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ORIGINAL ARTICLE

Is the Use of Transanastomotic Tube Beneficial in Pyloric Atresia?

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ABSTRACT

Introduction: Congenital pyloric atresia (CPA) is a rare gastrointestinal system anomaly characterized by gastric outlet obstruction. This study evaluated patients operated for CPA in the past 15 years. The impact of use or non-use of transanastomotic feeding tubes (TATs) on the follow-up results was examined.

Material and Method: Patients operated for CPA between 2005 and 2020 were evaluated. Further, cases in whom TATs were used and cases in whom TATs were not used were evaluated in two sub-groups. The impact of presence orabsence of TATs on postoperative follow-up results was examined.

Results: In this study, a total of 12 patients consisting of 7 boys and 5 girls were evaluated. The mean birth week was 35.1 ± 2.4 (31-38) weeks and the mean birth weight was 2602.9 ± 599.6 (1680-3620) grams. The mean time of operation was postnatal 3.8 (1-10) days. Among the cases, 8 (66.7%) had type 1 atresia, and 4 (33.3%) had type 2 atresia. Heineke-Mikulicz pyloroplasty was performed on 9 (75%) cases, and gastroduodenostomy was performed on 3 (25%) cases. 4 (33.2%) patients had various additional anomalies. The patient with EB (8.3%) died due to sepsis in the early postoperative phase. In 8 cases (66.7%), intraoperative TAT placement was performed. In cases with TATs, the time to postoperative feeding and length of stay were statistically determined to be lower.

Discussion: Pyloric atresia is a rare intestinal system obstruction. Comorbidity with congenital anomalies increases mortality. Intraoperative TAT insertion enables early enteral feeding.

Keywors: Congenital pyloric atresia, gastrointestinal system, transanastomotic feeding tubes

INTRODUCTİON

It is a rare congenital gastrointestinal system anomaly with an incidence rate of 1:100.000, characterized by gastric outlet obstruction (1,2). It constitutes less than 1% of all gastrointestinal atresias (3).

Diagnosing CPA is a breeze. Non-bilious vomiting, feeding intolerance, and upper abdominal distension are the first symptoms to appear shortly after giving birth. Diagnoses can be made using the diagnostic abdominal radiography (AXR), which shows a gasless abdomen and one big stomach region. Delayed diagnosis may cause serious complications such as fluid-electrolyte imbalance, gastric perforation, aspiration pneumonia and recurrent respiratory infections (3).

CPA is classified anatomically or clinically (4). Anatomically, it is divided into 3 sub-groups: the most common is a membrane, which accounts for 57% of cases; the second most common is a solid tissue cord replacing the pyloric tissue (34%); and the third most common, a split between the stomach and duodenum, accounts for 9% of cases (5). When it comes to diagnosis, it's either "complex," or "isolated." (6,7). The type of CPA not comorbid with any anomaly is called an isolated CPA which has good prognosis and presents a low postoperative complication rate. On the other hand, complicated CPA is observed with additional anomalies (6,7).

The treatment of CPA is surgical, the respective methods depending on the anatomic type. A Heineke-Mikulicz or Finney pyloroplasty and membrane excision are used in type A. There is a reconstructive method for the sphincter in type B, although gastroduodenostomy is the gold standard operation. Gastroduodenostomy is the treatment of choice for patients with type C of this condition. Before surgery, other intestinal atresias or related anomalies should be ruled out (8).

In the postoperative period after CPA surgery, gastric retention due to dysmotility may develop and enteral feeding may become problematic. In the postoperative first days, patients are fed either parenterally (PN) or they may require enteral nutrition support by transanastomotic feeding tubes (TATs) (9,10). Many advantages of TAT placement have been reported such as earlier transition to enteral feeding, less need for central venous catheters and shorter length of stay (11-15).

