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Is the Routine Insertion of a Gastric Tube Necessary for Full Term or Late Preterm Infants Admitted with Mild Respiratory Distress in NICU?

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Abstract

Objectives: Gastric tubes are routinely in infants with transient tachypnea of newborn and mild respiratory distress. This study was conducted to investigate the need for routine insertion of gastric tube in full term and late preterm infants with mild respiratory distress admitted to the neonatal intensive care unit.

Methods: This study was conducted on full term and late preterm infants who were admitted with mild respiratory distress to the Gangnam Cha Hospital NICU. From January to June 2014, a retrospective chart review was done 62 infants in the control group for whom an orogastric or nasogastric tube was routinely inserted and whose feedings were increased before gastric tubes were removed. In the experimental group infants, from July to September 2014, no gastric tube was inserted or was inserted for the identification of choanal atresia and for gastric contents aspiration and then removed rapidly.

Results: The mean gestational age and birth weight of the infants in the experimental group were 37.2 ± 3.6 weeks and 2866 ± 337 gm, respectively, and those in the control group, 37.2 ± 3.2 weeks and 2849 ± 677 gm. There were no infants who needed intubation and CPAP or mandatory ventilator support. Most of the subjects in the experimental and control group were diagnosed with transient tachypnea of the newborn. The mean achieving age at full enteral feeding of experimental group infants was 4.76 days that for the control group infants, 4.67 day. The duration of hospital stay was 7.15 days for the experimental group infants and 7.23 days control group infants.

Conclusion: We concluded that the routine use of a gastric tube for term and late preterm infants admitted with mild respiratory distress in NICU may be unnecessary, and that either a gastric tube should not be used at all for such infants or the period of its use should be minimized.

Keywords: Gastric tube; Transient tachypnea of the newborn; Late preterm infants; Full term infants

Introduction

Gastric tube insertion and feeding by an orogastric or nasogastric tube are used commonly for newborn infants who have structural or functional problems in their gastrointestinal system, or who require assisted feeding. Full-term or late-preterm infants admitted to the neonatal intensive care unit (NICU) with mild respiratory distress immediately after birth also may have gastric-tubes inserted commonly, as do preterm infants less than 34 weeks gestation or infants experiencing severe respiratory symptoms. These may be either oro- or naso-gastric tubes. As newborn infants breathe through the nose rather than mouth, orogastric-tube insertion is often used [1].

In the NICU, gastric-tube insertion may be used for treatment purposes and for nutrition. For treatment purposes, patients with abdominal distention or gastroenteritis or who underwent gastrointestinal-tract surgery also may receive gastric tube insertion to reduce gaseous distention of the gastrointestinal tract, thus alleviating symptoms, such as vomiting and abdominal distension [2]. Infants who cannot have oral feeding may use the gastric tube for medication administration. The orogastric tube is specifically used when infants cannot suck or swallow, so that they could be provided with feeding or medications with minimal effort. For preterm infants who cannot receive full oral feeding, a combination of oral feeding and tube feeding may be used. Infants less than 34 weeks gestation that do not have the ability to coordinate suck and swallow also may use an orogastric tube. Upon the insertion of the tube, the contents are aspirated, and the remnants are confirmed prior to feeding. The tube may also be used for preventing pulmonary aspiration of feeding contents.

In full-term infants, gastric-tube is sometimes inserted and removed immediately after birth; the tube is removed without delay to rule out obstruction of the posterior naris or esophageal atresia. In the case of Infants admitted in the NICU due to mild respiratory symptoms immediately after birth, the gastric tube may be left in, however, due to their aggravating respiratory symptoms, which may cause difficulty in feeding by mouth. In the case of newborn infants who have mild respiratory symptoms, including dyspnea not requiring assisted feeding, the gastric tube is removed after confirming the toleration of enteral feedings. However the insertion of gastric tubes has a risk of injury to the infant. When the gastric tube is inserted in the nasopharynx, the posterior pharynx is stimulated, and the vagus nerve

may trigger a gag reflex to develop brachycardia [3]. Unnecessary gastric-tube insertion can cause difficulty in feeding. In few preterm infants or term infants, gastric-tube insertion caused esophageal or gastric perforation [4-7].

In this study, the necessity of gastric-tube insertion in full-term or late-preterm infants admitted to the NICU due to mild respiratory distress, which is routinely performed in such infants, were investigated.

