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Research Article

Laparoscopic Management of Intestinal Duplication Cyst in Children

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Abstract

Purpose: To investigate the feasibility, safety and efficacy of Laparoscopic Surgery (LS) in management of Intestinal Duplication Cyst (IDC) in children.

Methods: Medical records of all patients with diagnosis IDC undergoing LS at our center from March, 2009 to October, 2012 were reviewed. Two types of laparoscopic procedures were performed: Completely Laparoscopic (CL) when the entire operation was carried out intra abdominally and Laparoscopic Assisted (LA) when the IDC was exteriorized (after maximal reduction of its volume by puncture and aspiration) through the minimally extended umbilical incision and removal of the cyst with/without intestinal resection was performed extracorporally.

Results: 26 patients were identified, (boys 57.7%), with median age of 24 months (range 10 days to 9 years). The most common clinical presentations were abdominal pain (88.5%), vomiting (61.5%), distended abdomen (30.8), and fever (15.4%). The mean size of the cyst was 4.2 cm ±1.8 cm. The most common location of IDC is ileum (69.2%), followed by caecum (19.2 %), jejunum (3.8%), transversal colon (3.8%) and duodenum (3.8%). LA was performed in 57.7% and CL in 42.3%. In 9 cases, only a single umbilical port was used. Complete excision of the cyst was carried out in 34.6%, cystic unroofing in 42.3% and intestinal resection in 23.1%. All cases of intestinal resection were performed by the LA approach. The mean operative time was 63.8±20 minutes. There were no intra- or postoperative complications, no case of conversion. The median postoperative hospital stay was 4 days (range 2 days to 6 days). At follow up 1 month to 36 months (median 12 months), all patients were in good health, without recurrence.

Conclusions: Laparoscopic management is feasible, safe, and efficacious and could be the treatment of choice for most cases of IDC in children. Both CL and LA approaches could be used but LA would be preferred in case of intestinal resection.

Keywords: Laparoscopic surgery; Intestinal duplication; Children

Introduction

Alimentary tract duplications are relatively rare, with a reported incidence of 1 in 4500 [1]. This anomaly can occur anywhere from the oropharynx to the anus, but ileum, jejunum, colon, stomach and duodenum are among the most common locations [1-7]. Intestinal duplications usually are seen as cystic type and rarely tubular type [1-3]. Standard treatment of Intestinal Duplication Cysts (IDC) in children is surgical excision with/without bowel resection and open laparotomy is still the most common approach [1,2,4,5,7]. The role of LS in routine treatment for IDC in children has not been well defined since only limited number of studies has been published [3,6,8-10]. In this report, we present our experience with laparoscopic management of a series of childhood IDC and investigate the feasibility, safety and efficacy of this approach.

Methods

Medical records of all patients with diagnosis IDC, who underwent LS at our center from March, 2009 to October, 2012 were retrospectively reviewed. Operations for IDC were performed by surgeons with different laparoscopic experience. One 10 mm umbilical port and 0 to 2 other 5 mm ports were used. Two types of laparoscopic procedures were performed: Completely Laparoscopic (CL) when the entire operation was carried out intra-abdominally and Laparoscopic-Assisted (LA) when the IDC with the bearing bowel loop was exteriorized through the minimally enlarged umbilical incision and removal of the cyst with/without intestinal resection was performed extracorporally. Needle puncture and aspiration of the cyst through the abdominal wall under direct laparoscopic control were performed to minimize the cystic volume and facilitate the exteriorization of the IDC. Mobilization of caecum was carried out for most cases of IDC locating in ileocecal region so the cyst with the bearing intestinal segment could be mobile enough to be exteriorized. For this location of IDC, appendectomy was also carried out.

In case of partial removal of IDC (unroofing), the free wall of the cyst was resected as much as possible, the remained mucosa was electrocauterized and plication was done if there was redundant common wall of the cyst and the bowel.

After discharge, patients were followed up by periodic clinical examination and ultrasound. Data on patients' characteristics, clinical presentations, imaging studies, lab tests, intra operative findings, operative techniques, postoperative course and length of hospital stay were collected and analyzed.