This study evaluated patients operated for CPA in our clinic in the past 15 years. The aim was to present the results of our CPA patients. Secondly, cases in whom TATs were used and cases in whom TATs were not used were evaluated in two sub-groups. The impact of presence or absence of TATs on postoperative nutrition and length of stay was examined.

MATERİAL AND METHOD

The records of those patients operated for CPA in our clinic between January 2005 and June 2020 were analyzed retrospectively. Birth weight, sex, reason for presenting, postnatal day of surgery, CPA diagnosis in the antenatal period, anatomical atresia type, existence of a comorbid anomaly, surgical procedures performed, presence of TAT, intraoperative and postoperative complications and survival status were recorded. All cases were given erect abdominal radiography (AXR) to confirm diagnosis and rule out differential diagnoses (Figure 1a). Barium passage radiography was ordered for cases whose diagnosis could not be verified. CPA diagnosis was verified by the presence of a large gastric gas and no view of intestinal gas distally in barium passage radiography. On October 25, 2021, the local human research ethics committee accepted this project (with the number 369). The parents or guardians of all participants signed a consent form stating that they had been fully informed about the research.

TAT placement procedure: TAT was inserted upon the request of the surgeon performing the procedure. A 6 Fr silicone tube (Vygon, France) was inserted through the nostril and fastened on the cheek. The TAT was advanced until 10-15 cm distal to the anastomosis (distal to the ligament of Treitz). A nasogastric tube (NGT) was also inserted for gastric decompression and measurement of gastric residual volume before enteral feeding. In infants with TATs, feeding started at postoperative 24 hours (for term infants, 5 ml/hour continuously) and when tolerated, it was increased to a full feeding volume of 150 ml/kg/day. In infants without TATs, when the gastric content from the NGT was lower than 5 ml/hour, enteral feeding was started through the NGT at 5 ml/hour.

The patients were divided into two groups as Group 1 involving cases with TATs and Group 2 involving cases without TATs. The two groups were compared in terms of time to enteral feeding, post-feeding residual volume (bile and gastric content), length of stay and weight at discharge.

Statistical method: The descriptive statistics of the data made use of mean, standard deviation, median lowest and highest, frequency and ratio values. The Kolmogorov-Simirnov test was used to gauge the distribution of the various variables. Mann-Whitney The independent quantitative data was analysed using the

U test. When the Chi-square test requirements were not met, the Fischer test was utilised in the analysis of independent qualitative data. The analysis was carried out using SPSS 28.0 software.

RESULTS

In this study, a total of 12 patients consisting of 7 boys and 5 girls were evaluated. The mean birth week was 35.1 ± 2.4 (31-38) weeks and the mean birth weight was 2602.9 ± 599.6 (1680-3620) grams. In all patients, the presenting complaints were non-bilious vomiting and epigastric distension. **Table 1** shows birth week, birth weight, sex, postnatal day of surgery, existence of antenatal CPA diagnosis, anatomical atresia type, existence of a comorbid anomaly, surgical procedures performed, presence of a TAT, complications and survival status. For one patient (case 9), barium passage radiography was ordered to verify the diagnosis (Figure 1b). The time of operation was mean postnatal 3.8 (1-10) days. Among the cases, 8 (66.7%) had type 1 atresia and 4 (33.3%) had type 2 atresia. According to the preference of the surgeon, Heineke-Mikulicz pyloroplasty was performed on 9 (75%) cases, and gastroduodenostomy was performed on 3 (25%) cases. For all cases, the mean time to postoperative feeding was 3.1 ±2.2 (1-7) days, and the mean length of stay was 11.5± 3.8 (7-19) days. The mean weight at discharge was 3048 ± 538 (2160-4050) grams. One patient with EB (Case 1) died due to sepsis in the early postoperative phase. Two patients (Cases 4 and 8) received medical treatment due to development of adhesive ileus in the postoperative second year.