Methods

From January to September 2014, this study was conducted on full term and late preterm infants who were admitted to the Gangnam Cha Hospital NICU on the first day of life with mild respiratory distress (tachypnea, grunting, nasal flaring, or chest retraction) but did not need CPAP or mechanical ventilator support. They had orogastric or nasogastric tubes placed until the amount of feeding reached ≥ 50 ml/kg per day of volumes, at which time the tube was removed. Infants with any congenital anomalies or functional disorders of oropharynx or gastrointestinal tract were excluded.

A retrospective chart review was done for 62 infants of "control group" admitted from January to June 2014, who admitted with mild respiratory distress in NICU and had orogastric or nasogastric tubes placed until the amount of feeding reached 50 ml/kg per day of volumes, at which time the tube was removed. From July to September 2014, gastric tubes were either not placed, or were inserted briefly for rule out obstruction of the posterior naris or esophageal atresia and then rapidly removed. The charts of 23 patients from this time period ("experimental group") were reviewed prospectively.

If experimental group infants had vomiting or abdominal distension, an orogastric tube was inserted for gastric decompression. Trained NICU nurses determined placement of the gastric tube according to our protocol. The length of the inserted tube was equal to the distance from the bridge of the nose to the earlobe and from the ear lobe to a point halfway between the xyphoid process and the umbilicus. For the experiment subjects, the consent of their parents was obtained after the objective and method of the research as well as the predicted side effects and the methods of handling these were explained to them upon their infants' admission to the neonatal intensive care unit.

We compared demographic data such as gestational age, birth weight, Apgar score, delivery of cesarean section, male sex, late-preterm infants, intrauterine growth restriction (IUGR) and duration of oxygen therapy. Full-term infants were defined by birth between 37 and 42 weeks gestation and late-preterm infants defined by birth at 34 0/7 weeks through 36 6/7 weeks. The definition of IUGR was a fetal weight below the 10^{th} percentile for gestational age.

Transient tachypnea of the newborn(TTN) were determined based on the respiratory distress symptoms less than 6 hours after birth (i.e., respiratory rate greater than 60/min, grunting, nasal flaring or retraction) and typical chest radiography findings (i.e., fluid in minor fissures, hyperinflation, prominent vascular/perihilar markings). And these symptoms usually resolve naturally within 48-72 hours after birth, but last up to 5 days. Meconium aspiration syndrome (MAS) was defined as respiratory distress in an infant born through meconium-stained amniotic fluid whose symptoms cannot otherwise be explained [8]. Bacterial infection such as pneumonia or sepsis was determined that serial blood cultures may be obtained to later identify an infecting organism. Chest radiography helps in the diagnosis, with bilateral infiltrates suggesting in utero infection [9].

The clinical outcomes of time to achieving full enteral feeding, duration of intravenous fluid therapy or parenteral nutrition, and the duration of hospital stay of the two groups were evaluated. Full enteral feeding was defined when the enteral feeding reached 100 ml/kg per day of volumes [10]. If infants had vomiting, abdominal distension or developed respiratory symptom and needed nasal CPAP or mechanical ventilator support, they are immediately inserted gastric tubes.

Descriptive statistics were calculated with means and standard deviations for continuous variables and number and percent. Statistical analysis was performed with SPSS program version 12.0 (SPSS Inc., Chicago, IL, USA). The Mann-Whitney test was used to determine differences between the experimental and controls group patients. Chi-square tests or Fisher`s exact tests as appropriate for small sample size were used to compare categorical patient characteristics such as Cesarean section, IUGR (Table 1). Results were considered significant when $P<0.05$.

Characteristics	Numbers of experimental group (n=23)	Numbers of control group (n=62)	P- value
	N(%)/Mean	N(%)/Mean	
Gestational age(weeks) *	37.2 ± 3.6	37.2 ± 3.2	0.93
Birth weight(g) *	2866 ± 337 g	2849 ± 677 g	0.89
Delivery Cesarean section	12(52.2%)	42(67.7%)	0.21
Apgar scare			
1 min	6.9	7	0.79
5 min	8.2	8.4	0.56
Male sex	14 (60.8%)	41 (66.1%)	0.46
Late preterm infants	10 (43.5%)	29 (46.8%)	0.95

Intrauterine growth retardation	1 (4.3%)	2 (3.2%)	0.74
Duration of Oxygen therapy(hours)	39.1	48.7	0.08

Table 1: Comparison of Characteristics between the experimental and control group. *mean ± standard deviation. Student t-test, Chi-square test, Fisher`s exact test, Mann-Whitney U test, Values are expressed as number (percent) or mean.

