

EVALUATION OF PULMONARY ASPIRATION AND SELICK'S MANEUVER IN EMERGENCY LAPAROTOMIES

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ABSTRACT

BACKGROUND

Sellick's maneuver is used for the prevention of pulmonary aspiration in emergency situation. To evaluate the efficacy of Sellick's maneuver controlled trials were not done up till now because of ethical and legal issue. On the background of recent updates, we have planned to evaluate the emergency laparotomy and obstetric cases of last four and a half years for the risk of pulmonary.

AIMS AND OBJECTIVES

To evaluate the incidence rate of pulmonary aspiration, the morbidity and mortality of pulmonary aspiration and to discuss the efficacy of Sellick's maneuver.

MATERIAL AND METHODS

Cases selected are from the period January 2011 to June 2015. Total 807 cases were for evaluation. After permission of record section of our hospital case sheets are evaluated. Where ever required the concerned assistant professor of anesthesiology was interviewed.

OBSERVATIONS

The incidence of pulmonary aspiration is 1:807. This patient did not need intensive pulmonary management. There is no mortality because of pulmonary aspiration. Two cases of vomiting immediately after extubation are observed, but there was nothing to suggest for pulmonary aspiration.

CONCLUSION

There are chances of regurgitation even with all preventive measures are applied. The incidence rate is 1:807 in emergency surgical procedures under general anesthesia. Out of three main groups, i.e. obstetric group, pediatric group and adult patients of emergency laparotomy group no group can be labeled as more high risk group for risk of aspiration. There is no mortality because of regurgitation. The training of assistant is crucial to prevent the incidence of aspiration. We are of opinion that Sellick's maneuver will remain beneficial during induction of general anesthesia to prevent pulmonary aspiration.

KEYWORDS

Pulmonary Aspiration, Sellick's Maneuver Emergency Laparotomies, General Anesthesia.

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INTRODUCTION

The risk for pulmonary aspiration is minimized by sellicks maneuver during rapid sequence induction and intubation of general anesthesia for emergency laprotomies. It is an application of pressure on cricoid cartilage ring against the body of C5 cervical vertebra which obliterate the oesophageal opening. It is an age old technique.^[1,2] on which the difference of opinion still continues.^[3,4,5,6,7] Pulmonary aspiration is defined as the inhalation of oro-pharyngeal or gastric contents into the larynx and respiratory track.^[8] Its prevention is the important skill in the management of anesthesia for high risk patients. This is the retrospective analysis study of emergency laparotomy cases performed in our institute. To evaluate the efficacy of sellicks maneuver

controlled trials were not done up till now because of ethical and legal issue. With the background of recent updates, we have planned to evaluate the emergency laprotomy cases of last four and half years for the risk of pulmonary aspiration.

AIMS AND OBJECTIVES

1. To evaluate the incidence rate of pulmonary aspiration.
2. To evaluate the morbidity and mortality of pulmonary aspiration.
3. To discuss the efficacy of Sellick's maneuver.

METHODOLOGY

After permission from the institute, data is retrieved from operation theater record and record section of hospital. The cases included were from the period January 2011 to June 2015. Total 807 emergency laparotomies for various diagnosis as mentioned in Table-1 were for evaluation. Wherever required the concerned assistant professor of Anesthesiology was interviewed.

In our institute, majority obstetric cases are done under spinal anesthesia. In this study, the common obstetric reasons for general anesthesia were eclampsia, obstetric hysterectomy, ruptured uterus and ectopic pregnancy.

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| Sl. No. | Diagnosis | No. of Cases |
|--------------|---|--------------|
| 1. | Appendix perforation/acute appendicitis | 031 |
| 2. | Blunt trauma abdomen (haemoperitonium and other injuries) | 188 |
| 3. | Intestinal obstruction | 144 |
| 4. | Duodenal perforation | 035 |
| 5. | Intestinal perforations other than Duodenal perforation | 164 |
| 6. | Obstetric cases (LSCS, Obstetric hysterectomy, ectopic pregnancy ruptured uterus) | 239 |
| 7. | Others | 006 |
| Total | | 807 |

Table 1: Diagnosis for which the Laparotomies were performed

Available data shows three distinct major group as follows:

