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Effect of Cricoid Pressure on Tracheal Intubation by Direct Laryngoscopy

KEYWORDS: *Cricoid pressure, intubation time, Sham cricoid pressure*

Dr. Sandeep Koti. V
Junior consultant, dept of anaesthesiology, narayana hrudayalaya, bengaluru

Dr. Padmanabha kaimar
Associate professor, dept of Anaesthesiology, Kasturba medical college, mangalore, Karnataka

ABSTRACT *BACKGROUND: Cricoid pressure is applied during induction of anaesthesia to prevent regurgitation of gastric content and pulmonary aspiration. However it has been reported that cricoid pressure makes tracheal intubation more difficult. The purpose of the study was to evaluate the effect of cricoid pressure on orotracheal intubation by direct laryngoscopy.*

METHODS: Two hundred patients undergoing general anaesthesia for elective surgery were randomly assigned to have a standardized cricoid pressure(CP) or sham CP(SCP) during laryngoscopy and intubation. After anaesthesia induction and complete muscle relaxation a 30s period was allowed to complete intubation with Macintosh no.3 laryngoscope blade.The primary endpoint was rate of failed intubation at 30s. Secondary endpoint were intubation time, Cormack Lehane grade of laryngoscopic view and the lateral shift of larynx.

RESULTS: Groups were similar for demographic data and risk factors for difficult intubation. The rate of failed intubation were comparable for two groups, 8% and 6% in the CP and sham CP groups respectively. Intubation time was slightly prolonged in the CP group than in the sham CP group(17.89s and 15.48s respectively, p< 0.001). The grade of Laryngoscopic view and the lateral shift of larynx were also comparable.

CONCLUSION: CP applied by trained personnel does not increase the rate of failed intubation. Hence CP should not be avoided for fear of increasing the difficulty when its use is actually indicated.

INTRODUCTION:
Cricoid pressure is a vital skill that should be performed during emergency tracheal intubation. Cricoid pressure was proposed by Brian A Sellick in 1961 to prevent regurgitation of gastric content during induction of general anaesthesia1.

Despite the lack of solid evidence of its efficacy, the CP remains a standard of care in patients at high risk of aspiration of gastric content during induction of anaesthesia. However it has been reported that CP may alter the upper airway anatomy and compromise its patency. Because the efficacy of cricoid pressure to prevent pulmonary aspiration of gastric content has never been demonstrated and several observations have suggested that cricoid pressure can make intubation more difficult, its effect on tracheal intubation needs further evaluation.

The Aim of the study was to evaluate the effect of cricoid pressure on the rate of failed orotracheal intubation and on the conditions of intubation in patients under general anaesthesia with the following objectives :

1. Duration of intubation
2. Cormack Lehane grading
3. Lateral shift of larynx.

METHODS:
Approval was taken from the ethics committee of the institution. Patients were evaluated the day before surgery and informed written consent was obtained for the study.

The study was conducted in a tertiary care teaching hospital over a period of two years. 200 patients of ASA grade I and II of either sex aged between 18-60yrs undergoing elective surgery under general anaesthesia with orotracheal intubation were included in the study.

Exclusion criteria:

Definite indication for Cricoid pressure

Morbid obesity

Contraindication to Cricoid pressure

Patients suspected of difficult airway

Surgery requiring double lumen ET tube

Pregnancy

Immediately before the induction of anaesthesia, patients were randomly assigned to recieve either cricoid pressure or a sham cricoid pressure. Standard monitors were applied for all patients. The head was positioned in the sniffing position using 5-7cm thick pillow. After preoxygenation with 100% oxygen for 3 min by face mask, anaesthesia was induced with propofol or thiopentone till the loss of eyelash reflex. After checking adequacy of ventilation neuromuscular blockade was obtained with succinylcholine 1.5-2mg/kg or rocuronium 1-1.2mg/kg. Patients were manually ventilated with 100% oxygen by mask until complete paralysis was achieved.

In the cricoid pressure group a standardized CP was applied using the single handed technique as originally described by Sellick. Cricoid cartilage was identified and a

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pressure of 30N or 3Kg was applied with first three fingers of the dominant hand. The pressure was applied with the thumb and the middle finger at 10 o'clock and 2 o'clock position respectively. The index finger was located above the cricoid cartilage to control the direction of the force.

In the sham cricoid pressure group the cricoid cartilage was identified and the finger was positioned as in cricoid pressure group but no pressure was applied. In both the groups, one of the certified anaesthesiologist intubated the trachea with Macintosh no.3 laryngoscope blade.

The intubation time was defined as the interval between the insertion of laryngoscope blade into the mouth and inflation of endotracheal cuff. Correct position of the tube was confirmed by capnography or by auscultation. A 30 second period was allowed for complete tracheal intubation

If capnography or auscultation did not confirm tracheal intubation, the attempt could be resumed only if there was time remaining in the 30s period. The anaesthesiologist rated the grade of laryngoscopic view on the Cormack and Lehane scale and was asked whether the larynx was in midline position or shifted laterally. If the intubation could not be completed within 30s, the intubation attempt was aborted and recorded as a failure. These patients were then ventilated with 100% oxygen by mask for 30s.

In the second intubation attempt, patients of CP group had a SCP applied and the patients of SCP group had a CP applied. The grade of laryngoscopy was again rated by the anaesthesiologist. If the trachea could not be intubated within 30s of the second attempt, the protocol was discontinued and the airway was managed following the difficult airway algorithm of the American Society of Anaesthesiologists (2003)2.

Statistical Analysis was performed with Chi-square test for proportions and Student t test for continuous data.

RESULTS:

Over a 2 year period patients were enrolled and randomly assigned to the CP or SCP

group. Groups did not differ for gender, age, ASA physical status or modified mallampati

grading. (table 1).

