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Effects of Early Feeding Support on the Postoperative Weight Gain Status of Infants with Esophageal Atresia

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Abstract

Background: Infants may lose their body resources after surgery due to inadequate nutrient intake and undergoing long periods of fasting after surgery for esophageal atresia, increases risk of several complications.

Aim: This study aimed to evaluate the effects of early feeding support on the postoperative weight gain status of infants with esophageal atresia.

Method: This randomized, controlled clinical trial was conducted on 36 infants with esophageal atresia (type C) selected 48 hours after surgery during July 2015-March 2016 at Dr. Sheikh Hospital of Mashhad, Iran. In the intervention group, detecting no lack of leakage on chest X-ray, feeding was initiated and the control group received routine feeding. Neonatal weight changes were measured daily using a digital scale (TANITA model) since the first day after the surgery and one month after discharge from the hospital. Data was analysed using SPSS version 16 by independent T-test and Chi-square.

Results: Mean neonatal weight on admission was 2558.1±337.4 grams in the intervention group and 2547.6±856 grams in the control group (P=0.47). Results of independent T-test showed that daily weight gain before and after feeding was significantly higher in the intervention group compared to the control group (P=0.01). Moreover, weight gain one month after discharge had a significant difference between infants of the intervention and control groups (P=0.03).

Implications for Practice: According to the results of this study, early feeding support could improve the weight index of neonates with esophageal atresia. Considering the possible complications and long-term consequences of surgery, early initiation of feeding could be an appropriate remedial measure in infants with esophageal atresia.

Keywords: Esophageal atresia, Oral feeding, Infants, Postoperative care

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Introduction

Esophageal atresia (EA) is a developmental defect of the upper gastrointestinal tract and a congenital anomaly, which leads to the failure of the esophagus to develop as a continuous passage, as well as the failure of the trachea and esophagus to separate into distinct structures. These abnormalities may occur separately or simultaneously (1).

There are various forms of tracheoesophageal fistula and EA; in 85-90% of the cases, the most common form of these anomalies is discontinuous upper esophagus and distal esophagus connected to the trachea through the fistula (EA type C). Other forms of EA are comparatively rare. In 50% of the cases, EA is associated with other birth abnormalities, such as vertebral column, anorectal, and cardiac, spinal, renal and limbs defects. Therefore, early diagnosis of EA is essential to the effective treatment and prevention of these complications (1, 2).

Global incidence of EA is approximately one case per 2,500-3,000 live births, which has been reported to be slightly higher in male neonates compared to female ones. In addition, preterm infants are at a higher risk of EA (1, 3). If EA remains undiagnosed or untreated, it poses significant risk to the health of neonates; as such, nursing interventions are required immediately after birth in order to detect this anomaly (1).

Early diagnosis of EA is associated with a higher treatment success rate. According to statistics, survival rate of patients with tracheoesophageal fistula with no abnormalities or other complications is more than 90%. However, the complications and associated disorders are more common in preterm or low-birth-weight infants, with the mortality rate estimated at approximately 50% (4).

According to the literature, birth weight and significant cardiac abnormalities are the main influential factors in the survival of infants with EA, so that the survival rate of infants with birth weight of less than 1500 grams is 20% lower than those with birth weight of more than 1500 grams. Furthermore, mortality rate of neonates with significant cardiac anomalies is 20% higher compared to other patients (5).

Patients with EA require immediate surgical intervention, which is considered the ultimate treatment for this condition. However, surgery might be delayed in these patients due to factors such as premature birth, other birth defects or complications caused by aspiration pneumonia.

Surgery could be performed on EA neonates with no cardiopulmonary disorders and other intestinal abnormalities within the first 24 hours of birth. Some EA patients have an uncomplicated postoperative period, while others are likely to present with various esophageal complications, as well as respiratory and nutritional problems. These complications could significantly affect the ability of EA infants to develop adaptive behaviors in adulthood.

Among the most important complications of EA are anastomotic leakage, stenosis, gastroesophageal reflux, esophageal motility disorder, recurrent fistula, scoliosis, chest wall deformity, respiratory disorders, growth retardation, and malnutrition (6). Moreover, the most frequent, early complications associated with EA are breathing difficulty and feeding intolerance (3).

