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The Seeing Stylet: a new device for tracheal intubation

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Abstract

A new tracheal intubation device is available. The 'Shikani Seeing Stylet™' is a new, inexpensive, reusable high resolution endoscope with a malleable stainless-steel sheath which can be inserted through a tracheal tube allowing intubation to be performed under direct vision. We have assessed this new device on 20 patients (ASA I-II; age 25–67) scheduled to undergo elective surgery with tracheal intubation. We measured heart rate (HR), non invasive blood pressure (NIBP), oxygen saturation (SpO_2) and end tidal carbon dioxide ($ETCO_2$) at three different times: T_0 (induction of anesthesia), T_1 (beginning of intubation procedure), T_2 (end of intubation procedure); we also recorded the time interval between T_1 and T_2. All patients were successfully intubated with the device. Eleven patients were intubated at the first attempt ($T_1 - T_2$ mean time = 8.65 s); three patients were intubated at the first attempt using cricoid pressure ($T_1 - T_2$ mean time 11.6 s); four patients were intubated at the second attempt ($T_1 - T_2$ mean time = 36.5 s); two patients were intubated at the third attempt ($T_1 - T_2$ mean time = 54.5 s). The HR, NIBP, SpO_2 and $ETCO_2$ remained fairly stable. On the basis of our preliminary experience with 20 patients, the 'Shikani Seeing Stylet™' seems to be a promising adjunct for airway management.

Keywords: Airway management; Difficult intubation; Lightwand; Fibrescope

1. Introduction

The management of the difficult airway is one of the major challenges that faces the anesthesiologist [1,2]. Over the last few years, several improvements have been made to reduce accidents associated with management of the difficult airway. Different anatomical parameters (Mallampati grade; interincisor gap; Patil distance; etc.) have been studied and effective devices have been developed (LMA; Trachlight™; COPA; etc.) to help the anesthesiologist to predict and manage difficult intubation cases [1,3].

2. The Shikani Seeing Stylet™

The 'Shikani Seeing Stylet™' is a new tracheal intubation device (Fig. 1), manufactured in the US by Clarus Medical Systems (Minneapolis, MN); sold under the Ventus™ brand name and approved in the US by FDA and in Canada by the Canadian Ministry of Health since 1996. It is a high resolution (30 000 pixel) endoscope consisting of several illumination fibres and a fibreoptic bundle of thousands of strands of glass arranged in a coherent pattern. It has a malleable stainless-steel sheath and, being completely sealed, can be sterilized with ethylene oxide or by immersion in glutaraldehyde solution. Two different sizes are available: the adult version fits into 5.5 mm I.D. tracheal tubes and larger, the pediatric shaft fits into smaller tubes >3 mm I.D. An 'adjustable tube stop' with an oxygen port, allows the tube to be firmly connected to the stylet and deliver oxygen if the patient is breathing spontaneously.

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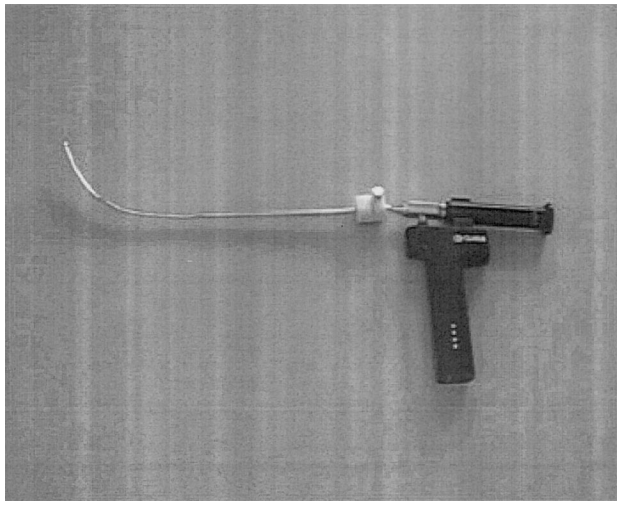

Fig. 1. A view of the Shikani Seeing Stylet™ connected with the SITElite™ handle-light source.

