedation [2, 7, 8, 10, 13, 14].

Awake tracheal intubation using a flexible fibreoptic endoscope should be a valuable alternative, because it increases the frequency of success if the intubation proves to be difficult [15–17], and minimizes the trauma and discomfort [16–18], and cardiovascular responses [19–20] associated with rigid laryngoscopy. In addition, awake fibreoptic laryngoscopy also appears to have a higher success rate than awake rigid laryngoscopy, even in patients who are not judged to present potentially difficult intubation [20]. As there do not appear to be any carefully documented reports describing the use of this technique for such patients, this descriptive report summarizes our experience with 129 awake fibreoptic tracheal intubations in 121 patients considered to be at high risk of aspiration of gastric contents.

PATIENTS AND METHODS

During a 6-yr period, two women and 121 men (mean age 60 (SD 12) yr; 78 (20) kg) considered at high risk of aspiration of gastric contents, underwent tracheal intubation with a flexible fibreoptic bronchoscope or laryngoscope (fibrescope) on 129 occasions, while awake (table I). All fibreoptic intubations performed on such patients during

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ANDRANIK OVASSAPIAN, M.D.; TOM C. KREJCIE, M.D.; SHARON J. YELICH, M.D., MICHAEL H. M. DYKES, M.D., M.ED.; Anesthesia Service, Veterans Administration Lakeside Medical Center, 333 East Huron Street, Chicago, Illinois 60611, U.S.A. Accepted for Publication: May 31, 1988.

Correspondence to A.O.

TABLE I. *Categories of patients at high risk of aspiration of gastric contents*

Category	No.
Emergency	
Acute abdomen	36
Miscellaneous operations (non-abdominal)	22
Small/large bowel obstruction	15
Upper gastrointestinal bleeding	10
Ludwig's angina/peritonsillar abscess	6
Non-emergency	
Presence of hiatus hernia	28
Intermittent bowel obstruction	7
Gastric outlet obstruction	3
Oesophageal diverticulum	2
Total	129

TABLE II. *Patients at high risk for aspiration also considered to present a difficult tracheal intubation*

Category	No.
Anticipated difficult intubation	
Ludwig's angina	6
Cervical and temporomandibular arthritis	5
Morbid obesity	3
Features such as a short thick neck, protruding upper incisors, large tongue or narrow mouth opening	5
Failed intubation with rigid larynoscope or by blind nasal approach	3
Known previous difficult intubation	3
Total	25

this period are included. The technique was used in 25 patients because of pathophysiological conditions which suggested that intubation would be difficult (table II); in the other patients it was chosen as the personal preference of the anaesthetist. All patients were interviewed before operation and verbal consent obtained. The patients were ASA physical status I or II (33 occasions), III (69 occasions), and IV (27 occasions). There were 39 nasal and 90 oral intubations. On 43 occasions premedication comprised diazepam 5–10 mg by mouth, or morphine sulphate 5–10 mg i.m., or both, in addition to atropine 0.4 mg i.m.; on 38 occasions the patients received only atropine, and on 48 occasions no premedication was given.

After insertion of a venous cannula and application of appropriate monitors, i.v. sedation was administered until the patient fell into a light sleep if unstimulated, but was still responsive to command and able to carry out instructions that might be given. On six occasions no sedation was used. The other patients received either a combination of diazepam 0.07 (0.03) mg kg^{-1} and fentanyl 1.7 (0.9) μg kg^{-1} ($n = 87$), or fentanyl ($n = 33$) or diazepam alone ($n = 3$), depending on age, general physical and medical status, condition of the airway, and any current use of drugs or alcohol. No local anaesthesia was used on 15 occasions, while on 29 occasions 4% lignocaine 3 ml was injected through the cricothyroid membrane. On the remaining 85 occasions, 4% lignocaine 4 ml was sprayed through the working channel of the fibrescope as described below.

For orotracheal intubation the mucus membranes of the mouth and pharynx were anaesthetized with five short sprays of benzocaine–amethocaine (Cetacaine) followed by application of benzocaine (Americaine) ointment to the base of the tongue. The intubating airway was inserted and the tracheal tube positioned in it. For nasotracheal intubation the nasal mucosa was anaesthetized by topical application of 4% cocaine, and the tracheal tube inserted through the nostril into the nasopharynx. In both circumstances the fibrescope was introduced through the tracheal tube and advanced until the vocal cords were identified. The fibrescope was passed into the trachea and the tracheal tube passed over it without delay when either no or transtracheal local anaesthetic had been applied. On the remaining 85 occasions the larynx was sprayed first with 4% lignocaine 2 ml through the working channel of the fibrescope, the tip of the fibrescope was advanced into the trachea 30 s later followed by a second spray of 4% lignocaine 2 ml to the trachea, and the tracheal tube was passed immediately into the trachea.

In all patients, gross evidence of aspiration of gastric contents into the trachea was sought through the fibrescope while it was withdrawn. Any complication encountered during intubation and the success or failure of the attempt were recorded. All patients were interviewed and examined after operation. Data obtained included symptoms or signs of aspiration in the immediate postoperative period (dyspnoea, respiratory distress, cyanosis, fever, tachypnoea, diffuse râles, bronchospasm and gross evidence of airway obstruction or atelectasis on physical examination), and radiological evidence of aspiration pneumonitis within 24 h of the operation. In the absence of such evidence, the patients were considered not to have suffered clinically significant aspiration. Clinical and radiological evi-

dence of any other pulmonary complication during the postoperative period was also sought.

