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Robotic-assisted repair of a duodenal diaphragm in a child

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ABSTRACT

The retroperitoneal location of the duodenum and the small volume of the peritoneal cavity in pediatric patients make the laparoscopic repair of congenital duodenal anomalies challenging. As a result, robotic-assisted repair of duodenal atresia in a pediatric patient has been reported only once in the literature. This report describes the robotic-assisted laparoscopic repair of a congenital duodenal diaphragm in a 2-year-old, 8 kg patient who presented with vomiting and failure to thrive. An upper gastrointestinal series revealed partial obstruction at the second part of the duodenum with proximal dilatation. These findings are consistent with a duodenal diaphragm. Traditional laparoscopy was utilized to kocherize the first and second parts of the duodenum and to identify a loop of proximal jejunum for the proposed anastomosis. A duodeno-jejunal anastomosis was then performed using intra-corporeal suturing with a *daVinci* SI robotic system. The patient had a quick and uneventful post-operative course. At 6 month follow-up, she was asymptomatic and the surgical incisions had healed with excellent cosmetic appearance. A combination of laparoscopic and robotic techniques offers a promising alternative to open or purely laparoscopic repair of congenital duodenal anomalies.

The retroperitoneal location of the duodenum and the small volume of the peritoneal cavity in pediatric patients make the laparoscopic repair of congenital duodenal anomalies challenging. Robotic repair offers the potential for better dexterity than can be achieved with rigid laparoscopic instruments. However, due to the challenges of performing robotic surgery in a small space, only one case of robotic repair of a duodenal anomaly has been reported in a pediatric patient [1]. We present a patient with a congenital duodenal diaphragm that was successfully repaired using a combination of laparoscopic and robotic techniques.

1. Case report

A 2-year-old, 8 kg female with a past medical history significant for Trisomy 21 and congenital hypothyroidism, presented with a one year history of vomiting and failure to thrive. She had been treated for reflux since birth and tolerated formula. However, the introduction of solid foods leads to worsening abdominal distention and emesis of undigested food. As a result, she gained almost no weight in the year prior to presentation. An upper gastrointestinal (upper GI) series of x-rays revealed dilatation of the stomach and proximal duodenum with partial obstruction of the second part of the duodenum (Fig. 1). The images were consistent with a congenital duodenal web that allowed only small amounts of liquid to pass into the distal duodenum.

1.1. Surgical procedure

A 5-mm VersaStep port was placed through an umbilical incision and a 30-degree telescope was inserted through the port. Under vision, three additional ports were placed. A 5-mm VersaStep port was placed in the suprapubic area and 3-mm ports were placed in the epigastric and the right lower quadrant areas. A dilated stomach and proximal duodenum were seen. The second portion of the duodenum was much narrower in caliber. Between the two sections of duodenum, there was a constriction of the duodenal wall consistent with a duodenal web. No other obvious abnormalities were found. Traditional laparoscopic techniques were used to kocherize the duodenum and expose the first and second parts of the duodenum. Next, a loop of jejunum 8 cm from the duodeno-jejunal flexure was mobilized and brought to the site of the dilated first part of the duodenum. Two intra-corporeal

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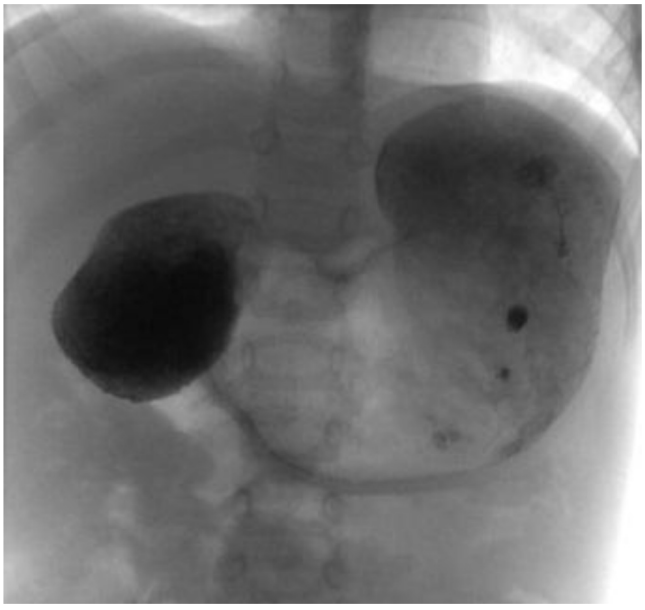

Fig. 1. Upper GI series revealing partial obstruction of the duodenum and proximal dilatation.

sutures were placed on either end of the proposed anastomosis to connect the two loops and the anastomotic site was hitched through the abdominal wall to secure it under good vision.

