A New Option in Airway Management: Initial Experience with the TotalTrack® Video Laryngeal Mask

Janine Choonoo,[1] Ross Hofmeyr,[2] Niall Evans,[3] Mike James,[4] Nick Meyersfeld[2]

[1]Registrar, [2]Specialist Anaesthesiologist, [4]Emeritus Professor, Department of Anaesthesia, University of Cape Town

[3]Specialist Anaesthesiologist, Private Practice, Cape Town. Correspondence to: Dr Ross Hofmeyr, ross.hofmeyr@uct.ac.za

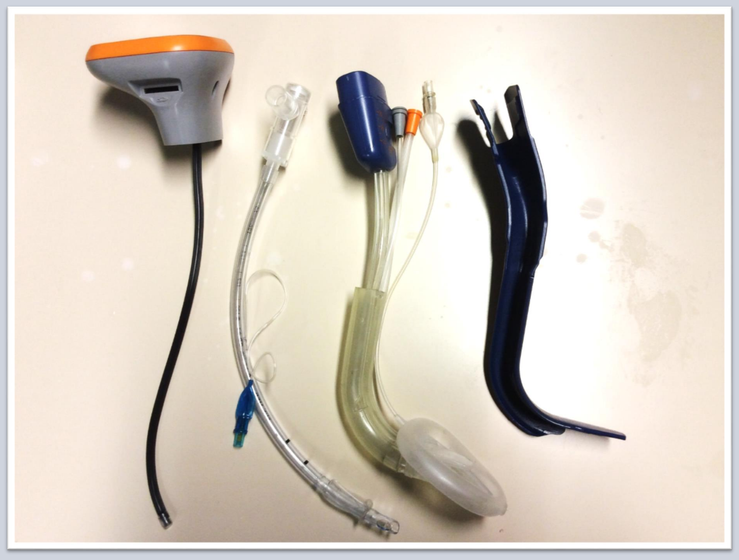
Introduction

The TotalTrack® VLM (Video Laryngeal Mask; Medcom Flow, Barcelona) is a novel video-assisted intubating supraglottic airway which allows minimally interrupted ventilation during tracheal intubation under continuous video guidance. It has been proposed for use in routine airway management, predicted difficult airways, and as a rescue device for the unanticipated difficult airway. It features a disposable laryngeal mask and rigid introducer. The mask component includes a supraglottic suction port and a conduit for a gastric tube. A preloaded tracheal tube forms the breathing tube when functioning as a laryngeal mask. A reusable camera and video display (Videotrack®) inserted via an isolated channel with a clear lens which protects against contact with the patient allows video guidance. A battery pack in the disposable portion of the mask provides power.[1] We report the first clinical study of the TotalTrack, with primary endpoints of LMA seal pressures and success of tracheal intubation.

Inclusion Criteria	Exclusion Criteria
ASA 1 or 2	ASA 3 or more
Age > 18 years	Inability to provide consent
Lean body mass 50-80 kg	BMI > 35kg.m^{-2}
Suitable for size 4 TotalTrack	Predicted difficult airway
Elective surgery of 30 – 120 minutes duration	Pregnancy or increased aspiration risk

Methods

Investigators with at least 5 years' anaesthetic experience received training in the use of the TotalTrack. Ethical approval and written informed consent were obtained from 60 patients. A standardised anaesthetic technique with IV induction, neuromuscular blockade and volatile maintenance was used. Upon TotalTrack® insertion, adequacy of ventilation was assessed by bilateral chest expansion, adequate expired tidal volumes, oxygenation and normal capnograph waveform. The time from first handling the device until effective ventilation was recorded. Insertion and intubation were limited to 2 attempts. Seal pressure testing used a manometric stabilisation technique.[2] If no leak was generated by 40 cmH_2O, seal pressure was documented as such. Presence of a leak was assessed in head flexion, extension and 30º rotation to either side.[3] Gastric insufflation was assessed by auscultation[4] and glottic view graded using the Cormack-Lehane and percentage of glottic opening (POGO) scores.[5,6] Upon optimal visualisation of the glottis, intubation was performed with the pre-loaded tracheal tube. Time for intubation was measured from optimisation of view until cuff re-inflation. The need for bougie or external laryngeal manipulation was recorded. Insertion of a gastric tube through the device was tested. At completion of surgery, the supraglottic suction was used to remove any secretions On return of spontaneous respiration, the tracheal tube was withdrawn and vocal cord function assessed using the camera. Soiling of the device was documented on removal. Patients were assessed postoperatively for sore throat, dysphagia and hoarseness

