

Laparoscopic Management of Duodenal Obstruction in Neonates

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Abstract

Objective: To review our early experience of laparoscopic management of duodenal obstructions in neonates.

Methods: Retrospective study included all neonates with congenital duodenal obstruction from 2015 to 2020. It included patients with duodenal atresia, malrotation of gut and annular pancreas. Those who presented with sepsis or associated severe cardiac problems were excluded. Data were collected from record and analyzed on SPSS 20 version.

Results: Total of 35 patients were analyzed; the mean age of presentation was 5.68 days+ 5.017 SD and mean weight at admission time was 2.53kg + 0.475 SD. The causes of duodenal obstruction included duodenal atresia 18 patients, annular pancreas 03 patients and malrotation of gut 14 patients. The mean operative time is 90.02 minutes + 15.1 SD. Per and Post-operative course was uneventful in majority of cases except few complications observed.

Conclusion: Laparoscopy is an effective method for managing congenital duodenal obstruction because of its superior visualization of delicate structures, benefit of early feeding and recovery than open method. Although, it's technically challenging and demands high level of skills.

Keywords: Duodenal Obstruction; Neonates; Laparoscopy

Introduction

Duodenal obstruction is a common congenital problem affecting 1 per 5000 to 10000 live births, more commonly seen in male neonates. 50% of patients have associated congenital anomalies including downs syndrome, VACTERL anomalies (vertebral, anorectal, cardiac, esophageal atresia, renal, and limb anomalies); isolated cardiac defects and another GI anomalies [1]. With the advent of miniature paediatric laparoscopic instruments over the last 20 years led the paediatric surgeons to do advance laparoscopic procedures in neonates.

Bax., *et al.* In 2001 first to report laparoscopic repair of a duodenal atresia [2]. After that Rothenberg and Frantzides reported their initial experience in subsequent years [3,4]. Vander Zee., *et al.* First described the laparoscopic management of intestinal malrotation with midgut volvulus in a neonate [5]. Laparoscopy in neonates we have started in 2009 and for duodenal obstruction we are doing since last 7 years. The aim of this study to share surgical outcome for duodenal obstruction in neonates being in a developing country.

Material and Methods

After approval from IRB, we retrospectively reviewed the data of patients with congenital duodenal obstruction who presented between 2015 to 2020 at people’s university of medical and health sciences Nawabshah. We have included patients with duodenal atresia, malrotation of gut and annular pancreas presented at neonatal age. Those patients with sepsis or associated severe cardiac problems were excluded. Data analyzed were demographic, operative procedures performed, complications and post-operative course.

Operative technique

Three port technique applied in all patients, 5mm camera with 0° at umbilicus and two 3mm ports one at right iliac fossa and other at left upper quadrant (Figure 1). Liver is retracted by hitch stitch applied either at falciform or at gall bladder serosa Surgeon standing on left side of patient with camera at head end of patient. For duodenal atresia and annular pancreas after Kocherisation and identification of two ends of duodenum stay suture applied to both ends transabdominally. In cases of duodenal atresia proximal portion is opened transversely and distal part longitudinally and in most of cases diamond shaped anastomosis done with interrupted stitches intracorporeally by 5/0 Vicryl or PDS. Except in few cases of duodenal atresia where side to side anastomosis done. Web excision done in selected cases. In cases of annular pancreas as both ends were of normal caliber side to side anastomoses done (Figure 2,3).



Figure 1: Ports position.



Figure 2: Annular pancreases with anastomosis.



Figure 3: Complete anastomoses in DA

In cases of malrotation of gut ladd's procedure was done in all cases starting from ladd's band division then untwisting was done in front of camera by walk through method of gut. After widening of mesentery and straightening of duodenum ladd's procedure was completed with appendectomy (Figure 4).



Figure 4: Completed ladd's procedure with appendix on left to be removed.

Results

Total 35 patients were analyzed; the mean age of presentation was 5.68 days+ 5.017 SD and mean weight at admission time was 2.53 kg + 0.475 SD. Of the 35 patients, 20 were male and 15 were females. The causes of duodenal obstruction included duodenal atresia 18 patients, annular pancreas 03 patients and malrotation of gut 14 patients (Figure a). The mean operative time is 90.02 minutes + 15.1 SD (range: - 60 - 90 mins). The procedures performed were duodenoduodenostomy in 19 patients, including 3 cases of annular pancreas and 16 cases of duodenal atresia. Duodenojejunostomy was done in 2 patients of duodenal atresia out of that one was with atresia at 4th part of

duodenum and other case was done because of technical difficulty. The duodenal anastomosis done in diamond shape 12 cases, Heineke-Mikulicz procedure with web excision 4 cases and side to side anastomosis was done in 3 cases of annular pancreas. Ladd’s procedure was done in 14 cases of malrotation of gut (Table 1).