Intraoperative TAT insertion was performed on 8 (5 females, 3 males) cases (66.7%) (group 1), whereas no TAT insertion was performed on 4 cases (33.3%) (group 2). **Table 2** shows the distribution of time to postoperative feeding, NGT removal time, residual volume, length of stay and weight at discharge between the two groups. In Group 1, mean time to postoperative feeding, NGT time, residual volume and length of stay were determined to be statistically significantly lower than those of Group 2 (p values 0.004, 0.005, 0.008, 0.049, respectively). The two groups were not significantly different in terms of mean weight at discharge (p=0.348).

Table 1 :Distribution of the cases in terms of birth week, birth weight, sex, postnatal day of surgery, antenatal diagnosis, atresia type, existence of a comorbid anomaly, surgical procedures performed, presence of a TAT, complications and survival status

Case	Sex	Age (days)	Weight (grams)	Antenatal Polyhydramnios	Comorbid anomaly	Atresia type	Surgical procedure	TAT	Results	Complications
1	F	4	1710	-	Epidermolysis bullosa (EB)	Type 1	Pyloroplasty	+	Expired	-
2	F	10	2950	-	Bartter Syndrome	Type 1	Pyloroplasty	+	Alive	-
3	F	5	1680	-	-	Type 1	Pyloroplasty	+	Alive	-
4	M	2	2150	+	-	Type 2	Gastroduodenostomy	-	Alive	Adhesive Ileus
5	M	3	3620	-	-	Type 2	Gastroduodenostomy	-	Alive	-
6	M	5	3050	-	-	Type 2	Pyloroplasty	-	Alive	-
7	M	3	2225	-	Epispadias	Type 1	Gastroduodenostomy	-	Alive	-
8	F	1	2760	-	Alopecia	Type 1	Pyloroplasty	+	Alive	Adhesive Ileus
9	M	3	3200	+	-	Type 2	Pyloroplasty	+	Alive	-
10	F	4	2780	+	-	Type 1	Pyloroplasty	+	Alive	-
11	M	4	2250	+	-	Type 1	Pyloroplasty	+	Alive	-
12	M	2	2860	+	-	Type 1	Pyloroplasty	+	Alive	-

Figure 1: Figure 1a: Large gastric gas and no distal gas shadow in erect abdominal radiography. Figure 1b: The nasogastrically administered contrast material fills the stomach but there is no passage from the stomach to the distal.

Table 2: Distribution of time to postoperative feeding, nasogastric tube (NGT) removal time, residual volume after NGT removal, length of stay and weight at discharge in Groups 1 and 2

	Group 1		Group 2		p	
	Mean±sd/n-%	Median	Mean±sd/n-%	Median		
Feeding (Day)	1.6± 0.5	2.0	6.0 ±0.8	6.0	0.004	m
NGT Removal Time (Day)	2.9±0.6	3.0	5.5±0.6	5.5	0.005	m
Residue (ml)	7.6±2.4	7.5	15.0±4.1	15.0	0.008	m
Length of Stay (Day)	10.3±3.8	9.5	14.0±2.4	14.0	0.049	m
Weight at Discharge (Gr)	2920±501	3150	3306±586	3175	0.348	m

[t] Independent sample t test / [m] Mann-whitney u test / [X²] Chi-square test(Fischer test)
Abbreviations: NGT: Nasogastric tube

DİSCUSSİON

The CPA is a very uncommon congenital disorder of the digestive tract (6). Less than 1% of all gastrointestinal atresias are caused by this condition (3). Several explanations have been put out as to the cause of CPA, including recanalization failure and vascular accidents (17). Non-bilious vomiting, feeding intolerance, and upper abdominal distension are the most common symptoms. Typically, a single, large gastric gas shadow is significant in erect AXR. However, intestinal gas passing to the distal has also been reported for type 1 CPA with membrane perforation (18). CPA diagnosis rarely requires contrast radiography, yet in suspicious cases, passage radiography highly facilitates diagnosis (19).

