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ORIGINAL ARTICLE

Outcome of postoperative intubation and mechanical ventilation in neonates with surgical pathologies

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Abstract:

Background and aims: With rising survival of neonates, the need for surgical intervention and mechanical ventilation are also increasing. Neonates with mechanical ventilation may have problems related to the intubation. In this study, we aimed to evaluate the factors leading to complications among the intubated neonates after surgery.

Materials and Methods: Twenty three newborns with surgical pathologies, who required endotracheal intubation and mechanical ventilation after surgery, were enrolled in the study between January 2008 and December 2008. The gestational age, diagnosis, duration of intubation, associated congenital abnormalities, intubation difficulties and respiratory problems after the extubation were recorded.

Results: The mean gestation age was 34 weeks. Congenital diaphragmatic hernia was present in four neonates. There were 5 patients with esophageal atresia and tracheoesophageal fistula, 3 patients with intestinal perforation due to necrotizing enterocolitis and 2 patients with omphalocele. Three patients (with diagnosis of bladder exstrophy, neonatal cholestasis, cystic adenomatoid malformation) having pneumothorax were also included into the study. The mean length of intubation was 8.8 days. Intubation difficulty was encountered in two patients. One patient had extubation failure due to laryngeal stenosis, laryngomalacia and laryngeal granulation. In four patients (17.3%) subglottic stenosis, laryngeal granulation, stridor and laryngomalacia developed. Endoscopic dilatation and excision of granulation tissue were performed in two of them. The other two patients were managed conservatively. All four patients were extubated successfully. Two patients -without extubation problems- died due to multiple organ failure.

Conclusion: Endotracheal intubation, extubation and mechanical ventilation are safe procedures in neonates with surgical pathologies if they are performed by the staff with experience. Follow up of these patients must be achieved in NICU. Complications may occur due to intubation and mechanical ventilation and these problems may require a surgical repair.

Keywords: Mechanical ventilation, Neonates, Surgery, Endotracheal intubation

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Introduction

Airway complications related to endotracheal intubation (EI) is common in neonatal intensive care units (NICU). Particularly low birth weight, preterm, critically ill postoperative neonates may be at the greatest risk with higher morbidity and mortality. Such neonates frequently require preoperative and postoperative EI.

EI has risk of some adverse outcomes including vocal cord injury, vocal cord granuloma, laryngeal and tracheal stenosis [1, 2]. Children have different airway anatomy and physiology compared to adults. Prevention of airway complications related to EI can be achieved by gentle insertion of tube and selection of correct size of the tube [3].

In the present study, we aimed to determine the

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incidence and type of airway complications in high risk surgical neonates who received mechanical ventilation and EI postoperatively.

Material and Methods

Twenty three neonates (10 male, 13 female with a mean age of 6.7 days) were included into the study between January 2008 and December 2008. They were followed in NICU postoperatively with EI. Outcome parameters were gestational age, gender, height, weight, diagnosis, type of surgical procedure, perinatal complications, receiving total parenteral nutrition or not, and associated anomalies.

We also recorded difficulties during EI, number of intubation, duration of intubation, and complications after extubation.

All patients were monitorized in NICU pre and postoperatively. All patients underwent a detailed physical examination and echocardiography, transfontanel ultrasonography to assess associated abnormalities. Genetic studies were also performed.

Results:

Twelve patients were preterm and 11 patients were term baby (The mean gestation age was 34 weeks). Their diagnosis were congenital diaphragmatic hernia in 4 patients, esophageal atresia with tracheoesophageal fistula in 5 patients, intestinal perforation due to necrotizing enterocolitis in 3 patients, omphalocele in 2 patients, and pneumothorax in 3 patients. The last three patients with pneumothorax had bladder exstrophy, neonatal choleostasis, and congenital cystic adenoid malformation as a primary pathology.

Thirteen patients already had been intubated in the preoperative period. Seven patients had pneumonia and four had sepsis. Twelve patients had associated cardiac abnormalities.

The length of operation time varied between 30 minutes to 5 hours.

At the postoperative period, all patients were monitorized. The mean intubation duration period was 8.8 days (1- 80 days).

Subglottic stenosis and laryngeal granulation were encountered in two patients.

There was laryngomalasia in a premature newborn with respiratory distress after extubation. The patient required a re-intubation. Another patient had stridor following extubation. Both patients were managed conservatively and they were extubated without any problems in the second attempt. In our four neonates with respiratory problems following extubation, corticosteroids have been utilized.

Two patients died. One had intestinal perforation due to NEC and sepsis. The cause of death was multi-organ failure. The other patient had omphalocele with multiple congenital abnormalities. This patient died after cardiopulmonary arrest.

In four patients, re-intubation was needed. In two of them, endoscopic dilatation and resection of granulation were performed. Other two patients received conservative management only. All of these four patients were extubated successfully after the re-intubation period.

Discussion

Airway complications related to EI are common among neonates [3, 4]. Physicians working in the NICU, operating room of pediatric surgery and emergency room need skill and experience for EI [5]. In some conditions such as abnormal physical features or coexisting disease, EI is difficult or even impossible. In case of difficult EI, extubation may occur and re-intubation may be needed.

EI has short-term adverse effects such as cough, vocal cord dysfunction. Most of them resolved in 48 hours. However EI also may have more severe complications including subglottic stenosis, laryngomalacia, and subglottic cysts [6,7]. Dyspnea following the extubation may indicate upper airway obstruction. Bronchoscopy is mandatory in most patients with clinical evidence of airway obstruction after extubation [8,9]. In our patients with respiratory difficulties, we have performed bronchoscopy, dilatation and resection of granulation tissue.

In our four neonates with respiratory problems

following extubation, corticosteroids have been utilized. Routine use of corticosteroids had not proven effectiveness for neonates and need to further investigation [10]. However some authors suggested particularly for high risk neonates, the benefit of corticosteroids [11]. We have the same opinion due to the positive outcome we obtained in our patients who had corticosteroid treatment.

For the treatment of laryngeal stenosis, temporary tracheotomy or anterior cricoid split are surgical methods of choice [12,13]. None of our patients needed those procedures.

In neonates with surgical pathologies having extubation difficulties, the underlying pulmonary disorders within the pre or postoperative period are the main problems such as pulmonary dysplasia and atelectasia. These problems also cause the prolonged mechanical ventilation and complicated the process. For that reasons, we think that both in pre and postoperative period, an appropriate care of pulmonary problems is the most critical point in management. Intubation and extubation must be performed by the staff with experience and follow up of these patients must be achieved in NICU.

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