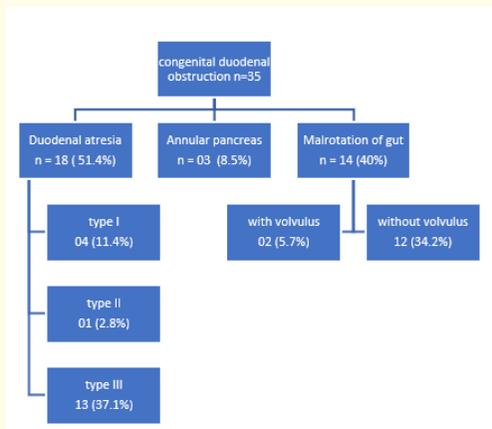


Figure a: Causes of Congenital Duodenal Obstruction.

Procedure	Type of obstruction	Total Number of patients (n = 35)
Duodenoduodenostomy	Duodenal atresia	16
	Annular pancreas	03
Duodenojejunostomy	Duodenal atresia	02
Ladd’s procedure	Malrotation of gut	14

Table 1: Operative Procedures Performed in Congenital Duodenal Obstruction.

Per and Post-operative course was uneventful in majority of cases except few complications observed. Minor bleeding happened in 2 cases which tackled easily with 3mm bipolar, port site infection seen in one case at umbilicus which was treated with antibiotics. In 5 cases persistent vomiting observed which includes 3 cases of malrotation, 1 case of duodenal atresia and one case of annular pancreas which were all managed conservatively. Post-operative adhesions seen in 2 cases of malrotation that subsided conservatively except one patient who later require laparotomy for complete obstruction. One patient died because of septicemia. No conversion was done and there was no anastomotic leak seen in any case (Table 2).

Cause of Obstruction	Per/Postoperative Complications	Total Number of Patients (N = 35)
Duodenal atresia	Minor bleeding	2
	Persistent vomiting	1
	conversion	0
	Anastomotic leak	0
Annular pancreas	Persistent vomiting	1
Malrotation	Port site infection	1
	Persistent vomiting	3
	Post-operative adhesions	2
	Death due to sepsis	1

Table 2: Per/Post- Operative Complications in Congenital Duodenal Obstruction.

Feeding was commenced on 5th to 7th postoperative day in most of cases of duodenal atresia and annular pancreas except few cases of duodenal atresia where because of dilated duodenum feeding started late. In cases of malrotation feeding started after 6 days mostly. All patients were followed for 6 months after discharge from hospital at 10th post-operative day.

Discussion

Congenital duodenal obstruction was previously managed by open methods but with the advent of pediatric laparoscopic instruments, refinements in surgical techniques and marked improvement in neonatal surgical care led the pediatric surgeons to perform laparoscopic duodenoduodenostomy [1].

Technically, it's easy to deal with congenital duodenal obstruction then other neonatal intestinal problems where there is an issue of abdominal distension that causes hindrance in trocar insertions but in duodenal obstruction there is no such problem and as distension is in upper abdomen which can be evacuated by nasogastric aspiration to have room for working with instruments even in low birth weights [6]. Although it do help in identification of the cause of duodenal obstruction and its subsequent management.

Laparoscopic ladd's procedure is comparatively easier procedure as there is minimal handling of bowel that in turn helps early return of peristalsis, less postoperative adhesion and early hospital discharge but it do poses some restrictions like identification of intra-luminal obstruction, assessment of degree of rotation and its complete correction [7].

In our study, the mean age and weight at presentation, was almost same as seen in other studies and the most common cause of congenital duodenal obstruction was duodenal atresia (51.4%) followed by malrotation of gut (40%) [8,9]. Although type- I duodenal atresia is a commonest variety, but in our study we found more cases of type-III atresia (Figure a).

The average operative time was variable between procedures as it took more time in cases of web excision and malrotation with mid-gut volvulus because it always need total correction.

We also adapted the technique of traction sutures, instead of placing fourth trocar that helped us in better visualization and anastomosis of the gut safely as it was reported by Min Jeng Cho., *et al.* [10].

AK Saxena conducted a meta-analysis where he reported that there is no significant difference in outcome whether vicryl or PDS suture is used or anastomosis done in running or interrupted method [11] that's what we have observed in our study with no anastomosis leak in any case.

In cases of malrotation, laparoscopic ladd's procedure is more feasible in terms of less postoperative complications until associated with some other problems or volvulus [12]. In our study only 2 patients developed postoperative adhesions and they were those patients who having associated volvulus.

In cases of annular pancreas, where we performed side to side anastomosis the feeding returned to normal earlier comparative to diamond shaped anastomosis which is comparable to other study [13].

Conclusion

Laparoscopy is an effective method for managing congenital duodenal obstruction in good hands. It helps in better visualization of structures and patient get quick recovery and early oral feeding than open methods. Its technically challenging and demands high level of skill. Its less traumatic and cosmetically better than open.

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