All patients received the CP or SCP as determined by randomization. The proportion of patients who could not be intubated within the first 30s attempt was comparable between the CP and the SCP groups (8% and 6% respectively). In our study, failure to intubate the trachea was considered when the time taken for intubation was more than 30s. 8% of patients in CP group and 6% in SCP group required > 30s for intubation. The intubation time for the successful intubations at the first attempt was slightly longer in the CP group compared with the SCP group (table 2).

In other patients of CP group who could not be intubated, were intubated when SCP was given. In the SCP group who could not be intubated in the first attempt, glottis exposure worsened when CP was applied and in these patients, airway was managed as per difficult airway algorithm of the American Society of Anaesthesiologists 2003.

DISCUSSION:

In our study, CP had no influence on the rate of failed orotracheal intubation with Macintosh No.3 laryngoscope blade, but CP worsened the glottic view in those patients who could not be intubated initially with SCP applied. Even median intubation time was slightly prolonged in the CP group than in the SCP group(17.89s and 15.48s respectively). Lateral shift of larynx was observed in 44.6% of patients in CP group compared to 11.8% in SCP group.

The clinical effectiveness of CP should be determined by weighing its efficacy in preventing pulmonary aspiration of gastric content against the risk of impending tracheal intubation. Our study shows that concerns about impending intubation are not justified because tracheal intubation can be achieved successfully with CP. Previous studies evaluating the effect of CP on laryngoscope view with a standard laryngoscope blade have yielded conflicting results. In a group of 100 patients, Brimacombe et al3 reported no effect of CP on laryngoscopy grade.

In another study by Vanner et al4, 50 patients had a standard CP, an upward and backward CP, or CP applied. They concluded that laryngoscopic view, assessed in millimeters of visible vocal cords, was worse with standard CP than without CP. Cricoid pressure was more likely to give better view of glottis than no cricoid pressure and cricoid pressure in cephalad and backward direction was more likely to give a better view at laryngoscopy than standard technique. However in minority of patients view will either be the same or better with no cricoid pressure.

A review on the cricoid pressure by Brimacombe et al5 inferred that there have been no studies proving the benefits of cricoid pressure . Yet there is evidence that it is often ineffective and it may increase the risk of failed intubation and regurgitation. Even oesophageal rupture has been reported following retching as a consequence of Sellick maneuver applied during induction of anaesthesia6.

Vigorous cricoid pressure can distort the laryngeal anatomy or inadvertently flex the neck impairing intubation. In addition improperly applied cricoid pressure may make it hard to ventilate a patient, irrespective of whether the laryngeal view is improved7. But Skinner et al8 concluded that cricoid pressure is demonstrably capable of reducing the risk of passive regurgitation of gastric contents.

Other studies have evaluated the success of intubation with CP using devices other than a common laryngoscope blade. With a lightwand9 and the Wu-scope system10, a lower success rate of tracheal intubation was reported with application of CP. Shulman et al 11 reported that success of intubation with the bullard laryngoscope is not altered by CP.

Most of the previous studies used laryngoscopic view as their primary end point. In our study we elected to use the rate of failed intubation within a fixed time period as orotracheal intubation is the final objective of direct laryngoscopy. The choice of 30s duration was made as it represents a reasonable duration for an intubation attempt.

In our study application of cricoid pressure had two minor adverse effects on laryngoscopy. Median intubation time was slightly increased by 2.41s and lateral shift of larynx was more frequent in the CP group. However these effects had no influence on the failure rate of intubation.

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CONCLUSION:

Cricoid pressure is not a substitute for optimal patient preparation. Ensuring optimal positioning and a rapid onset of anaesthesia and muscle relaxation to decrease the risk of coughing, straining or retching during the induction of anaesthesia are more important in the prevention of pulmonary aspiration than cricoid pressure.

Results in the study indicate that CP, when applied properly, does not increase the rate of failed orotracheal intubation. However need to intubate or ventilate can mandate partial release of cricoid pressure when airway difficulties arise. Hence application of CP should not be avoided for fear of increasing difficulty in intubation by direct laryngoscopy, when its use is actually indicated.

Fig 1: Intubation time

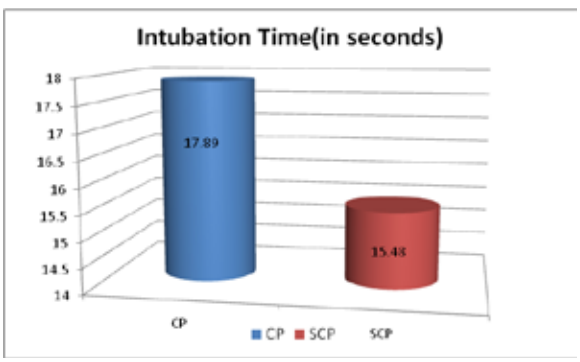
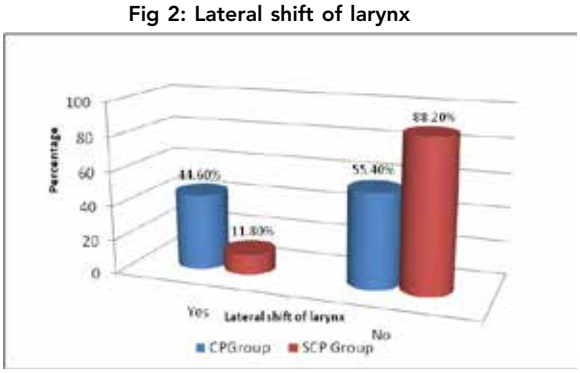


Fig 2: Lateral shift of larynx



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