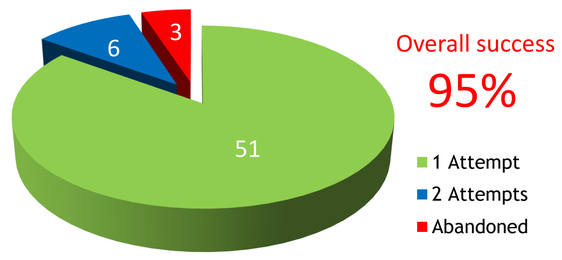


Results

Patient Demographics	Mean (SD)	Range
Age (yrs)	41 (14)	18-73
Weight (kg)	71 (14)	42-101
Height (cm)	167 (10)	145-189
BMI (kg.m-1)	25 (5)	14-34
Neck Circumference (cm)	37 (3)	31-47

Insertion and ventilation was successful in 98.3% (59/60), with mean time to adequate ventilation 16.8 seconds (range 4.0–52.0, SD 10.8). Insertion failed in one case. One patient desaturated to 92% during insertion. Median static leak and maximal inflation pressures of the laryngeal mask component were 32 cmH_2O (range 10.0 - 40.0) and 40 cmH_2O (range 16.0 - 40) respectively.

Intubation Success Rates(n=60)



Glottic view was possible in 59/60 cases. Tracheal intubation was successful in 95% (57/60), with a first attempt success rate of 86% (51/60). Mean time for intubation was 9.5 seconds (95% CI 14.0–19.7/SD 10.8). In two cases, tracheal intubation was not achieved in two attempts. The need for repositioning to gain appropriate view occurred in 25% (15/60). Mean total apnoea time (calculated as the sum of LMA insertion and tracheal intubation times) was 25.6 seconds (95% CI 20.4–30.9/SD 19.9).

Gastric tube insertion was successful in 91% (52/57). Supraglottic secretions were present at completion in 79%, and the suction port effective in 91%. Vocal cord assessment was possible in 75% (43/57). Where the cords were not visualised, the majority had secretions on the interior of the mask, obscuring the view on the VideoTrack®. The device was easily removed in all cases and there was no soiling of the device in 77% (44/57). On the day of procedure, 35% (21/60) reported sore throat, 15% (9/60) dysphagia and 8.3% (5/60) hoarseness. At 24 hours 21% (13/60) still experienced sore throat, 8.3% (5/60) had dysphagia and 11.6% (7/60) were hoarse.

Discussion

The TotalTrack VLM allows supraglottic ventilation, video-assisted laryngoscopy and intubation, placement of a gastric tube, and supraglottic suctioning. We found it simple to insert, with only one case abandoned due to the laryngeal mask folding over itself. Insertion was graded as easy in 77%, and the short insertion time impacted favourably on total apnoea time. We also assessed haemodynamic parameters including mean arterial pressures and heart rates during the insertion and intubation through the device. While there was a statistical difference in the data, it was considered to have no clinical significance.

The laryngeal mask component resembles the ProSeal™ LMA, which is the current gold standard. Literature on the ProSeal describes sealing pressures varying between 22 and 29.5 cmH_2O.[7–10] The TotalTrack VLM was shown to have static leak and maximal inflation pressures of above 30 cmH_2O, demonstrating excellent function as a supraglottic airway.

The TotalTrack® VLM is also a video intubating laryngeal mask. Whilst the current gold standard for intubating laryngeal masks is the LMA-Fastrach™, the TotalTrack is most comparable to the LMA-CTrach™ due to its video capabilities. The LMA Fastrach™ has been widely assessed, with studies showing intubation success rates ranging from 70% to 100%.[11–15] The CTrach™ has reported tracheal intubation success rates between 89.7%[16] and 96%[17] [18]. A direct comparison of the LMA Fastrach™ and the CTrach™ by Lui, Goy, Lim and Chen showed an overall intubation success rates of 96% for the Fastrach and 100% for the CTrach[19]. In a smaller study of morbidly obese patients, intubation was equivalent in both the CTrach™ and the LMA Fastrach.[20] Our study revealed a similar rate.

Although no ventilation occurs during placement of the TotalTrack, ventilation did continue during intubation, although a leak was present due to tracheal tube cuff deflation. Total apnoea time was thus calculated from the insertion and intubation times. In the study by Goy *et al* the insertion times of the laryngeal mask component averaged 23 and 25 seconds and tracheal intubation times averaged 100 seconds for the Fastrach™ and 116 seconds for the CTrach respectively.[19] Thus, the short total apnoea time for the TotalTrack may be advantageous.

Incidence of patient reported side-effects diminished on Day 1 post anaesthesia from Day 0. The findings on day 1 correlate with results published on other supraglottic devices.[7 23-25]

Conclusions

The TotalTrack® VLM was shown to function well as a laryngeal mask, with excellent seal pressures. It allowed continuous ventilation while optimising the view for tracheal intubation. Intubation success rates are comparable to those reported for the gold standards in the literature. Whilst we have elucidated the basic performance of the device, direct comparative trials and research in patients with known or predicted difficult airways is needed.

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Acknowledgments & Conflicts of Interest

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UNIVERSITY OF CAPE TOWN