Results

26 patients were identified, 15 boys (57.7%) and 11 girls (42.3%), with median age of 24 months (ranged from 10 days to 9 years). The most common clinical presentations were abdominal pain (88.5%), vomiting (61.5%), distended abdomen (30.8) and fever (15.4%). Ultrasound and CT showed intestine-like cystic structure in most

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cases and preoperative diagnosis of IDC was correctly made in 22 patients (84.6%). The remained incorrect diagnoses were cystic lymphangioma, appendicitis, ovarian cyst and choledochal cyst. The mean size of the cysts was 4.2 cm ± 1.8 cm (ranged from 2 cm to 9 cm). The most common location of IDC is ileum (18 cases, 69.2%), followed by caecum (5 cases, 19.2 %), jejunum (1 case, 3.8%), transversal colon (1 case, 3.8%) and duodenum (1 case, 3.8%). The performed procedures were LA in 15 cases (57.7%) and CL in 11 cases (42.3%). In 9 cases (34.6%), only a single umbilical port was used. Complete excision of the cyst was carried out in 9 cases (34.7%), cystic unroofing in 11 (42.3%) and intestinal resection in 6 patients (23%). All cases of intestinal resection were performed by the LA approach. Adjunctive appendectomy was done in 14 cases (53.8%).

The mean operative time was 63.8±20 minutes (ranged 30 minutes to 90 minutes). There was no intra or postoperative complication, no case of conversion. The median postoperative hospital stay was 4 days (ranged 2days to 6 days). For the follow up from 1 month to 36 months (median: 12 months), all patients were in good health, without recurrence.

Pathology study of the resected cystic specimen showed intestinal structures in all cases. There was no case of ectopic gastric mucosa.

There was no significant difference between the LA group and the CL group regarding patients' characteristics, IDC size, operative time and postoperative hospital stay (Table 1). However, bowel resection was carried out only in the LA group ($p<0.05$). The mean number of ports used in the LA group was significantly less than the CL group (1.8 *vs.* 3.0, $p<0.05$) as single port was used only in the LA group.

Comparing the group patients with complete removal of the IDC (complete cyst excision or resection of the intestinal segment together with the cyst) to the group patients with partial cyst removal (unroofing), there was no significant difference regarding patients' characteristics, IDC size and location, laparoscopic approach, operative time and postoperative hospital stay (Table 2). However, the postoperative time to restart oral feeding of the latter group was significant shorter than the former (2.0 *vs.* 2.5, $p<0.05$).

Table 1: Laparoscopic-assisted and complete laparoscopic procedures for IDC.

Variables	Laparoscopic assisted (n=15)	Complete laparoscopic (n=11)
Patients characteristics		
Age (months)	33.1 ± 30.3	28.9 ± 22.7
Gender: male/ female	10-May	05-Jun
Bodyweight (kg)	12.0 ± 5.1	11.5 ± 5.8
Intestinal duplication cyst		
Location		
Ileum	10	8
Caecum	5	0
Jejunum	0	1
Transversal colon	0	1
Duodenum	0	1
Size (cm)	4.1 ± 2.3	4.4 ± 1.0
Operative procedures		
Complete excision of IDC	5	4
Unroofing	4	7
Segmental bowel resection*	6	0
Appendectomy	8	6
Mean number of ports used*	1.8	3
Operative time (minutes)	63.7 ± 18.7	64.1 ± 17.9
Postoperative hospital stay (days)	4.6 ± 1.0	4.0 ± 1.3

*Variable with statistical significant difference ($p<0.05$).

Table 2: Laparoscopic complete removal versus partial removal (unroofing) of IDC.

Variables	Complete removal (n=15)	Unroofing (n=11)
Patients characteristics:		
Age (months)	38.2 ± 28.9	21.9 ± 19.7
Gender: male/ female	11-Apr	04-Jul
Bodyweight (kg)	12.9 ± 4.7	10.3 ± 4.9
Intestinal duplication cyst:		
Location:		
Ileum	11	7
Caecum	2	3
Jejunum	0	1
Transversal colon	1	0
Duodenum	1	0
Size (cm)	4.1 ± 2.3	4.4 ± 1.0
Operative procedures:		
Complete laparoscopic	4	7
Laparoscopic assisted	11	4
Mean number of ports used	2.2	2.5
Operative time (minutes)	63.3 ± 20.0	64.6 ± 15.6
Time to resuming of oral feeding (days)*	2.5 ± 0.8	2.0 ± 0.0
Postoperative hospital stay (days)	4.3 ± 1.3	4.2 ± 1.2

*Variable with statistical significant difference ($p<0.05$).