Antenatal diagnosis is rare, and polyhydramnios appearance at the 3rd trimester (50%) facilitates diagnosis. Gastric dilatation in antenatal ultrasonography raises suspicion regarding CPA diagnosis (20,21). In 41.6% of our patients, polyhydramnios and gastric dilatation were reported in antenatal scannings. These patients were diagnosed in the early term thanks to CPA suspicion. Patients with antenatal diagnosis are operated in a shorter period which may prevent early-stage complications such as aspiration pneumonia, electrolyte disorder or gastric perforation.

The most common anomaly is EB which is autosomal recessively inherited (22, 23). Other than that, cardiac anomalies, intestinal anomalies or urethral and renal anomalies may also coexist (6). 4 (33.2%) patients had various additional anomalies. The patient with EB (8.3%) died due to sepsis in the early postoperative phase. One case had isolated epispadias. One case had comorbid alopesia whereas one case had comorbid Bartter Syndrome. The literature involves comorbid anomalies associated with the intestinal system, but our series did not include comorbid intestinal system findings.

CPA treatment is surgical. Heineke-Mikulicz Pyloroplasty and gastroduodenostomy are the most effective surgical methods. Some authors have supported the opening of a gastrostomy in such patients in order to prevent the probable long-term effects of bile reflux that may develop post-pyloroplasty (25). 9 patients (75%) were treated by Heineke-Mikulicz pyloroplasty whereas 3 patients (25%) were treated by gastroduodenostomy.

Some authors routinely insert TATs postoperatively for early transition to feeding (26). It has been reported that newborns with TATs operated for duodenal atresia had earlier first enteral feedings and lower complications due to central venous catheters (27). In 8 cases, intraoperative TAT placements were performed. In our series, it was observed that in cases with TATs, time to enteral feeding and length of stay were shorter (mean 2 and 9.5 days, respectively). Early feeding will not damage the anastomosis as the TAT is sent to the distal of it. Therefore, we consider that the time to enteral feeding was shorter in infants to whom TATs were inserted because the anastomosis was by-passed. In our series, NGTs were removed earlier in infants with TATsthan infants without TATs, because, to our opinion, in the group without TATs, the residual volume was higher since the gastric secretion could not reach the distal due to edema in the anastomosis area. Further, we believe that the length of stay was shorter in the TAT group because feeding started earlier and full enteral feeding commenced in a short time after the removal of the NGTs.

In conclusion, pyloric atresia is a rare intestinal system obstruction. Chance of survival is higher in isolated CPA. Comorbidity with congenital anomalies increases mortality. Availability of antenatal diagnosis may prevent probable complications by early surgical intervention. Intraoperative TAT placement enables early enteral feeding and positively contributes to length of stay.

REFERENCES

1 Moore CM: Congenital gastric outlet obstruction. J Pediatr Surg 1989; 24:1241-1246.

2 Adashi EY, Louis FJ, Vasquez M. An unusual case of epidermolysis bullosa hereditaria letalis with cutaneous scarring and pyloric atresia. J Pediatr 1980; 96:443-6.

3 Muller M, Morger R, Engert J. Pyloric atresia: report of two cases and review of literature. Pediatr Surg Int. 1990; 5:276-9.

4 Saka R, Yamamoto D, Kuroda S, Ibuka S, Kodama T, Hasegawa T. Prenatally diagnosed congenital pyloric atresia in consecutive three siblings: a case report. Surg Case Rep. 2021 Jan 6;7(1):9.

5 Okoye BO, Parikh DH, Buick RG, Lander AD. Pyloric atresia: five new cases, a new association, and a review of the literature with guidelines. J Pediatr Surg. 2000;35(8):1242–5.

6 Ilce Z, Erdogan E, Kara C, et al. Pyloric atresia: 15-year review from a single institution. J Pediatr Surg. 2003;38(11):1581-1584.

7 Al-Salem AH, Abdulla MR, Kothari MR, Naga MI. Congenital pyloric atresia, presentation, management, and outcome: a report of 20 cases. J Pediatr Surg. 2014 Jul;49(7):1078-82.

