Videolaryngoscopy

Why go blind if you can see?

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The most challenging aspect for the anaesthetist is the insertion of a 
tracheal tube.
No other anaesthetic gesture is this important.
Failure to succeed can ultimately lead to a life-or-death situation
Problems with Airway Management

• Endotracheal Tubes
  • Laryngoscopy: classic laryngoscopy fails (Cormack-Lehane grade III-IV = blind intubation)
  • Tracheal intubation (NAP4 Report – UK)
    • Failed: 1 in 1-2,000 pts (elective surgery) – 1:250 (OB pts) – 1:50-100 (ICU/DEM)
    • Failed: difficult or failed tracheal intubation is low (1:2,000 to 1:50 cases)
    • CICO: 1:5,000 cases

• Laryngeal Masks
  • Downfolding of the epiglottis: incidence: >50% - 90%
    • Glottis (slightly) obstructed by epiglottis
    • Epiglottis seen in bowl of laryngeal airway mask
    • ➔ LEAK & OBSTRUCTION – inadequate ventilation
  • Vocal cords not always visible during fibreoptic scopy
Be Prepared

Danish Airway Registry: **93%** of difficult tracheal intubations are unpredictable! Anaesthesia 2015

<table>
<thead>
<tr>
<th>Preoperative Evaluation Airway</th>
<th>Correct Position on Operating Table</th>
<th>Have Airway Equipment Ready ad Hand</th>
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- **Plan A**
- **Plan B**
- **Plan C**
- **Plan D**
Mallampati-Gatt Score

Grade I
Grade II
Grade III
Grade IV
Tenaceous secretions/saliva/pus ➔ Aspiration!

Clear the airway!
An estimation of the global volume of surgery: a modelling strategy based on available data

Thomas G Weiser, Scott E Regenbogen, Katherine D Thompson, Alex B Haynes, Stuart R Lipsitz, William R Berry, Atul A Gawande

Summary
Background Little is known about the amount and availability of surgical care globally. We estimated the number of major operations undertaken worldwide, described their distribution, and assessed the importance of surgical care in global public-health policy.

Methods We gathered demographic, health, and economic data for 192 member states of WHO. Data for the rate of surgery were sought from several sources including governmental agencies, statistical and epidemiological organisations, published studies, and individuals involved in surgical policy initiatives. We also obtained per-head total expenditure on health from analyses done in 2004. Major surgery was defined as any intervention occurring in a hospital operating theatre involving the incision, excision, manipulation, or suturing of tissue, usually requiring regional or general anaesthesia or sedation. We created a model to estimate rates of major surgery for countries for which such data were unavailable, then used demographic information to calculate the total worldwide volume of surgery.

Findings We obtained surgical data for 56 (29%) of 192 WHO member states. We estimated that 234·2 (95% CI 187·2–281·2) million major surgical procedures are undertaken every year worldwide. Countries spending US$100 or less per head on health care have an estimated mean rate of major surgery of 295 (SE 53) procedures per 100 000 population per year, whereas those spending more than $100 have a mean rate of 1110 (SE 1300; p=0·0001). Middle-expenditure ($401–1000) and high-expenditure (>1000) countries, accounting for 30–2% of the world’s population, provided 73–6% (172·3 million) of operations worldwide in 2004, whereas poor-expenditure (<100) countries account for 34–8% of the global population yet undertook only 3–5% (8·1 million) of all surgical procedures in 2004.

Interpretation Worldwide volume of surgery is large. In view of the high death and complication rates of major surgical procedures, surgical safety should now be a substantial global public-health concern. The disproportionate scarcity of surgical access in low-income settings suggests a large unaddressed disease burden worldwide. Public-health efforts and surveillance in surgery should be established.

Funding WHO.

250 million operations/yr

General anaesthesia

Airway Management
1940s

Sir Robert Macintosh (1897-1989) and his skilled technician Mr. Richard Salt developed the Macintosh laryngoscope in 1943.

2015

Successful intubation: 99%

D-blade for DIFFICULT AIRWAY
RAMP POSITION

Ear-to-sternal notch

RAMP POSITION
10 Major Advantages of VLS over Classic Direct Laryngoscopy

You see more!

10 Major Advantages of VLS over Classic Direct Laryngoscopy

You see more!


Greenland et al.
10 Major Advantages of VLS over Classic Direct Laryngoscopy

You see more!