In infants with EA, a hypermetabolic response occurs immediately after surgery, which leads to the emergence of potential complications, such as hypoglycemia, gluconeogenesis, protein catabolism, fat oxidation, and increased need for energy. In this regard, clinical and experimental studies have suggested that early nutritional support could diminish these complications. For instance, José Paulo et al. (1994) reported the reduced incidence of sepsis and length of hospital stay in patients receiving early enteral nutrition after gastrointestinal surgeries (6). Furthermore, it was stated that these complications were more severe in infants, followed by more adverse consequences, since the health problems of infants undergoing surgery were more complex than adults.

Infants have a smaller body, higher growth rate, lack of evolved body systems and limited calorie reserves. In addition, neonates undergoing surgery have increased need for calorie intake (7). Therefore, it is anticipated that feeding support in infants undergoing surgery could remarkably affect their surgical outcomes.

Researchers have suggested that adequate calorie intake could restore infant growth after response to the acute injuries caused by surgery since it drastically increases resting energy expenditure (REE), especially within 4-6 hours after surgery.

On the other hand, infections and other postoperative complications increase the severity of postoperative REE despite the fact that newborns have limited energy storage. Consequently, if these infants do not receive sufficient feeding support, their physical resources deplete immediately, giving

rise to catabolic processes and increased need for energy, which exposes neonates to growth disorders (8).

Early feeding in patients with EA has been rarely addressed in the literature. In a study, Sweed et al. (1991) carried out early feeding in EA patients via a soft silastic nasogastric tube, and the patients were orally fed one day after surgery (9). Similarly, Kevin et al. (1996) initiated early oral feeding in EA patients via transanastomotic feeding tubes one day after surgery (10).

In the aforementioned studies, early feeding was not associated with the increased incidence or clinical complications of anastomotic stenosis and leakage. Furthermore, it could reduce the length of hospital stay and treatment costs (9, 10).

Currently, infants with EA are unable to feed orally before surgery due to the defects in the upper digestive system; therefore, they should receive caloric requirements through parenteral nutrition only. After the surgical repair of EA, parenteral nutrition continues for 5-7 days, and oral feeding is delayed for at least 5-7 days in order to repair the surgical points.

After the removal of nasogastric tube and ensuring the lack of anastomotic leakage, oral feeding is started with 5% glucose serum, followed by breastfeeding. This might challenge the initiation of oral feeding since long-term effects of fasting on infants leads to the delayed development of the digestive system, increasing the risk of cholestasis, accelerated catabolic processes, delayed wound healing, weight loss, and increased length of hospital stay (10). Although the quality nutrition in neonates after this operation is considered an indicator of acute malnutrition (7), scientific evidence is scarce on the complications associated with long-term postoperative fasting in infants (6).

In nursing care, nutritional support is an inherent element of health care, especially in the case of high-risk infants. In this study, we attempted to determine whether early nutritional support in patients with EA could minimize the complications caused by long-term fasting and if concurrent parenteral nutrition could provide the necessary energy and induce weight gain in EA infants.

Considering the incidence rate of EA, high costs of the surgery and treatment and the associated complications, early oral nutrition might play a key role in the prevention of these complications and improvement of the survival rate of EA infants (6, 8). It is recommended that further studies be conducted on reducing the incidence of EA complications and improving the quality of life of these patients. This study aimed to investigate the effects of early feeding support on the postoperative weight gain status of infants with EA.

Methods

This randomized, controlled clinical trial was conducted on infants with EA (type C), who met the inclusion criteria and underwent surgery, during July 2015-March 2016 at Dr. Sheikh Hospital of Mashhad, Iran. Since this hospital is the only center of pediatric surgery in the north-east of Iran, it was selected as the research environment.

Sample size was calculated using the "comparison of means" formula at the confidence level of 95% and test power of 80%. In a pilot study, weight change rates were determined at 17.1±6.8 grams for the control group and 24.9±9.3 grams for the intervention group. In total, 36 subjects were selected via convenience sampling and randomly divided into two groups of intervention and control (18 infants in each group).