RESULTS

Fibreoptic intubation was successful in 128 of the 129 attempts, with no evidence of regurgitation or aspiration during any of the procedures. The only failure was in a 77-yr-old male (with a bleeding peptic ulcer) who vomited a large amount of fresh and clotted blood, during attempted nasotracheal intubation, and this obscured vision through the fibrescope. A rigid laryngoscope was used to complete the intubation. The only patient in whom two attempts with the fibrescope were required was a 68-yr-old male with a small bowel obstruction who developed laryngospasm and coughing, and vomited liquid material during attempted orotracheal intubation without laryngotracheal topical anaesthesia. The fibrescope was removed, the oropharynx cleared and, on reinsertion of the fibrescope, the vocal cords were seen and sprayed with 4% lignocaine 2 ml; 45 s later the fibrescope and then the tracheal tube were advanced successfully into the trachea. None of these two patients exhibited immediate symptoms or signs of aspiration and there were no pulmonary complications detected after operation. Six patients who underwent major intra-abdominal operations developed postoperative pulmonary complications: two had pleural effusions, one atelectasis and three infiltrates in the lungs. All complications developed after the first day after operation and none was thought to have resulted from aspiration.

Complications occuring during intubation included laryngospasm on 10 occasions and moderate to severe coughing on 32; two patients were oversedated with fentanyl 200 μg and diazepam 5 mg, and with fentanyl 50 μg and diazepam 5 mg, requiring verbal encouragement to breathe. No patient became apnoeic or developed airway obstruction as a result of sedation.

One hundred and four postoperative interviews were conducted. On 37 occasions the patients recollected the procedure, but on only three occasions did the patient consider the recollection unpleasant: one patient had undergone an attempted blind awake nasotracheal intubation followed by an attempted nasotracheal intubation using a rigid laryngoscope, before undergoing successful intubation with the fibrescope; the second patient had undergone a nasotracheal, and the third an orotracheal fibreoptic intubation, but because both had compromised airways neither had been given premedication, and one had received no i.v. sedation.

DISCUSSION

This study has documented the feasibility and safety of awake fibreoptic tracheal intubation in patients at high risk of aspiration, as an alternative to the two generally accepted techniques—rapid sequence induction and tracheal intubation, and awake tracheal intubation with a rigid laryngoscope [2, 4]. We believe this to be the first new method for dealing with this special circumstance since the rapid sequence induction and tracheal intubation with preoxygenation and cricoid pressure was described by Sellick in 1961 [1].

The primary advantages of fibreoptic intubation are its undoubted value in the management of a known or potential difficult tracheal intubation [15–17], and the lesser degree of hypertension and tachycardia that accompany it [19, 20]. Its initial use in our practice for patients at high risk of aspiration was for those patients who also presented a potentially difficult intubation. As experience was gained it began to be used as an additional approach for securing the airway in any patient at high risk of aspiration. It has three additional significant advantages over the rapid sequence induction and intubation technique: it is not subject to the three hazards of failure of cricoid pressure to prevent regurgitation and aspiration [12, 21], failure to intubate the trachea of such a patient [6, 10, 11], and cardiovascular collapse [10]. It has two advantages over awake rigid intubation in that it is less painful and unpleasant for the patient [2, 7, 8, 16–18], and it may have a higher success rate [20]. However, it has the disadvantage, compared with the rapid sequence induction and intubation technique, of recall of the intubation in many instances [17, 18].

Local anaesthesia of the larynx during fibreoptic or rigid intubation of an awake patient at high risk for aspiration is controversial [7, 8, 13]. Vandam included topical anaesthesia as part of the awake intubation technique, but warned that the larynx could no longer be assumed to be "awake" [2]. Walts recommended that only the base of the tongue, vallecula and epiglottis be anaesthetized, and that spraying local anaesthetic solution directly on the vocal cords, transtracheal

anaesthesia and superior laryngeal nerve block should be avoided in patients at high risk of aspiration [7]. Thomas recommended that, although local anaesthetic sprayed directly on the larynx, and superior laryngeal nerve block could be used, transtracheal anaesthesia should be omitted, as the cough reflex would no longer be preserved [8]. In this study the cords were sprayed through the working channel of the fibrescope on 85 occasions and transtracheal anaesthesia was used on 29 occasions without any evidence of aspiration. Kopriva, Eltringham and Siebert [14] have shown in a small group of patients that, although local anaesthesia of only the tongue, vallecula and the lingual surface of the epiglottis did not result in incompetence of the largyeal closure reflex, laryngeal exposure with a rigid laryngoscope was successful in only 12 of 18 unsedated patients. In contrast, all of a second group of 12 patients who were sedated with Innovar 4–8 ml, but given no local anaesthesia, underwent successful intubation with a rigid laryngoscope, but evidence of incompetence of the laryngeal closure reflex was present in four of the patients [14].

We believe that the efficacy and safety of the fibreoptic technique can be maximized by the use of minimal or no sedation, the administration of oxygen during the intubation by nasal cannula if indicated, and the application of local anaesthetic to the larynx and trachea by spraying through the working channel of the fibrescope. If topical anaesthesia is applied when the tip of the fibrescope is in close proximity to the vocal cords, the fibrescope can be advanced into the trachea 30 s later and a second application sprayed into the trachea before the tracheal tube is advanced over the fibrescope. This technique appears to reduce the patient's discomfort and reaction to intubation, while minimizing the time during which the airway is unprotected.

The use of the fibrescope as reported in this study provides anaesthetists with a third option for securing the airway in patients at high risk of aspiration. Evaluation of its role compared with rapid sequence induction and intubation and awake rigid intubation awaits the completion of carefully controlled comparative studies.

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