10 Major Advantages of VLS over Classic Direct Laryngoscopy

Improved glottic view & less failed laryngoscopies (CL III-IV)

Direct: 90% good laryngoscopy  
Successful Intubation

VLS  
99% success

Direct: Up to 10% failed laryngoscopy  
Difficult Airway Management

Prediction of a difficult airway = inexact science  
Overall patients with a difficult airway were NOT predicted by preoperative parameters
10 Major Advantages of VLS over Classic Direct Laryngoscopy

Clear differentiation between trachea & esophagus
10 Major Advantages of VLS over Classic Direct Laryngoscopy

Reduced hemodynamic response during tracheal intubation

Hemodynamics: Blood Pressure & Heart Rate

Maassen et al. 2010 Hemodynamics
10 Major Advantages of VLS over Classic Direct Laryngoscopy

Reduced need for adjuncts (e.g. rigid stylet)


Maassen-van Zundert Anesth Analg 2009
10 Major Advantages of VLS over Classic Direct Laryngoscopy

Less trauma to upper incisors + soft tissue

10 Major Advantages of VLS over Classic Direct Laryngoscopy

6. Less trauma to upper incisors + soft tissue

Rigid stylet
### 10 Major Advantages of VLS over Classic Direct Laryngoscopy

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<tr>
<th>Complications ~ the use of a Stylet</th>
<th>Literature</th>
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<tr>
<td>Cooper RM</td>
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**Trauma to Palatopharyngeal Wall**

- **Rigid stylet**
10 Major Advantages of VLS over Classic Direct Laryngoscopy

More successful intubations in NORMAL + DIFFICULT AIRWAYS
10 Major Advantages of VLS over Classic Direct Laryngoscopy

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10 Major Advantages of VLS over Classic Direct Laryngoscopy

More successful intubations in NORMAL + DIFFICULT AIRWAYS

Acute Epiglottitis
Acta Anaesthesiol Belg 2010;61:67-70

COMBI: C-MAC + Bonfils
Van Zundert – Pieters Br J Anaesth 2012;108:327-8
10 Major Advantages of VLS over Classic Direct Laryngoscopy

More successful intubations in NORMAL + DIFFICULT AIRWAYS

Cervical fractures fixation
10 Major Advantages of VLS over Classic Direct Laryngoscopy

More successful intubations in NORMAL + DIFFICULT AIRWAYS

Videolaryngoscopes facilitates safe insertion

- Orogastric/nasogastric tubes
- Temperature probes
- Gastroscopes/esophagoscopes
- Double lumen tubes
- Laryngeal masks
- Facilitate surgeons (ENT)

Thyroidectomy
Correct insertion depth NIM tube
Neural Integrity Monitor
10 Major Advantages of VLS over Classic Direct Laryngoscopy

More successful intubations in NORMAL + DIFFICULT AIRWAYS

Limited Lip/Mouth Opening

Giant Tonsils / Kissing Tonsils
CL- IV / Long epiglottis
10 Major Advantages of VLS over Classic Direct Laryngoscopy

More successful intubations in NORMAL + DIFFICULT AIRWAYS
10 Major Advantages of VLS over Classic Direct Laryngoscopy

Improved initial intubation success rate of novice intubators and paramedics

A systematic review of the role of videolaryngoscopy in successful orotracheal intubation

David W Healy, Oana Maties, David Hovord and Sachin Kheterpal

Abstract

Background: The purpose of our study was to organize the literature regarding the efficacy of modern videolaryngoscopes in oral orotracheal intubation, and to perform a quality assessment according to recommended external criteria and make recommendations for use.

Methods: Inclusion criteria included devices with recent studies of human subjects. A total of 180 articles were reviewed in the initial search and 68 additional articles were identified using cited references. After exclusion of articles failing to meet study criteria, 77 articles remained. Data were extracted according to the rate of successful intubation and improvement of glottic view compared with direct laryngoscopy. Studies were classified according to whether they primarily examined subjects with normal airways, possessing risk factors for difficult direct laryngoscopy, or following difficult or failed direct laryngoscopy.

Results: The evidence of efficacy of videolaryngoscopy in the difficult airway is limited. What evidence exists is both randomized prospective and observational in nature, requiring a scheme that evaluates both forms and allows recommendations to be made.

Conclusions: In patients at higher risk of difficult laryngoscopy we recommend the use of the Airtraq, CTrach, GlideScope, Pentax AWS and NMAC to achieve successful intubation. In difficult direct laryngoscopy (CMI > 3) we cautiously recommend the use of the Airtraq, Bonfils, Bullard, CTrach, GlideScope, and Pentax AWS, by an operator with reasonable prior experience, to achieve successful intubation when used in accordance with the ASA practice guidelines for management of the difficult airway. There is additional evidence to support the use of the Airtraq, Bonfils, CTrach, GlideScope, McGrath, and Pentax AWS following failed direct laryngoscopy to achieve successful intubation. Future investigation would benefit from precise qualification of the subjects under study, and an improvement in overall methodology to include randomization and blinding.

