RELEVANCE OF ENDOTRACHEAL TUBE CUFF PRESSURE (ETTC)
MONITORING DURING CERVICAL SPINE SURGERIES. MANUAl V/S
AUTOMATIC METHOD

- ABSTRACT

Intubation and assessment of the endotracheal tube cuff (ETTC) pressure is often underestimated as a critical aspect of endotracheal intubation. ETTC pressure, endotracheal intubation leads to the clinician seal the airway to prevent aspiration while maintaining spontaneous ventilation without air leaking. If the ETTC pressure exceeds the tracheal mucosal capillary perfusion pressure, the ETTC quickly begins to injure the mucosa and surrounding tissues. During anterior surgical approach for cervical spine surgeries, use of retractors and distraction devices increases the pressure on the tracheal mucosa by the endotracheal tube cuff.

The length of time needed for an elevated cuff pressure to cause these complications is unclear, but mucosal damage has been demonstrated after only 15 minutes in an animal model. Based on recent recommendations, cuff pressure should be maintained around 20 cmH2O in critically ill and mechanically ventilated patients. Automated cuff pressure controllers have been introduced to overcome these risks and to keep the cuff sufficiently inflated.

The aim of the present study was to investigate the effect of continuous automated cuff pressure regulation on tracheal sealing during cervical spine surgery. Correlations between manual methods of assessing the pressure by an experienced anesthesiologist and assessment with maintenance of the pressure within the normal range (20-30 cmH2O, fixed at 25 cmH2O by the automated pressure controller device were studied.

We concluded that the ETTC pressures were significantly in the higher range when ETTCs were inflated manually, even with the experienced anesthesiologist and due to placement of retractors during anterior approach, ETTCs further increases. The ETTC pressure further rises with the use of Nitrous Oxide. The complications high ETTC pressures can be avoided if the cuff pressure controller device is used and manual methods cannot be relied on for keeping the pressure within the recommended levels.

- METHODS

The study was a prospective observational study by trained anesthesiologists. The anesthesiologists were responsible for the intubation of the airway and intubation when the cuff was inflated. The cuff pressure was assessed when the cuff was inflated within minutes of the tracheal intubation. The cuff pressure was assessed by a non-dependent muscle relaxant, and endotracheal intubation was done with the appropriate size ETTC. All patients were intubated with a size-cuffed PVC single-stage endotracheal tube with high-volume low-pressure cuff and a luer lock in the post induction (Haryana, India) with internal diameter 7.5-8.5 cm and with endotracheal intubation tube with high pressure low cuff (Portex Reinforced Tracheal Tube, Smith & Medical International Ltd, T27a), single-stage tube with internal diameter 7.5-8.5 cm. Patients were maintained in oxygen (100%) of 10% (Scullcap, India). Cuff pressure was measured using a Muller manometer, which was made by the anesthesiologist to maintain with inflation of non-0.95 mmHg and deflation of 0.95 mmHg. All surgeries were conducted with intubation pressure within 0.95 mmHg and deflation of 0.95 mmHg. As per the surgeon's advice, the cuff pressure was maintained as 0.95 mmHg and deflation was at 0.95 mmHg. All surgeries were conducted in the department of neurosurgery, post operated trauma, and critically ill patient in the ward.

These patients were divided into two groups; those were further divided in two sub groups.

- Group A: Patients were posted for cervical spine surgeries through anterior approach

- Sub-Group AM of 30 patients—In this group, the ETTc was inflated manually by a trained anesthesiologist and checked by its pressure hourly by cuff pressure monitor.

- Sub-Group PM of 30 patients—In this group, the ETTc was inflated manually by a trained anesthesiologist and checked by its pressure hourly by cuff pressure monitor.

- Group B: Patients were posted for cervical spine surgeries other than anterior approach

- Sub-Group BM of 30 patients—In this group, the ETTc was inflated manually by a trained anesthesiologist and checked by its pressure hourly by cuff pressure monitor.

- Sub-Group PM of 30 patients—In this group, the ETTc was inflated manually by a trained anesthesiologist and checked by its pressure hourly by cuff pressure monitor.

- Group C: Patients were posted for cervical spine surgeries other than anterior approach

- Sub-Group AC of 30 patients—In this group, ETTC was inflated by automated cuff pressure controller and was maintained at 25 cmH2O throughout the surgeries.

- Sub-Group PC of 30 patients—In this group, ETTC was inflated by Automated cuff pressure controller and was maintained at 25 cmH2O throughout the surgeries.

In subgroup AM and PM, based on standard technique consisted of ETTC cuff inflation using a syringe to inject into the cuff and assessment of cuff pressure by palpation of the exerted inflation and also to be the disappearance of the bubble at the pressure of ETTc was recorded and monitored hourly, while in subgroup AC and PC, cuff was inflated by checking with Automatic cuff pressure controller and pressure was maintained at 25 cmH2O throughout the surgeries. The safe cuff pressure in our study protocol was taken as pressure less than 25 cmH2O. This pressure was measured by highly sensitive and accurate VMB cuff controller type—cuff controller digital 0-99 cmH2O, VMB Medizintechnik (AHR, Germany).

- RESULTS

- Studied subjects were randomly allocated in 2 groups using appropriate randomization method which is freely available on site www.randomization.com.

- Descriptive statistics

- Independent T-Test

- Test of Spicificity (Mann–Whitney’s Test)

- Repeated measure ANOVA

- Bonferroni Correction Test

- RESULTS

- ABSTRACT

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The aim of the present study was to investigate the effect of continuous automated cuff pressure regulation on tracheal sealing during cervical spine surgery. Correlations between manual methods of assessing the pressure by an experienced anesthesiologist and assessment with maintenance of the pressure within the normal range (20-30 cmH2O, fixed at 25 cmH2O by the automated pressure controller device were studied.

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- OBJECTIVE

The objective of the present study was to investigate the effect of continuous automated cuff pressure regulation on tracheal sealing during cervical spine surgery.