To ensure reliability, at last 20 patients were allocated to each study group. Inclusion criteria were as follows: 1) gap of two bags <3 cm; 2) weight of ≥1800 grams; 3) physiological stability (heart rate=120-160, respiratory rate=30-60, SPO_2=88-93%, pink colour skin and perfect tonicity) and 4) gestational age of ≥34 weeks (11).

Exclusion criteria of the study were as follows: 1) ventilator dependence; 2) delayed removal of the patient from ventilator (>48 hours); 3) clinical signs of anastomotic leakage; 4) lack of cooperation of parents or physicians in the study; 5) twice feeding intolerance and 6) impossibility of feeding for any reason (e.g., increased bile secretion or apnea on day seven of surgery) in the control group.

Based on the inclusion and exclusion criteria, demographic data of the infants were collected using data entry forms, which were developed based on previous studies and measured weight of infants using a digital scale with gram accuracy (TANITA model). During weight measurement, infants were minimally clothed, and weight of the diaper was deducted from the total baby weight. In addition, accuracy of the measurement device was controlled daily with a standard weight of 100 grams.

Data entry forms consisted of a table to collect daily data on weight, nutrient intake and feeding modes within the past 24 hours. Moreover, data on anastomotic leakage within the first 48 hours of surgery were recorded in this table for the intervention and control groups (on day seven of surgery in the control group).

The second section of data entry forms evaluated the weight of neonates one month after discharge from the hospital. Neonatal weight was measured by the researcher at the intensive care unit (ICU) of the clinic using similar scales, the reliability and validity of which had been confirmed. Required data in this regard were collected over an interval between the surgery and discharge, as well as one month after discharge from the hospital.

After the surgery, infants who met the inclusion criteria were enrolled in the study. In the intervention group, non-anastomotic leakage was confirmed via chest X-ray 48 hours after the surgery. Following that, feeding by serum glucose (5%) (Low volume: 2cc/kg) was performed via a nasogastric tube every three hours based on the surgeon's expert opinion (8). After repeating this regimen three times, breastfeeding was started with the volume of 2cc/kg every two hours.

At the surgeon's discretion, the nasogastric tube was removed 72 hours after the surgery in infants with feeding tolerance and lack of anastomotic leakage signs. In the presence of feeding tolerance at the mentioned breastfeeding volume, feeding continued with the same process based on the medical supervision of ICU fellowship (Table 1) (12).

Since oral intake reached up to 100 ml/kg/d, equivalent calories were obtained from milk, and 60% of the received milk volume was deducted from the serum volume of the patient. Finally, parenteral nutrition was discontinued, while oral feeding continued. Infants were controlled by the researcher and nurses in terms of feeding intolerance (abdominal distention, hemodynamic changes, nausea and vomiting) during the feeding process.

If the infant showed one of the mentioned criteria of feeding intolerance, fed up with not getting medical supervision Fellowship ICU but with very low volume cc 1 every two hours continued to maintain the intestinal enzyme evolution of intestinal function (13). On the following day, if the same volume was tolerated, feeding would continue (Table 1).

If these manifestations persisted (or in the presence of anastomotic leakage), the infant would be kept fasting and excluded from the study. Since the morning after surgery until discharge from the neonatal intensive care unit (NICU), weight gain status of the infants was assessed daily by nurses using a scale at the beginning of the morning shift after diaper change.

In this study, infants of the control group remained on routine fasting until six days after surgery and received parenteral nutrition. On day seven of surgery, chest X-ray was carried out on the infants using contrast agents to investigate anastomotic leakage. If no finding confirmed anastomotic leakage, the nasogastric tube would be removed at the surgeon's discretion, and oral feeding would continue in the intervention group. In addition, infants of the intervention group were evaluated daily in terms of body weight changes during NICU admission.

To respect the rights of the patients in this study, the researcher was fully introduced to the parents of neonates before the intervention, and an overview of the study was presented as well. Moreover, parents were assured of the safety of all the procedures. As explained to the parents and ICU authorities and personnel, participation and withdrawal from the study were optional. Informed consent was obtained from all the parents before the study, and possible risk factors were considered in the exclusion criteria. In the presence of risk factors, the infant would be excluded from the study immediately to receive care under the supervision of surgeons and ICU fellowship.

