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Transanastomotic Feeding Tube In Surgical Management of Congenital Duodenal Obstruction: Case Series

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Abstract

Introduction. Prolonged fasting is a major concern in the postoperative management of congenital duodenal obstruction. Massive dilatation of the proximal segment would lead to diameter discrepancy and lack of propulsion, thus delaying enteral feeding. A transanastomotic feeding tube is an option to deliver early enteral feeding after surgical correction. The study evaluates the effectiveness and safety of a transanastomotic feeding tubes in the surgical management of congenital duodenal obstruction.

Method. The transanastomotic feeding tube's effectiveness in cases of congenital duodenal obstruction of the newborn underwent surgical correction was evaluated. Those managed from January 2016 to December 2018 at dr. Cipto Mangunkusumo and Fatmawati General Hospital were subjected to the evaluation.

Results. Ten cases were recorded, with the mean gestational age of 30.4 weeks (SD ± 2.12), with a mean bodyweight of 2.571 g (SD ± 392). Seventy percent of the cases accompanied by other anomalies. Enteral nutrition was introduced immediately after surgery. The median time of oral nutrition initiation was 13 days (3-21), and the patients were fully fed in 19.5 days (13-37). The average length of stay was 24.5 days (16-40 days). One case had a complication requiring surgery, and mortality in two cases complicated with sepsis.

Conclusion: Transanastomotic feeding tube is an option to deliver early enteral feeding after surgical correction of congenital duodenal obstruction.

Keywords: congenital duodenal obstruction, transanastomotic feeding tube, early enteral feeding, case series

Introduction

Congenital duodenal obstruction is one of the most common cause of intestinal obstruction of the new born. They are found in 1 of 2.500 to 10.000 live births.^{1,2} Intrinsic or extrinsic lesion could cause obstruction of duodenum partially or totally.² Embryological defect such as abnormality of development, canalization, and foregut rotation could cause intrinsic lesion such as atresia duodenum, duodenal web, and malrotation leading to duodenal obstruction.³ Pancreatic anomaly, such as annular pancreas, may leading to an extrinsic lesion of the duodenum.^{2,3}

Management of congenital duodenal obstruction has been improved in past decades, including operative technique, total parenteral nutrition, anesthesia, and postoperative care in Neonatal Intensive Care Unit, leading to improvement in postoperative survival from 60 to 90% and decreased in morbidity and mortality.^{4,5} Late complication found of 12-15%.⁵

Early enteral nutrition is the integral part of the treatment in these cases. Prolonged fasting leading to delay intestinal maturation, lead to thin intestinal mucosa, atrophy of the villi, decrease intestinal enzymatic activity, and induces translocation of bacteria leading to sepsis.⁶ However, application of early postoperative enteral nutrition is not possible due to delayed motility. Lack of propulsion in a massive dilated proximal segment to the obstruction is the main problem encountered, followed by luminal stasis and unable to pass the anastomosis.⁷ Insertion

of transanastomotic feeding tube referred to an alternative to delivering early enteral feeding. However, there are controversies regarding the effectiveness of transanastomotic feeding tube in congenital duodenal obstruction. Transanastomotic feeding tube was reported to hasten oral feeding and reduce postoperative mortality.⁸ Other report showed that transanastomotic feeding tube did not hasten delivery of preanastomotic nutrition compared to normal gastric tube.⁹ There is also some consideration about the use of both nostril for transanastomotic feeding tube and gastric tube due to the theory that neonates are obligatory nasal breathers.¹⁰ While others believe that neonates may adapt well to breathe with the mouth when needed.¹¹

The study aimed to evaluate the safety and effectiveness of transanastomotic feeding tubes in the surgical management of congenital duodenal obstruction. A series of cases in our centers is presented as additional evidence of the use of transanastomotic feeding tube in congenital duodenal obstruction

Method

New born diagnosed with congenital duodenal obstruction underwent surgical correction and treated with transanastomotic feeding from January 2016 to December 2018 at dr. Cipto Mangunkusumo (RSCM) and Fatmawati General Hospital (RSF) were subjected to evaluation. Subjects demographic data including gestational age, gender, birth weight, body weight before surgery, other congenital anomaly, type of duodenal obstruction. Time to initiate oral feeding, time to full oral

feeding, length of stay, complication and mortality were subjected to evaluation.

Results

Of ten subjects enrolled, three subjects in RSCM and seven subjects in RSF. The mean of gestational age was 38.4 weeks ± 2.12, and mean of birth weight of 2.675 g ± 487). The median age of surgery was 12 days (5-24) with mean body weight before surgery of 2.571 g ± 392. The subjects characteristics presented in table 1.

