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Original Research Article

Cuff inflation technique under king vision video laryngoscope superior to conventional method of Magill forceps for nasotracheal intubation

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Abstract: Cuff inflation technique under King Vision video laryngoscope (KVVL) for nasotracheal intubation (NTI) in which cuff inflation of endotracheal tube (ETT) lifts ETT anteriorly, off the posterior pharyngeal wall to direct it towards glottis. Once tip of ETT is lifted and placed to vocal cords, cuff is deflated and tube is pushed gently into trachea through vocal cords then cuff is rein flatted to achieve intubation. The Aim was Effectiveness and safety of cuff inflation technique under king vision video laryngoscope over conventional method of Magill forceps for NTI. The Study Design and Methods was Sixty patients for 1 year of Inclusion Criteria- age 18 to 65 years, ASA grade 1 / 2, MPC 1 to 4 with mouth opening ≥2 cm undergoing elective surgeries. Exclusion Criteria- ASA 3/4, mouth opening <2cm. After informed consent and ethical committee approval, randomized by chit method to undergo NTI with either cuff inflation technique(Group C) under king vision video laryngoscopy (n=30) or Magill forceps(Group M) under conventional direct laryngoscopy (n=30). Study criteria- Stress response (HR, MBP), airway injuries and SPO_2. In Statistical analysis Software's- Excel, SPSS. Statistical tests - unpaired t test, Mann-Whitney test. P value<0.05 was considered significant. In Results were Demographical data was not significant (p>0.05). Group M showed rise in stress response as compared to group C (p=0.001). In group M, 5 patients recorded upper airway injury (p=0.794) and 1 patient with ETT cuff injury (p=0.981). No patient of either group showed hypoxia. The Conclusions was Cuff inflation technique reduced stress response and airway injuries due to Magill forceps. It can increase success rate of difficult NTI.
Keywords: Cuff inflation technique, King Vision Video Laryngoscope, Nasotracheal intubation, reduced stress response, Magill forceps, easy intubation

INTRODUCTION:

Nasotracheal intubation (NTI) usually is accomplished using direct laryngoscopes such as the Macintosh or McCoy. Although direct laryngoscopes provide a sightline view of the airway during nasotracheal intubation, the patient's neck must be extended and Magill forceps are needed to guide the endotracheal tube into the glottis [1]. NTI is routinely done for surgical procedures involving oral cavity, oropharynx, facial trauma specially mandible fracture and restricting movement of temporo mandibular joint, cervical spine injuries, etc.

The King Vision video laryngoscope (KVVL) is the latest device which provides a perfect view using video and digital technology. The device is inexpensive and portable with a two piece design. The reusable monitor is attached to a disposable blade with a specially incorporated channel for the endotracheal tube. The advantage of the KVVL is that the operator can look at the monitor making it possible to visualize the larynx. Another advantage is its shape which allows for easier and less traumatic intubation [2].

We describe a cuff inflation technique in which the KVVL is used for nasotracheal intubation and cuff inflation of ET tube lifts the ET tube anteriorly, off the posterior pharyngeal wall to direct it towards glottis. Once tip of ET tube is lifted and placed to glottic opening, cuff is deflated and tube is pushed gently into trachea through vocal cords to achieve intubation and cuff is rein flatted. So NTI is accomplished without the need to insert a Magill's forceps into the patient's mouth or to perform a direct

laryngoscopy during intubation [3]. We compared effectiveness and safety of endotracheal (ET) tube cuff inflation technique combined with KVVL over Magill forceps for NTI.

Fig 1: King Vision Video Laryngoscope

Fig 2: showing steps of cuff inflation technique for nasotracheal intubation:

Fig 3: Nasotracheal intubation accomplished.

AIMS:

To prove advantages of cuff inflation technique using KVVL over Magill forceps under direct laryngoscope for NTI in terms of-

1. Ease of intubation technique
2. Intubation stress response
3. Visualisation of vocal chords
4. Complications like airway injuries and damage to endo tracheal tube cuff due to instrumentation and hypoxia.

Subjects and Methods:

- Study type: A randomised prospective clinical study
- Sample size: 60 patients
- Study centre: ESI-PGIMSR Andheri, Mumbai-400093
- Duration of study: 1 year

Inclusion criteria:

1. Age between 18 to 65 yrs
2. ASA grade I and II
3. Mouth opening at least 2 cm
4. Elective surgery requiring nasal intubation

Exclusion criteria:

1. ASA grade III or more
2. Mouth opening less than 2 cm.

After local ethics committee approval and written informed consent, we recruited 60 patients into the study as per power of study with calculation according to statistician and our hospital patient flow.

All patients were randomly divided into two groups 30 each by chit method:

Group C: Cuff inflation technique under King Vision video laryngoscope

Group M: Magill forceps technique under direct vision laryngoscopy

Topical preparation of the nasal cavity by instilling xylometazoline 0.05% drops twice into each nostril, 30 minutes and 5 minutes before the induction of anesthesia with puffs of 10% lidocaine spray was done in both groups.

GA Technique: Standard monitors were attached:

1. Pulse ox meter
2. Blood Pressure cuff
3. Cardio scope
4. Capnography
5. Temperature probe

Intravenous access was established and slow infusion of crystalloids commenced. Patients were premedicated with inj. Glycopyrrolate 0.004 mg/kg, inj. Ondansetron 0.08 mg/kg; Inj. Pentazocine 0.5mg/kg Inj. Midazolam 0.04 mg/kg were administered IV slowly, as an analgesic and sedative agent in all the two groups.