Keywords: Laryngoscopy, Airway management, Intubation, Technology

Video-assisted instruction improves the success rate for tracheal intubation by novices

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Background. Tracheal intubation via laryngoscopy is a fundamental skill, particularly for anesthesiologists. However, teaching this skill is difficult since direct laryngoscopy allows only one individual to view the larynx during the procedure. The purpose of this study was to determine if video-assisted laryngoscopy improves the effectiveness of tracheal intubation training.

Methods. In this prospective, randomized, crossover study, 37 novices with less than six prior intubation attempts were randomized into two groups, video-assisted followed by traditional instruction (Group VIT) and traditional instruction followed by video-assisted instruction (Group TV). Novices performed intubations on three patients, switched groups, and performed three more intubations. All trainees received feedback during the procedure from an attending anesthesiologist based on standard care. Additionally, during the video-assisted part of the study, the supervising anesthesiologist incorporated feedback based on the video images obtained from the fiberoptic camera located in the laryngoscope.

Results. During video-assisted instruction, novices were successful at 69% of their intubation attempts whereas those trained during the non-video-assisted portion were successful in 55% of their attempts (P=0.04). Oesophageal intubations occurred in 3% of video-assisted intubation attempts and in 17% of traditional attempts (P=0.01).

Conclusions. The improved rate of successful intubation and the decreased rate of oesophageal intubation support the use of video laryngoscopy for tracheal intubation training.

Br J Anaesth 2008; 101: 568–72

Keywords: anaesthetic techniques, laryngoscopy; education; equipment, laryngoscopes; equipment, videos
Major Advantages of VLS over Classic Direct Laryngoscopy

More successful tracheal tube exchange procedures under continuous glottis visualization
10 Major Advantages of VLS over Classic Direct Laryngoscopy

Better teaching, learning and monitoring tool

Videolaryngoscopy is easy to learn!

Van Zundert et al. Minerva Anestesiol 2013
Major Advantages of VLS over Classic Direct Laryngoscopy

A novel method of intubation and orogastric tube insertion using a C-MAC-D-blade videolaryngoscope-bougie technique

A. A. J. Van Zundert (*) and S. P. Gatt (**)

(Acta Anaesth. Belg., 2015, 66, 000-000)
What will the future hold for videolaryngoscopy?

- Preop. transnasal evaluation of airway ➔ be prepared
- Videoclip/still image laryngoscopy/TT
  ➔ in patient’s records = **Better Informed Anesthesiologists**
  ➔ For education/courses/research = **Better Teaching Options**
- Telemedicine/Tele-intubation:
  ➔ Remote advice to jr (night shift problem) & snr (remote hospital)
- Difficult airway alert / bracelet /identification document
Videolaryngoscopy: Time to change our practice!

We have now the tools available to facilitate successful, fast, accurate, atraumatic tracheal intubation in patients:

- Normal airway
- Anticipated difficult airway
- Unanticipated difficult airway
- **ALL Patients** undergoing Anesthesia
- Elective & Emergency Surgery
Videolaryngoscopy: Time to change our practice!

Videolaryngoscopy should become the rule not the exception!
Videolaryngoscopy: the new standard for intubation. Ten years’ experience

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Dear Editor,

Tracheal intubation is a technically challenging life-saving procedure, that is practised on more than 100 million surgical patients worldwide every year. The use of videolaryngoscopy has revolutionized airway management in anesthesia and has demonstrated clear advantages over classic direct laryngoscopy, including: 1) a wider angle of view (60° vs. 15°) of the oropharynx; 2) an improved glottic view and less failed laryngoscopies; 3) a clear differentiation between tracheal and esophageal inlets; 4) a reduced hemodynamic response during endotracheal intubation; 5) a reduced need for adjuncts (e.g., stylets), which may contribute to palatopharyngeal trauma; 6) potentially less trauma to the upper incisors; 7) and soft oropharyngeal tissue; secondary to a reduction in maximum force applied with a more homogeneous pressure distribution to the maxillary incisors and oral tissues. These improvements of success facilitate intubations may be performed under local anesthesia and sedation, yielding the same success rate but in a shorter time compared with fiberoptic intubation.

Furthermore, videolaryngoscopy facilitates the safe insertion of medical devices including orogastric tubes, temperature probes, gastroscopes/esophagoscopes and double lumen tubes in the correct orifice. The enhanced visualization of insertion depth of tracheal tubes enabled by videolaryngoscope is of key value in thyroid and parathyroid surgery when a ‘nerve integrity monitor’ tracheal tube (incorporating bipolar stainless steel electrodes, which contact both vocal cords) is used to aid the surgeon in identifying the recurrent laryngeal nerve (branch of vagal nerve).

The integrated video modality combined with optics, mounted 2.3 cm proximal to the tip of the blade, allows the operator an improved view of the glottis and vocal cords, reducing the degree of alignment of tracheal, laryngeal and oral axes required to visualize the vocal cords in comparison with direct laryngoscopy. Hence, proper patient positioning further