Table 1. Subjects characteristics

	%
Gender	
• Male	40%
• Female	60%
Other congenital anomaly	70%
• Congenital heart disease	50%
• Down syndrome	40%
Diagnosis	
• Duodenal web	40%
• Duodenal atresia type III	20%
• Annular pancreas	40%
• Others	0%
Duodenal defect	
• Part II	70%
• Part II, III	10%
• Part III	20%

Definitive surgery is carried out according to the etiology. The duodenoduodenostomy side-to-side was carried out in those diagnosed with annular pancreas or duodenal atresia of type III. For those diagnosed with the duodenal web, web resection with or without duodenoduodenostomy was carried out. The two tubes were intraoperatively inserted in all subjects, namely, gastric– and transanastomotic feeding tubes. Complete description presented in table 2.

The median of oral feeding initiation was 13 days (3–21), and full–oral feeding was 19.5 days (13–37). The complication was found in a subject due to adhesion requiring reoperation. No complication of transanastomotic tube–related recorded. The mortality recorded in 2 subjects (20%) due to sepsis; a subject of prematurity (33 weeks of gestational age) and a subject with low birth weight (1.600 g). The median length of hospital stays in those who survived was 24.5 days (14–40).

Discussion

Transanastomotic feeding tube was expected to be a solution for early enteral feeding in congenital duodenal obstruction affecting the outcomes after surgical correction. Congenital duodenal obstruction leads to massive dilatation of the gaster and duodenum proximal to the obstruction. In a massive dilated segment, a lack of propulsion of luminal content, followed by intestinal stasis and unable to pass the anastomosis.⁷ Two tubes were inserted to overcome this problem. Firstly, a nasogastric tube (or orogastric tube) for decompressing the proximal dilated segment. Secondly, the transanastomotic feeding tube. Enteral nutrition was given early as soon as bowel sound was identified. Enteral nutrition was given early as soon as bowel sound was identified. However, oral feeding was initiated if the gastric residual volume of less than 5 mL/kg/4 hour. The median of time to initiate oral feeding in this

report was 13 days (3-21 days) and median of full oral feeding was 19.5 days (13-37 days). Length of stay in those who survived had a median of 24.5 days (16-40 days).

On the literature search, we found that the initiation of oral feeding and length of hospital stay was found to vary. Sencan (2002) reported the mean of oral feeding in annular pancreas undergone duodeno-duodenostomy was 9.2 ± 0.9 days, and the mean of length of stay was 22 ± 1.8 days.¹² Elsayed (2014) showed that in duodenal atresia cases using transanastomotic feeding tube, either orally or with gastrostomy, the feeding commencing on the third postoperative day. In contrast, for those without a transanastomotic feeding tube, the feeding starts in 4-5 postoperative days. Length of stay between the two groups also differed; 1-2 weeks in those with a transanastomotic feeding tube and ten days to three weeks in those without a transanastomotic feeding tube.⁷ Hall (2011) reported in those with a transanastomotic feeding, enteral nutrition starts in 2 (1-4) days postoperatively. For those without a transanastomotic feeding tube, enteral feeding starts in 3 days (1-7 days). The time takes to achieve a full-fed also differed; 6 (2-12) days in a transanastomotic feeding group and 9 (3-36) days in those without a transanastomotic feeding tube. However, they found no difference in length of stay in both groups.¹³

In a subject (of ten), adhesion was found in our report, and mortality was found in 2 subjects (of ten)—no other complication such as stricture nor leakage of the anastomosis. The complication and mortality rate were found in various, but no evidence concluded using transanastomotic feeding tube with complication and mortality. Rattan (2016) reported that mortality was 9%, with 50% related to sepsis and 40% related to other anomalies such as congenital heart disease.² Mustafawi (2008) explained in ten years of experience, the complication related to surgery was adhesion (2.6%) that could be managed non-operatively, incisional hernia (3.9%), and sepsis (11.6%) due to central venous catheter insertion; the mortality rate was 2.6%.³ Kumar (2016) reported that 38.7% had undergone sepsis postoperatively. In addition, 6.45% had reoperation due to hiatal hernia or mid-ileal perforation; mortality was found of 22.5%.¹⁴

The use of a transanastomotic feeding tube remains controversial in the management of congenital duodenal obstruction. Hall (2011) showed that a transanastomotic tube allowed earlier full enteral feeding, thus significantly reducing the need for central venous catheterization.¹³ Harwood (2018) showed that using a transanastomotic feeding tube would reduce 44.8% of the cost of parenteral nutrition after surgery.¹⁵ On the contrary, Updhyay (1996) showed that transanastomotic feeding tube would lengthen oral feeding initiation and length of stay, leading to increment of hospital cost.⁹

In this series, the only premature patient (33 weeks of gestational age) and with low birth weight (1.600 g) had a mortality due to sepsis. The surgery's timing had an inverse relation to the outcome, contradicted the widespread belief that late presentation leads to adverse outcomes. The inverse relation in this series may be related to delayed presentation; these may be due to obstruction of a lesser degree. However, the condition is less severe than those with a totally obstruct. Other congenital anomalies are also affecting outcomes. Thus, the small sample size in the study hampered us to analyse each factor affecting further.