At the end of the study, one infant was excluded from the intervention group due to the malfunctioning of the chest tube and episodes of apnea during transfer to the operation room. In addition, another infant was excluded due to the lack of cooperation by the parents and surgeon. Finally, 18 infants remained in the intervention group.

In the control group, one patient was excluded due to increased bile secretion on day eight after surgery, and another infant was eliminated due to apnea (severe respiratory distress associated with ventilator dependence). In total, 18 neonates remained in the control group.

Data analysis was performed in SPSS version 16 using Kolmogorov-Smirnov and Shapiro-Wilk tests to assess the quantitative data for normal distribution. Moreover, descriptive statistics, including distribution index, central tendency index (mean and standard deviation) and frequency distribution, were used to describe neonatal characteristics in the intervention and control groups.

Independent T-test was used to analyze quantitative variables with normal distribution, and Chi-square test was applied for nominal variables, which were assessed in the study groups in terms of homogeneity. In addition, To compare clinical outcomes in cases where the normal distribution was Quantitative in both groups, independent t-test was used.In all statistical analyses, confidence interval and significance level were determined at 95% and 0.05, respectively.
To compare clinical outcomes in cases where the normal distribution was Quantitative in both groups, independent t-test was used.

Table 1. Feeding protocol in high-risk infants (12)

Total daily volume	Increase (per hour)	Volume every two hours (ml/kg)	Stage
12 cc/kg	24	1	1
(increase up to 24 ml/kg/d) 36 ml/kg	12	2 3	2
(increase up to 24 ml/kg/d) 60 ml/kg	12	4 5	3
(increase up to 24 ml/kg/d) 84 ml/kg	12	6 7	4
(increase up to 24 ml/kg/d) 108 ml/kg	12	8 9	5
(increase up to 24 ml/kg/d) 132 ml/kg	12	10 11	6
(increase up to 24 ml/kg/d) 156 ml/kg	12	12 13	7
To be continued by paediatrician			8

Results

In this study, mean age of 10 infants in the intervention group (2.8±1.7 days) was higher compared to the control group (2.0±1.1 days); however, this difference was not significant according to the results of independent T-test (P=0.27). Infants of the intervention and control groups were matched in terms of the mean age on admission (Table 3).
Mean weight of the subjects in the intervention group (2558.1±337.4 grams) was higher compared to the control group (2547.6±85 grams); however, results of independent T-test showed no significant difference in this regard (P=0.47). Moreover, infants of the intervention and control groups were matched in terms of mean weight on admission.
Mean gestational age in the intervention group (37.2±1.2 weeks) was slightly higher compared to the control group (37±1.0 weeks); however, results of independent T-test indicated no significant difference in this regard (P=0.56). Infants of the intervention and control groups were matched in terms of mean gestational age (Table 2).

Table 2. Comparison of demographic characteristics of infants in intervention and control groups

Groups	Mean±SD		Test	
	Control	Intervention	Method	Results
Age (day)	2.0±1.1	2.8±1.7	Independent T-test	P=0.27
Weight (gram)	2547.6±856	2558.1±337.4	Independent T-test	P=0.47
Gestational age (week)	37±1.0	37.2±1.2	Independent T-test	P=0.56

Before feeding (the first 48 hours after surgery), mean daily weight gain in the intervention group was 17.8±3.7 grams, while it was 24.3±3.5 grams after feeding (48 hours after surgery). As for the control group, mean daily weight gain before feeding (before day seven of surgery) was 13.2±3.1 grams, while it was 17.1±1.6 grams after feeding (after day seven of surgery). The difference in the daily weight gain of the neonates was considered significant in both stages (P<0.05).
One month after discharge from the hospital, mean weight gain in the intervention group was 731.9±58.1 grams, while it was 578.9±48.8 grams in the control group. In comparison with the mean weight on admission, this variable had a statistically significant difference between the two groups (P=0.030).