Table 1
Preoperative evaluation

Features	Data
Males	9
Females	11
Age	45.9 ± 11.83
ASA I	14
ASA II	6
Weight	70.9 ± 10.9
Height	168.69 ± 5.58
BMI	24.4 ± 0.25
Mallampati grade I	13
Mallampati grade II	7
Interincisor gap (cm)	3.48 ± 0.31
Patil distance (cm)	6.8 ± 0.45

The stylet can be used with several light sources such as the SITElite™ (made by Clarus Medical Systems) a 6 V halogen handheld light source, any 120 V remote light source with a fibreoptic cable or a fibreoptic laryngoscope handle with an adapter. The device can be used for direct vision or may be connected to a camera with the image shown on a screen [4].

3. Methods

After passing the approval of our Institute Ethical Committee and obtaining the patients' informed consent, we assessed this new device in 20 cases. Patients were scheduled to undergo elective surgery with general anesthesia and tracheal intubation; 9 were males and 11 were females, with a mean age of 46 years (range 25–67), a mean weight of 70.9 kg (range 52–90), a mean height of 168.75 cm (range 160–181) and a mean body mass index (BMI) of 24.4 (range 20.5–30.4).

At preoperative anesthetic examination 13 patients were Mallampati grade I and 7 were Mallampati grade II, the mean interincisor gap was 3.48 cm (range 3–4.3) and the mean Patil distance was 6.80 cm (range 6–7.5) (Table 1).

The procedure was carried out by four anesthesiologists with over 3 years experience each of whom had practised for at least 1 h on the training manikin.

The stylet was bent to the same curvature as a Mackintosh laryngoscope blade, lubricated with a silicone spray, and inserted into a tracheal tube. The tube was fixed to the stylet by the 'adjustable tube stop' so that the tip of the stylet did not protrude past the end of the tube (Fig. 2); the light

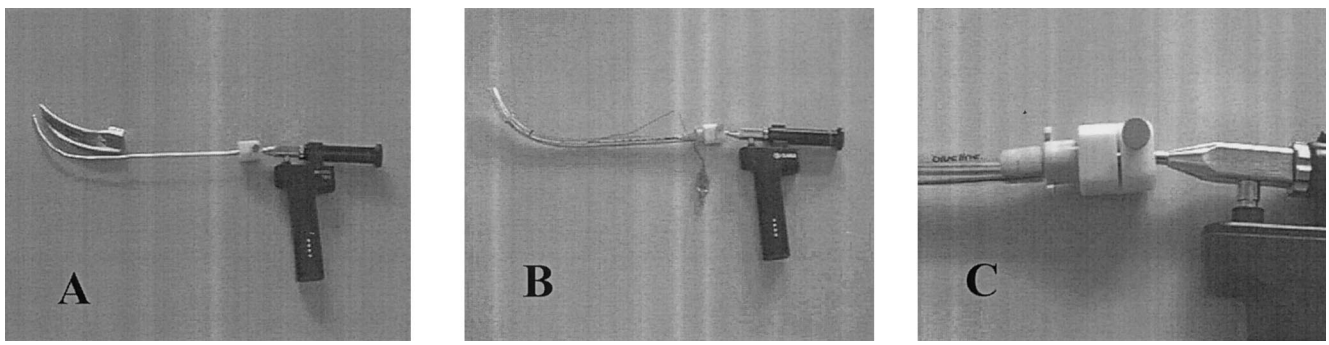

Fig. 2. (A) The Shikani Seeing Stylet™ bent to the curvature of a Mackintosh laryngoscope blade. (B) The Shikani Seeing Stylet inserted into a tracheal tube. (C) The tracheal tube fixed by the 'adjustable tube stop'.

Table 2
Procedure times[a]

		Heart rate	Systolic pressure	Diastolic pressure	SpO_2	$ETCO_2$
T_0	Mean	73.57	137.04	72.6	99.23	
	SD	10.8	11.35	6.8	0.53	
T_1	Mean	65.4	130	66.47	99.38	41.6
	SD	5.2	10.6	4.9	0.58	2.5
T_2	Mean	64.9	135.2	68.5	98.2	42.9
	SD	4.9	8.8	5.6	0.55	1.79

[a] T_0, awake patient; T_1, beginning of intubation; T_2, placement of the ETT in trachea.