- Group-O (Obstetric patients) – 239.
- Group-A (Adult patients of emergency laparotomy) – 479.
- Group-P (Paediatric patients of emergency laparotomy) – 89.

| Age Group | 0-1 Years | 1-5 Years | 6-12 Years | 13-18 Years | >18 Years | Total |
|--------------|-----------|-----------|------------|-------------|-------------|-----------|
| No. of Cases | 22 | 21 | 56 | 46 | 662 | 807 |
| | 89 cases | | | | 324 Females | 338 Males |

Table 2: Age Group of the Patients

The paediatric age group (Up to 12 years of age) are 11% of total. Amongst the adult 662 patients, 48.94% are female patients and 51.05% are male patients. General Anesthesia protocol followed for the emergency laparotomy was:

1. Before induction of general anesthesia, aspiration of stomach contents is tried with the help of wide gauge nasogastric tube.
2. Pre-oxygenation started along with intravenous fluids.
3. Rapid sequence induction was done of which the Sellick's maneuver was one step. The pressure applied during this maneuver was about 30 N.
4. Sellick's maneuver was released after securing endotracheal tube with cuff inflation. Patient was maintained under adequate depth of anesthesia. At the time of difficulty in endotracheal intubation cricoid pressure was minimized as per instructions of the anesthetists.
5. After the surgical procedure, patient was reversed from the non-depolarizing muscle relaxants and extubation was done after all the precaution when the patient was conscious.

OBSERVATIONS

In addition to the physiological risk factors for pulmonary aspiration, the patients were at high risk of aspiration because of various reasons like intestinal obstruction, paralytic ileus, patients have taken solid and liquid food recently before getting hospitalized, alcohol intake, gastroesophageal reflux, etc.

Amongst total 807 cases, we had one case of regurgitation of gastric content at the time induction of anesthesia. It was two-month-old baby of congenital hypertrophic pyloric stenosis posted for pyloromyotomy. On rapid sequence induction, the first attempt was failure. On repeat attempt, the cricoid pressure was released which resulted in regurgitation of clear fluid from stomach which was collected in pharynx only. The anesthetist was successful

in securing the airway after oral suction. On examination of respiratory system, there was mild bronchospasm in lower lobes bilaterally. Air entry was equal on both sides. Oxygen saturation dropped to not less than 92% on FiO2 of one. Endotracheal suction was done, which revealed no fluid or foreign material.

Airway spasm was managed by bronchodilators, controlled ventilation, chest physiotherapy antibiotics. Patient was extubated on table with normal oxygen saturation on air. In next 24 hours baby developed respiratory distress which was mild and managed successfully and in due course of time patient was recovered fully from this insult. On followup, there were no specific findings on chest radiograph.

Extubation is a step where again chances of regurgitation and aspiration are high. Two cases of vomiting immediately after extubation were observed. Because both of them were recovered completely from anesthesia, they vomited out completely. No one had signs and symptoms suggestive of aspiration. On examination, respiratory system was normal. Patients were comfortable. Oxygen saturation was within normal range on air. On followup till discharge, there was nothing to suggest for pulmonary aspiration. The incidence rate of pulmonary aspiration in our study is 1:807 and no patient required any intensive respiratory support. There was no mortality because of pulmonary aspiration.

DISCUSSION

Event of aspiration is a nightmare to any anesthetists. In 1862, the first incidence of pulmonary aspiration was reported.^[9] and in 1946 Mendelson identified the pathophysiology of lung injury because of gastric acid.^[10] British anesthetist Brian A. Sellick in 1961 introduced the application of cricoid pressure to prevent the pulmonary aspiration of gastric content.

Efficacy of Sellick's maneuver is questionable, because assistant requires knowledge of anatomy, causes distortion

of anatomy of larynx, closure of the vocal cords, difficulty in ventilation and moreover it will not guarantee the prevention of aspiration.^[11,12]

Smith et al. with the help of computed tomography imaging shown that the position of esophagus is lateral to the cricoid ring of which the incidence was 49%. This finding shows that there cannot be esophageal compression by cricoid pressure and ultimately questioned the efficacy of Sellick's maneuver.^[13]