8 Dessanti A, Benedetto VD, Iannucceli M, Balata A, Rocca PC, Benedetto AD. Pyloric atresia: a new operation to reconstruct the pyloric sphincter. J Pediatr Surg. 2004; 39(3): 297-301.

9 Heinen FL. Atresia de píloro. Comunicación de 3 casos. Arch Argent Pediatr. 2014; 112(5): e227-e230.

10 Treider M, Engebretse Ah, Skari H, Bjornlan K. Is postoperative transanastomotic feeding beneficial in neonates with congenital duodenal obstruction? Pediatric Surgery International 2020; 38: 479-484.

11 Harwood R, Horwood F, Tafilaj V, Craigie RJ. Transanastomotic tubes reduce the cost of nutritional support in neonates with congenital duodenal obstruction. Pediatr Surg Int 2019; 35(4):457–461

12 Hall NJ, Drewett M, Wheeler RA, Griffiths DM, Kitteringham LJ, Burge DM. Trans-anastomotic tubes reduce the need for central venous access and parenteral nutrition in infants with congenital duodenal obstruction. Pediatr Surg Int 2011; 27(8):851–855

13 Arnbjörnsson E, Larsson M, Finkel Y, Karpe B. Transanastomotic feeding tube after an operationfor duodenal atresia. Eur J Pediatr Surg 2002;12(3):159–162

14 Jiang W, Lv X, Xu X, Geng Q, Zhang J, Tang W. Early enteral nutrition for upper digestive tract malformation in neonate. Asia Pac J Clin Nutr. 2015; 24(1):38–43

15 Sonal N, Jitoko KC. Pyloric atresia in a healthy newborn – Two stage procedure. J Ped Surg Case Reports 2 (2014) 12-14.

16 Kim JH, Park HY, Lee HJ, Eom M, Choi EH. Case of epidermolysis bullosa with pyloric atresia. Ann Dermatol 2011;23 Suppl 1:S41-4.

17 Snyder CL, Mancini ML, Kennedy AP, et al. Multiple gastrointestinal atresias with cystic dilatation of biliary ducts. Pediatr Surg Int 2000;16:211–3.

18 Achiron R, Hamiel-Pinchas O, Engelberg S, et al. Aplasia cutis congenital associated with epydermolisis bullosa and pyloric atresia: the diagnostic role of prenatal ultrasonography. Prenatal Diagn 1992; 12:765–71.

19 Peled Y, Hod M, Friedman S, et al. Prenatal diagnosis of familial congenital pyloric atresia. Prenat Diagn 1992;12:151–4.

20 Frisova V, Kavalcova L, Kyncl M, et al. Congenital gastric outlet obstruction by pyloric membrane: Prenatal and postnatal diagnosis and management. Fetal Diagn Ther 2009; 26:98–101.

21 Al-Salem AH. Congenital pyloric atresia and associated anomalies. Pediatric Surg Int 2007;23(6):559–63.

22 Kansra M, Raman VS, Kishore K, Khanna S, Puri B, Sharma A. Congenital pyloric atresia—nine new cases: single-center experience of the long- term follow-up and the lessons learnt over a decade. J Pediatr Surg. 2018;53 (11):2112–6.

23 Narasimhan KL, Rao KLN, Mitra SK. Membranous pyloric atresia—Local excision by a new technique. Pediatr Surg Int 1991;6:159–60.

24 Prasad GR, Rao JV, Fatima F, Anjum F. Congenital pyloricatresia: Experience with a series of 11 cases and collective review. J Indian Assoc Pediatr Surg 2021;26:416-20.

25 Cresne R, Neville JJ, Drewtt M, All JN, Darwish AA. Use of trans-anastomotic tubes in congenital duodenal obstruction. J Pediatr Surg. 2022 Feb 6;S0022-3468(22)00121-X. doi: 10.1016/j.jpedsurg.2022.01.049.