Results

From January through September 2014, total 85 neonates participated in the study in a single institution. From January through June 2014, retrospective study was conducted on 62 infants who met inclusion criteria. From July through September 2014, we conducted a prospective study of 23 newborns hospitalized with mild respiratory distress in the NICU. After admission, experimental group infants did not have gastric tubes inserted except briefly to rule out choanal or esophageal atresia, or aspirate initial gastric contents.

The clinical characteristics of experimental and control group infants are shown in Table 1. The mean gestational age and birth weight of the infants in the experimental group were 37.2 ± 3.6 weeks and 2866 ± 337 gm, respectively, and those in the control group, 37.2 ± 3.2 weeks and 2849 ± 677 gm. There were 10 (43.5%) late preterm infants in the experimental group, and 29 (46.8%) infants in control group. Intrauterine growth restriction present in 1 (4.3%) infants in experimental group and 2 (3.2%) infants in control group. The proportion of males to females of experimental and control groups was 1.3:1 and 1.95:1, respectively. The mean of 1 minute Apgar score was 6.9 and 5 minute Apgar score was 8.2 in experimental group. The mean of 1 minute Apgar score was 7.0 and 5 minute Apgar score was 8.4 in control group. The mean duration of oxygen treatment by hood, mask or nasal cannula was 39.1 hours in experimental group, and 48.7 hours in control group. There were no significant differences in gestational age, birth weight, 1 minute Apgar score, 5 minute Apgar score, late preterm infants, IUGR and duration of oxygen therapy (Table 1).

The mean age at achieving full enteral feeding for experimental group infants was 4.76 days that of the control group infants, 4.67 day. Mean duration of fluid therapy or parenteral nutrition of experimental group was 71.8 hours and control group was 83.5 hours. The duration of hospital stay was 7.15 days for the experimental group infants and 7.23 days control group infants (Table 2).

	Numbers of experimental group (n=23)	Numbers of control group (n=62)	P-value
Duration of fluid therapy or parenteral nutrition(hours)	71.8	83.5	0.31
Age at full feeding(days)	4.76	4.67	0.83
Duration of hospital stay(days)	7.15	7.23	1

Table 2: Clinical outcomes of the experimental and control group. Student t-test, Chi-square test, Fisher`s exact test, Mann-Whitney U test, Values are expressed as number or mean.

There are no infants who needed to intubation and non invasive or invasive ventilator support. Thus, there was no significant difference between experimental and control groups in terms of the mean age at achieving full feeding, the duration of fluid therapy of parenteral nutrition and the duration of hospital stay($P<0.05$). Most of the subjects in the experimental (86.9%) and control (91.9%) group were diagnosed with transient tachypnea of the newborn. Other causes of mild respiratory distress included neonatal aspiration of meconium, apnea, cyanosis and pneumonia (Table 3).

Diagnosis	Numbers of experimental group(n=23)	Numbers of control group(n=62)
Transient tachypnea of the newborn	20 (86.9%)	57 (91.9%)
Meconium aspiration	1 (4.3%)	3 (4.8%)
Infection(e.g., pneumonia, sepsis)	0 (0%)	2 (3.2%)
Cyanosis	0 (0%)	3 (4.8%)
Apnea	2 (8.7%)	2 (3.2%)
Bradycardia	1 (4.3%)	7 (11.3%)

Table 3: Symptom or diagnosis of the experimental and control group. Values are expressed as number (percent) or mean.

Of 23 newborns hospitalized with mild respiratory distress in NICU from July to September 2014, there were two infants who had vomiting or abdominal distension. There were no infants who developed gastrointestinal perforation or necrotizing enterocolitis.