This series shows a difference in the literature. Many factors contributed to the difference, such as late presentation, delayed treatment, assessment for other congenital anomalies, management, and high infection rate. Antenatal ultrasound was not a routine, let no antenatal identification and late presentation.

Table 2. Diagnosis and management of congenital duodenal obstruction in the series

No	Gestation (weeks)	Age of surgery (days)	Gender	Body weight at surgery (gram)	Birth weight (gram)	Antenatal diagnosis	Clinical manifestation	Diagnosis	Surgery	Other congenital anomalies	Initiation of Oral Feeding (days)	Full oral feeding (days)	Length of Stay	Complication	Mortality
1	39	8	P	2.565	2.800	No	Vomit	Duodenal Atresia type I	Duodeno-duodenostomy side-to-side	Neonatal jaundice, patent ductus arteriosus (PDA), Down syndrome	21	37	40	None	None
2	40	5	P	3020	3020	Yes	Antenatal diagnosis	Annular pancreas	Duodeno-duodenostomy side-to-side Kimura technique	Small PDA, suspected Down syndrome, congenital cataract	14	20	22	None	None
3	39	24	L	2980	3000	No	Bilious vomit	Annular pancreas	Duodeno-duodenostomy side-to-side	Congenital hypothyroidism, sepsis	-	-	18	None	Sepsis
4	40	12	P	2.750	2.800	Yes	Antenatal diagnosis	Annular pancreas	Duodeno-duodenostomy side-to-side	None	15	16	27	None	None
5	39	23	L	2.570	2.900	No	Bilious vomit	Duodenal Atresia type I	Web excision	Splenomegaly	10	15	16	Adhesion	None
6	38	19	P	2.130	2.000	No	Bilious vomit	Duodenal Atresia type I	Web excision, duodeno-duodenostomy side-to-side	None	3	19	20	None	None
7	33	5	P	1.750	1.660	Yes	Antenatal diagnosis	Duodenal Atresia type III	Duodeno-duodenostomy side-to-side	Large PDA	15	-	18	None	Sepsis
8	40	14	L	2.900	3.200	No	Vomit	Annular pancreas	Duodeno-duodenostomy side-to-side	Arterial septal defect, PDA, Down syndrome	12	13	20	None	None
9	39	12	L	2.550	2.875	No	Bilious vomit	Duodenal Atresia type I	Duodeno-duodenostomy side-to-side Kimura technique	None	7	26	27	None	None
10	37	5	P	2.500	2.500	Yes	Antenatal diagnosis	Duodenal Atresia type III	Duodeno-duodenostomy side-to-side Kimura technique	Large PDA, Pulmonary Hypertension, congenital hypothyroidism, Down syndrome	14	20	35	None	None

In our series, merely four subjects (40%) were diagnosed antenatally compared to Applebaum (2012), who recommending antenatal ultrasound that may detect 30-65% double bubble in those with polyhydramnions.¹ In this series, seven subjects (70%) presented with other congenital anomalies, five subjects with congenital heart disease, and four Down syndrome subjects. However, the finding is in line with Applebaum, reporting about half of the neonates with duodenal atresia had other congenital anomalies: Down syndrome accompanied 28.2%, congenital heart defect of 22.6%, and annular pancreas in 23.1%.¹ Further assessment needs to be addressed for neonates with congenital duodenal obstruction in our center to detect other anomalies, resulting in more comprehensive management. Last, but not least, infection that remains high in the centers may contribute to the outcomes, as in India and other developing countries.¹⁴ In contrast to well-developed countries.¹⁴

Conclusion

The median time to initiate oral feeding with a transanastomotic feeding tube in congenital duodenal obstruction management was 13 days. The median time to achieve full oral feeding was 19,5 days. The median length of stay with a transanastomotic feeding tube was 24,5 days. Complication requiring surgery was found in 10% of the cases, and the mortality rate was 20%. This report may contribute additional evidence regarding transanastomotic feeding tubes and their effectiveness for early enteral feeding.

Disclosure

The authors declare no conflict of interest

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