Discussion

The number of reports on management of childhood IDC by LS has been quite limited and most of them have been anecdotal cases [7,8-10]. The only one report of a large series was a multi centered study from 18 hospitals over 15 years [3]. According to our knowledge, our study was based on the largest series of pediatric patients with IDC treated by LS at a single center to date.

Clinical presentations of IDC in children vary in according to its localization [1-4]. All our IDC were intraabdominal and their presentations were not specific. Diagnosis of IDC in our series was determined mainly by ultrasound and/or CT. However, in some cases the imaging studies could not differentiate IDC from other conditions as ovarian cyst, cystic lymphangioma, choledochal cyst… as seen in our study and other reports [6,11]. Although a 99 mTc pertechnetate scan can be useful for the detection of ectopic gastric mucosa in IDC, it cannot differentiate IDC from Meckel's diverticulum [10]. According to our experience and other studies [6,10,11], LS could be used as an effective diagnostic tool in such cases.

Optimal treatment for IDC is surgical complete excision of the cyst, which however is not always achievable because of different localization of the IDC and its relationship to the adjacent structures [1-4]. Various surgical techniques in management of IDC have been reported in the literature including resection of the cyst with/without the adjacent intestinal segment, fenestration or marsupialization of the cyst into the adjacent intestinal lumen, partial removal of the cyst and mucosa stripping, internal drainage…, mostly by conventional open surgery [1,2,4,5,7]. In a large multi-centered study on laparoscopic management of alimentary tract duplications [3], the most common procedure was laparoscopic enucleation 48%, bowel resection 28% and unroofing 24%, as CL was performed more often than LA approach. In our study, both LA and CP procedures were

used and the choice between the two approaches depended on the surgeon's preference. Our results showed that localization of the IDC might play a role in decision making since all caecal duplication cysts were managed by LA approach and IDCs in the jejunum, transversal colon, and duodenum were managed by CL approach. Certainly, LA can be use only for those IDC, which is mobile or can be mobilized free enough (with bearing intestinal segment) to be exteriorized through the umbilical site.

Complete removal of IDC was carried out in 57.7% of our patients as the rate of intestinal resection was only 23%, both lower than other reports [3]. Unroofing of IDC was our favorite alternative technique since it was performed in nearly half of our patients, in case of intimate relationship of the cyst with the bearing bowel segment. Our results showed that unroofing of IDC could be as effective as complete removal of the cyst, but with the advantage of avoiding intestinal resection and earlier resuming of oral feeding. While a rate of macroscopic residue of 18 % has been reported by a study after partial removal of IDC [3], no case of macroscopic residue or recurrence was noted during the follow up of our patients with unroofed IDC. We recommend complete excision of IDC without intestinal resection when possible; otherwise, unroofing of the cyst should be considered as a viable option.

The rate of conversion has been reported to be as high as 32% in a large multi centered study [3]. In our series, we had no case of conversion. According to our experience, complete excision or unroofing of IDC could be performed by either LA or CL approach. The LA approach is easier since almost all the surgical procedure is performed extracorporally as conventional open surgery. When intestinal resection was indicated, the LA approach is definitely the preferred choice. All our cases of bowel resection were carried out using LA approach. With minimal enlargement of the umbilical incision, the postoperative cosmesis was excellent. We found that in most cases, LA could be performed using single port. Similar experience was also reported by other authors [11,12]. According to our experience, a 10 mm camera with engrafted 5mm working channel would be a very good tool for that single port LA procedure.

Our results showed LS is safe in management of childhood IDC. While unintentional opening of digestive tract as a most common intra operative complication (nearly 9% of all cases) of LS for IDC has been reported [3], in our series, we had no intraoperative complication. Intestinal obstruction is a frequent late postoperative complication but during the follow up of our patients, we had no such complication either [3].

In summary, laparoscopic management is feasible, safe, and efficacious and could be the treatment of choice for most cases of IDC in children. Both CL and LA approaches could be used in selected cases but LA would be preferred in case of intestinal resection.

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