Table 3. Comparison of mean weight gain of infants in intervention and control groups

Groups	Mean±SD		Independent T-test
	Control (n=18)	Intervention (n=18)	
Daily weight gain before feeding (gram)	13.2±3.1	17.8±3.4	P<0.001
Daily weight gain after feeding (gram)	17.1±1.6	24.3±3.5	P=0.010
Weight gain one month after discharge (gram)	578.9±48.9	731.9±58.1	P=0.030

Discussion

According to the results of the present study, early feeding support could significantly increase the mean daily weight gain in neonates with EA. One month after discharge from the hospital, weight gain was observed to be higher in the intervention group compared to the control group, and this difference was statistically significant. In a study, Sashin Suri et al. (1999) evaluated the effects of early feeding after upper gastrointestinal tract surgery and concluded that weight loss was not significant in infants receiving early breastfeeding. In their study, 13 out of 14 infants weighing more than 1.5 kg were discharged from the hospital with no complications and need for readmission (14).

In the mentioned study, the researchers emphasized that early feeding could prevent the metabolic complications associated with parenteral nutrition, as well as the high costs of treatment and hospitalization. Furthermore, it was stated that enteral feeding is physiologically preferred to parenteral nutrition.

Findings of the study by Sashin Suri et al. are in congruence with the results of the current research. Although no advanced procedures were presented in the mentioned study to improve weight gain or weight loss, the findings indicated that early oral feeding prevents the complications caused by weight loss after upper gastrointestinal tract surgery. Moreover, in the research by Sashin Suri et al., feeding was initiated 48 hours after surgery, which is similar to the present study. In addition, selected patients in their study were infants undergoing upper gastrointestinal surgeries, which is relatively similar to our research since surgical repair of EA is part of upper gastrointestinal surgery.

In the present study, a coherent program was applied for the daily measurement of body weight in the intervention and control groups. Considering that nutritional requirements and complications vary in different gastrointestinal surgeries, this study focused on the surgical repair of EA.

Infants have a smaller body, higher growth rate, lack of development in several body systems, limited calorie reserves, and higher need for calorie intake after surgery (14). Postoperative fasting supplies infants with the required energy for wound healing through protein metabolism in muscles and stored body fat, which leads to the loss of weight and muscle tissues (15).

According to the results of the present study, risk of oral feeding was high within 48 hours after surgery. As such, we attempted to provide the infants with the required energy for metabolism, growth and surgical repair through parenteral nutrition. During this period, the infants had daily weight gain of 17.8 grams. After applying oral feeding 48 hours after surgery, this rate reached 24.3 grams, which was significantly higher compared to the weight gain of infants before oral feeding.

In the current research, daily weight gain in infants of the control group, who were kept fasting until day seven after surgery, was 13.1 grams, which was significantly lower than the intervention group. Therefore, it could be concluded that without oral feeding, the weight gain caused by parenteral nutrition would be lower than the ideal level. This could be due to the fact that weight gain declines with the age of infants because of increased caloric needs based on their weight.

In another research entitled the "Long-term analysis of children with esophageal atresia and tracheoesophageal fistula", Little et al. (1972-1990) confirmed concurrent delayed growth and weight loss in all the patients (16). Therefore, our findings regarding weight changes in the control group are consistent with the mentioned study.

According to the results of the present study, weight of infants significantly increased daily in the intervention and control groups after oral feeding, which confirms the effect of nutrition on postoperative metabolic complications. However, it is noteworthy that even after daily oral feeding, weight gain in the control group was significantly lower compared to the intervention group.

According to the information in Table 3, delayed weight gain was detected in infants one month after surgery, which is in line with the results of the study by Little et al. In this regard, our findings suggested that early feeding after EA surgery could affect long-term and short-term weight gain outcomes within at least one month after surgery .

One of the strengths of the present study was the initiation of low-volume breastfeeding in order to maintain the integrity of the small intestine, as well as the safety and nutritional needs of neonates, through the intestinal tract (7).
Breast milk is the paramount nutritional option for early oral feeding in infants since it is the most wholesome, accessible and cost-efficient nutrient to meet the physiological needs of newborns. Furthermore, breast milk strengthens the emotional bond between the mother and infant since it contains multiple immunological factors, which protect the infant against various infections (17).
It is predicted that early oral feeding could effectively reduce healthcare costs because with early oral feeding of the parenteral nutrition reduced and eventually stopped, which in practice it can reduce the duration of the use of parenteral nutrition. , this method is cost-effective. Nevertheless, future studies are required as to compare the benefits and risks of this feeding method.
Some of the limitations of our study were the long-term sampling to select the inclusion criteria and association of the disease with other disorders.