On application of cricoid pressure esophagus gets compressed was the finding of cadaveric study by Fanning in 1970.^[14] In 2009 under magnetic resonance imaging studies, Rice et al. found that on application of cricoid pressure hypopharynx is compressed and not the esophagus. On compression of cricoid ring, hypopharynx is occluded even if the cricoid ring is lateral to vertebral body. The relationship between the hypopharynx and cricoid ring is preserved even in lateral movement, which is essential to the efficacy and reliability of the alimentary tract occlusion maneuver. Moreover, he concluded that lateral movement of the esophagus inferior to the cricoid level is not relevant to the efficacy of cricoid pressure.^[15]

Zeidan, Ahed M., et al. studied the functional patency of the esophageal entrance during CP under direct vision. The functional capacity of cricoid pressure is tested first time in this study. The patency of the esophageal entrance during CP was directly visualized by using the Glidescope video laryngoscope in anesthetized and paralyzed patients with and without CPA cricoid force of 30 N is sufficient in occluding the esophageal entrance. The efficacy of the maneuver was independent of the position of the esophageal entrance relative to the glottis, whether midline or lateral.^[16]

These finding nullified the technical queries related to Sellick's maneuver. We can say that Sellick's maneuver is effective in prevention of possibility of regurgitation of gastric contents. It becomes an alternative to the natural protection of upper esophageal sphincter.

Additional advantage of cricoid pressure is that it prevents the stomach insufflation during mask ventilation. In paralyzed patients even the lower pressure of ventilation may cause the gastric insufflation.^[17] Thus, it will not allow the building up of intragastric pressure and ultimately prevent the chances of regurgitation.

The cricoid pressure causes the difficulty in mask ventilation.^[18] and the rapid sequence induction will result in high incidence of oxygen desaturation.^[19] This emphasizes the optimization of preoperative patients and training of anesthetists in using the techniques of rapid sequence induction and intubation.^[20,21]

On failure of endotracheal intubation Ellis D.Y., et al. suggested that the removal of cricoid pressure should be an immediate consideration.^[22]

Another issue related to pulmonary aspiration is in situ position of nasogastric tube. It was said that nasogastric tube will prevent the proper occlusion of esophagus. But it helps to reduce the intragastric pressure and help in reducing the risk of aspiration.^[23]

The risk factors for pulmonary aspiration in our study are difficult intubation, which leads to second attempt of intubation and possibility of inadequate depth of anesthesia during repeat attempt of intubation. The other important factor is improper application of cricoid pressure.

In our study, there are three distinct major groups which are high risk for pulmonary aspiration. Overall, the incidence rate in our study is 1:807. Paediatric group is more high risk group as compared to other groups as far as risk of pulmonary aspiration is concerned.^[24] But with the available data, we can say that no group is inclined more for the risk of aspiration.

Pulmonary aspiration is not always with morbidity or mortality. The pulmonary aspiration case in our study did not need the intensive respiratory care management. Mark A., Warner et al. observed that 63% patients of total pulmonary aspiration cases none required intensive care or respiratory support, nor did pulmonary complications developed. Children who have clinically apparent pulmonary aspiration, but in whom symptoms do not develop within 2h. of aspiration or discontinuation of anesthesia appear to be unlikely to have respiratory sequelae.^[25] Olsson G.L. and his associates observed that out of 87 cases of aspiration, only 41 cases (47%) led to aspiration pneumonitis which are confirmed by x-ray.^[26]

We did not come across the cases related to the complications of cricoid pressure like esophageal rupture, cricoid fracture and cervical spine trauma. Hence cannot be commented.

CONCLUSION

There are chances of regurgitation even with all preventive measures are applied. The incidence of pulmonary aspiration is 1:807 in emergency surgical procedures under general anesthesia. Out of three main groups, i.e. obstetric group, paediatric group and adult patients of emergency laparotomy group no group can be labeled as more high risk group for risk of aspiration. There is no mortality because of regurgitation. The training of assistant is crucial to prevent the incidence of aspiration.

The incidence being very low it is difficult to define statistical significance. Considering the recently observed studies and our experience of pulmonary aspiration case, we are of opinion that Sellick's maneuver will remain beneficial during induction of general anesthesia to prevent pulmonary aspiration. The cricoid pressure needs to be minimized as per the instructions of anesthetist to facilitate the endotracheal intubation.

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