Discussion

Most patients in the NICU will have a gastric tube placed during their hospitalization. If infants have an oropharyngeal anomaly, gastrointestinal disorder and serious trouble swallowing and can`t get enough food by mouth, then they must receive nutrition by feeding tubes. Also, gastric tubes may be inserted into term or late preterm infants with respiratory distress that is characterized by tachypnea, nasal flaring, grunting or chest retraction. At admission, gastric tubes are frequently used to provide decompression of the stomach and aspirate gastric contents. The tube is inserted the desired distance and an abdominal radiograph obtained to identify the internal location of the tube. Tubes placed too high with the tube tip in the esophagus or at the gastroesophageal junction and placed too low with the tube tip in the pylorus or duodenum are considered to be misplaced [11]. Infants of less than 34 weeks gestation who do not have the ability to swallow may also use an orogastric tube for feeding and medication administration. In such cases, gastric tubes may be essential for nutrition and growth.

After birth, if full term or late preterm infants can be fed orally but have a breathing rate over 80 breaths per minute, they may need to

receive fluids and nutrition parenterally [9]. If the breathing rate is 60~80 breaths per minute, feeding through a nasogastric tube or an orogastric tube may be required. When respiratory symptoms are relieved and the intake of feeding increases, the tube is eventually removed. Thus, there are almost no patients in the neonatal intensive care unit who do not have a gastric tube during the early days of birth.

The insertion, placement and use of these tubes are among the most common procedures in NICU. But, there are few guidelines for time to insert, the maximum length for to use and the time to remove for improving safety. There are great variations in practice and regional difference, and lack of evidence and studies to guide the gastric tube care in neonates.

Gastric tubes are used for relieving vomiting and abdominal distension [12,13]. Their use may decrease the possibility that the fed milk may aspirate to the lungs. But, insertion and use of gastric tubes has a risk of injury to the infant. In preterm infants, the insertion of a gastric tube alters cerebral blood flow [14]. The tube may be positioned inappropriately, such as in the lungs, small intestines, or esophagus [15]. Misplacement of gastric tubes may result in malabsorption, diarrhea, pneumothorax, pleural effusion, pneumoperitoneum, sepsis, aspiration of the feeding into the lung and prolong hospital stays [6,11,16,17].

When infants have gastric tubes while feeding, gastric residuals may be measured by aspirating stomach contents through the tubes prior to feeding. The negative pressure created by aspiration of gastric residuals in combination with the close contact of the tip of the gastric tube with the gastric mucosa has the potential to damage the gastric mucosa [12]. The presence of a gastric tube might interfere with oral feeding; shortening the period of gastric tube use may be clinically beneficial.

NICU infants have an immature immune system, and an indwelling feeding tube may increase the risk of infection. Feeding tubes in NICU infants might be colonized with bacteria.

Hurrell et al. [18] found that bacterias may develop in the gastric tubes from the orogastric area even when babies are “nil by mouth”. Also, it has been reported that bacterias separate in as fast as 6 hours after the insertion of the tube. The orogastric tube may act as the reservoir of infection, and antibiotic-resistant bacteria sometimes grow on it [19]. Because that relationship between indwelling time of gastric tube and bacterial colonization is not well described, evidence based guidelines for the placement and care of gastric tube are necessary.

Based on the results of this study, there was no significant difference between experimental and control groups in terms of the mean achieved age at full feeding, the duration of parenteral fluid therapy and the duration of hospital stay ($P<0.05$). Of the 23 newborns hospitalized with mild respiratory distress in the NICU from July to September 2014, there were two infants who experienced vomiting or abdominal distension. Orogastric tubes were immediately inserted into these two infants. The infants’ symptoms were observed while the amount of food that they were fed was decreased, and the symptoms improved in a few days. As a result, 21 (91.3%) infants out of the 23 were able to avoid the routinely used orogastric tube.

Most of the subjects in the experimental and control group were diagnosed with transient tachypnea of the newborn. TTN is a common respiratory problem of the newborn shortly after delivery. It is often seen in late preterm infants and full-term infants who are delivered by cesarian section [15,20]. Treatment varies with severity, from observation to oxygen by hood or cannula, nasal CPAP, and even intubation and mechanical ventilation rarely. If infant`s breathing rate is too high, tube feedings may be necessary because of the risk of aspiration of the milk, or the patient may be given fluid and nutrients intravenously until breathing is easier. Therefore, long fasting is unnecessary, and in the case of a full term or preterm infant’s mild respiratory distress, it was unnecessary to keep the gastric tube. This study is significant in that it suggests as in our study a gastric tube in only necessary for term and late preterm infants if symptoms such as difficulty in breathing develop and oral feeding is not possible.

Further studies examining a larger number of patients and their follow-up studies are necessary.

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