Implications for Practice
According to the results of this study, weight gain of infants with EA during postoperative fasting was significantly higher in the intervention group (48 hours after surgery) compared to the control group (seven days after surgery) after feeding and one month after discharge from the hospital. Therefore, it could be concluded that initiation of early feeding in the intervention group could prevent weight loss through reducing the period of fasting and increase weight gain, which positively continued up to one month after discharge in the neonates.
Considering these favorable outcomes, it is recommended that future studies investigate the impact of this variable on early outcomes, such as feeding intolerance, leakage from surgical site and respiratory problems, as well as the long-term consequences, such as the narrowing of surgical site, fistula and reflux.

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Conflict of interest
The authors declare that there is no conflict of interest.

References

1. Wong D, Vilson D, Hakenbary M. esophageal atresia. Pediatric Nursing 2011;5;426-30.
2. Hiradfar M, Bazrafshan A, Judi M, Gharavi M, Shojaeian R. An 8-year Experience of Esophageal Atresia Repair in Sarvar Children Hospital (Mashhad-IRAN).J Neonat.2011;3(1);20-2
3. Myrchrkhchyan M. Esophageal Atresia &Tracheo Esophageal fistula. Available from: http//www.pezeshkanomoomigilan.ir.2011.(Persian)
4.Chctcuti P, phelen P. Gastrointestinal Morbidity and Growth after Repair of Eesophageal Atresia and Tracheo-oesophageal Fistula. adcbmjcom. 2014;68;163-6.
5. Pinheiro P, Simoes S,Pereira M. Current Knowledge on Esophageal Atresia. World J Gastroenterol. 2012 Jul 28;18(28):3662-72
6.pablo JV, Fernando LL, Restrepo I. Early Enteral Nutrition in Gastrointestinal Nutrition. 1996; 13(5);442-5.
7.Wesson D. Nutrition in the Surgical Patient. Nutr Clin Pract,. 2009 Apr-May;24(2):242-9.
8.Meurling S. The Perioperative Nutritional Care of Neonates and Infants. J Nutr. 2002;44;8-11.

9.Sweed J, Shoshany G. Insertion of a Soft Silastic Nasogastric Tube at Operation for Esophageal Atresia: A new technical Method. J Pediatr Surg. 1992;27(5):650-1.
10.Kevin P, Nabil N, Burton H, Laurie A, Frank M, Timothy M. Transanastomotic Feeding Tubes in Repair of Esophageal Atresia. J Pediatr Surg. 1996;31(1):53-5.
11.Teitelbaum D,Coran A. Perioperative Support in Pediatrics. Nutrition Support in Pediatric Surgery.1998;14(1); 130-142.
12.CormackB.NewbornServicesClinicalGuideline.Available from:http://www.adhb.govt.nz/newborn/Guidelines/Nutrition/Nutrition.htm;2015 May .
13.Ekingen G, Ceran C, Guvenc H, Tuzlaci A, Kahraman H. Early Enteral Feeding in Newborn Surgical Patients .2005;21(1) ; 142-6.
14.Suri S, Eradi B, Chowdhary S, Narasimhan K, Rao K. Early Postoperative Feeding and Outcome in Neonates Nutrition.2002;18; 380-2.
15.Pierro A. Metabolism and Nutritional Support in the Surgical Neonate. J Pediatr Surg. 2002 Jun;37(6):811-22
16.Little D, Rescorla F, Scherer L. Long-Term Analysis of Children With Esophageal Atresia and Tracheoesophageal Fistula. J Pediatr Surg. 2003;38(6):852-6.
17.Farhat A. Feeding in Premature Infants and Low Weight.Intensive Care in Newborns and Pediatrics Diseases; 2011;73-85(Persian)