Patients were preoxygenated for 3 minutes. Anaesthesia was induced with intravenous Inj. Propofol 2 mg/kg, the endpoint being the loss of the eyelash reflex. A bolus dose of the Rocuronium 0.6mg/kg was injected. After complete relaxation and patient ready to be intubated, the endotracheal tube is inserted through the nostril until its tip lies in the pharynx (approx 18-20cm from the nostril) and respective intubation technique of corresponding concerned group was followed.

We assessed intubation in terms of Cormack-Lehane grading system-

Grade 1 - full view of the vocal cords
Grade 2A - partial view of the vocal cords
Grade 2B - only the arytenoids and epiglottis seen
Grade 3 - only epiglottis visible
Grade 4 - neither the epiglottis nor glottis seen[4]

Cardiovascular data (HR, MBP, ECG, and SPO2) were recorded before induction (baseline), at the time of induction, and at 2 minute and at 5 minute thereafter.
We noted if there are any complications like upper airway injury, cuff perforation, hypoxia.

STATISTICS AND RESULTS:

This table-1 shows both study groups are well comparable to each other with respect to patient characteristics including demographical data ($p>0.05$).

Table 1: Patient characteristics

Patients	**Group C**	**Group M**	**P value**
Age in years (mean ±SD)	38.57 ± 10.52	38.50 ± 11.38	0.981
Gender (M/F)	13/17	11/19	0.598
Weight in kg	58.73 ± 9.88	56.12 ± 10.46	0.841
Height in meters	1.6 ± 0.06	1.6 ± 0.08	0.993
MPC I/II	16/14	17/13	0.795
ASA I/II	18/12	21/9	0.417

P > 0.05 Not Significant

Table 2: study parameters

Study parameters	Group C	Group M	P value
Modified Cormack Lehane grades (I/IIA/IIB)	30/0/0	18/8/4	0.031
Heart rate (basal/at Intubation/ 3min/5min)	84.73±12.19/84.60±12.83 /80.63±10.37/ 77.50±8.43	84.63±9.56/99.33± 11.22/95.93±8.38/ 91.47±9.80	<0.001
MBP (basal/at Intubation/ 3min/5min)	91.43±8.52/87.23±9.84/7 8.30±7.05/ 78.30±5.24	90.03±12.09/104.87±12. 43/92.07±12.89/89.03±1 2.74	<0.001
COMPLICATIONS			
ECG-Arrhythmia (Y/N)	0/30	1/29	0.981
SPO2-Hypoxia (Y/N)	0/30	0/30	1
Upper airway injury (Y/N)	0/30	5/25	0.794
ET tube cuff Perforation (Y/N)	0/30	1/29	

Table 2 show that all 30 patients in group C recorded Cormack Lehane grade I view. In group M according to Cormack Lehane grades 18 patients showed grade I, 8 patients showed grade IIA and 4 patients presented with grade IIB. Thus, there is a significant difference between both groups (p=0.031).

Cardiovascular parameters show significant difference except at baseline. All 30 patients in group M show significant rise in heart rate and blood pressure where as in group C cardiovascular parameters are significantly stable as compared to group M (p=0.001).

As far as complications are concerned only 1 patient in group M showed arrhythmia(p=0.981), no patient of either groups showed hypoxia, 5 patients in group M recorded upper airway injury(p=0.794) and only 1 patient in group M presented with ET tube cuff injury(p=0.981). So, total seven patients in group M showed complications and none in group C.

DISCUSSION:

Cuff inflation technique for nasotracheal intubation was first explained by Gorback MS in late eighties [3] and was first demonstrated by Van Elstraete AC, Pennant JH, Gajraj NM, Victory RA in early nineties [5].

Our results have shown that the KVVL achieved a high rate of success for nasotracheal intubation with cuff inflation in patients who underwent head, neck and maxillofacial surgeries by avoiding forceps and its disadvantages.

Magill forceps helps to guide the tip of the endotracheal tube into the glottis during nasotracheal intubation. Several studies have reported that cuff inflation is useful to guide the tip of tube located posterior toward the glottis [6]. We used cuff inflation in 30 patients.

Patients with fascio-maxillary or neck injuries presents with difficult airway requiring nasal intubation. Failure to intubate in difficult airway situation is a leading cause of anaesthesia related morbidity and mortality.

Cuff inflation technique for NTI avoids need of Magill forceps, so it avoids instrumentation, trauma to upper airway mucosa and avoids ET tube cuff perforation and decreases intubation duration. So it contributes to minimise intubation stress response and to keep oral cavity free to operate [7].

KVVL has a limitation of needing at least 2cm of mouth opening; still it gives advantage of getting better Cormack Lehane grade. This latest video laryngoscope minimises intubation stress response as its tip need not to be inserted till epiglottis or vallecula [8].

It is helpful learning aid to the newly joined residents for intubation as this device does not require highly skilled personnel and is easier to use than conventional direct laryngoscopy [9].

Cuff inflation is a simple and useful way to correct the position of the endotracheal tube tip during nasotracheal intubation by KVVL [10].

Thus cuff inflation technique combined with KVVL is definitely easier than use of Magill forceps under direct laryngoscopy and can help in reducing intubation duration.

CONCLUSION:

1. Cuff inflation technique using KVVL for NTI reduces intubation stress response and airway injuries due to instrumentation.
2. KVVL provides better visualisation of cords so it can increase success rate of difficult NTI.
3. NTI by cuff inflation technique using KVVL is easier than conventional method of Magill forceps for newly joined students.

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