Table 3
Attempts and difficulties during intubations

Attempt		Number of patients	Percentage (%)	Mean time (s)	S.D.
1st		11	55	9.6	1.14
	Aspiration	NO			
	Cricoid compression	3	15	11.6	0.57
	Change angle	NO			
2nd					
	Aspiration	4	20	33.3	2.08
	Cricoid compression	NO			
	Change Angle	NO			
3rd		2	10	54.5	2.12
	Aspiration	YES			
	Cricoid compression	YES			
	Change Angle	YES			

source used was the SITElite™ which also served to handle the stylet. After 3 min of preoxygenation with 100% O_2 with the patient awake, we measured and recorded heart rate (HR), non invasive blood pressure (NIBP), oxygen saturation (SpO_2) at T_0. General anesthesia was induced with propofol 2 mg/kg, fentanyl 3 μg/kg and vecuronium 0.1 mg/kg. Anaesthesia was maintained with face mask ventilation (O_2/Isoflurane) for 2 min. After placing the patient's head in the 'sniffing position', HR, NIBP, SpO_2 and end-tidal carbon dioxide ($ETCO_2$) parameters were again recorded (T_1). The anaesthetist grasped and elevated the mandible using the left hand and the stylet was inserted into the right side of the mouth and advanced until the tip was in hypopharynx. Under direct vision the tip was introduced between the vocal cords. The 'tube stop' was released and the tube advanced into the trachea; the stylet was removed and the HR, NIBP, SpO_2 and $ETCO_2$ parameters were recorded again (T_2). The correct position of the tube was confirmed by auscultation and capnography. If, after three attempts, tracheal intubation was unsuccessful, the operator planned to intubate the patient with a standard laryngoscope. Between attempts, time recording was suspended and face mask ventilation was maintained for 30 s.

4. Results

All patients were successfully intubated with the 'Shikani Seeing Stylet'. Eleven patients (55%) were intubated without problems at the first attempt ($T_1 - T_2$ mean time = 8.65 s; S.D. 1.11); three patients (15%) were intubated at the first attempt but the glottic view had to be improved by pressure applied by an assistant to the cricoid cartilage ($T_1 - T_2$ mean time = 11.6 s: S.D. 0.57); in four patients (20%) it was necessary to remove the stylet from the mouth in order to clean the lens and/or to aspirate oral secretions and they were then intubated at the second attempt ($T_1 - T_2$ mean time = 36.5 s; S.D. = 1.5); in the final two patients (10%) it was also necessary to change the

stylet curvature to a hockey-stick shape and they were then intubated at the third attempt ($T_1 - T_2$ mean time = 54.5 s; S.D. = 2.12) (Table 3).

HR, NIBP, SpO_2 and $ETCO_2$ remained fairly stable (Table 2). No sore throat, mouth pain, dysphagia or dysphonia was reported after surgery. There were no other complications.

5. Discussion

These preliminary results suggest that the 'Shikani Seeing Stylet' is safe and easy to use apparently needing only a brief learning period. We have only assessed it on a small number of random patients who had a normal airway, in whom difficult intubation was not predicted.

The fact that only 70% of the patients were intubated at the first attempt may be due to limited experience with a new unreported device. In fact the number of needed attempts diminished during the course of the study.

We have found that it is better to aspirate the patient's mouth and to apply an antifogging agent to the lens tip before beginning the intubation procedure.

The stability of HR and BP, recorded during the procedure, indicates that this is a relatively atraumatic intubating device. Compared to the lightwand, it produces a lower incidence of sore throat [4].

The device may be useful for some patients with predicted difficult intubation. As with other devices such as LMA or Trachlight™ the Shikani Seeing Stylet™ is not affected by many of the factors (small mouth, stiff neck, large tongue, buck teeth, cervical spine injury, reduced jaw mobility, etc.) that make conventional intubation difficult. It could be useful to study if variations was made to the curvature of the instrument to confirm to the individual patient anatomy would result in a reduced intubation time. We shall continue the study in this direction.

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