The procedure was then converted to a robotic procedure. The daVinci SI robotic system (Intuitive Surgical, Sunnyvale, CA) was docked over the right shoulder of the patient (Fig. 2). The suprapubic port was replaced with an 8.5-mm daVinci port to accommodate a 30-degree camera facing down and the two 3-mm ports were replaced with 5-mm ports to accommodate the robotic arms. The umbilical 5 mm port was left in place as an assist port. Using robotic scissors, incisions were made in the first part of the duodenum and the jejunum that were hitched together for the anastomosis. A robotic instrument was placed through the proximal duodenum into the stomach to confirm the absence of any obstruction proximal to the proposed anastomosis. Intra-corporeal suturing using a single layer of Ethibond 2-0 suture was used to close the anastomosis. After two Connell stitches were placed for

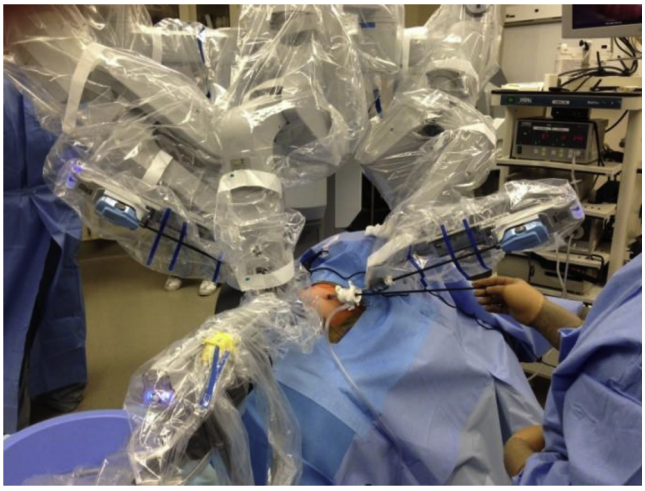

Fig. 2. Intraoperative view showing port positioning with the daVinci SI Robotic system.

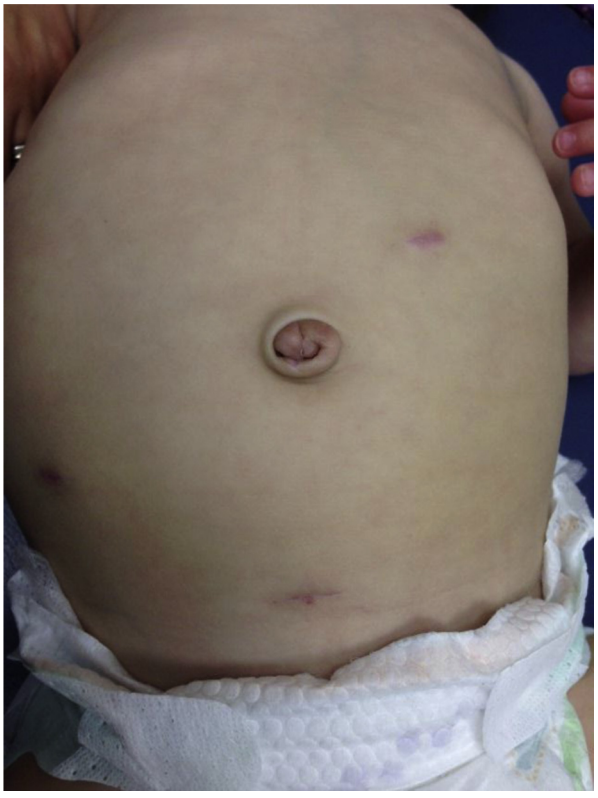

Fig. 3. Post-operative appearance at 3 weeks showing the excellent cosmesis.

the corners, two running sutures were placed starting from the corners and tied together in the center of each layer. Methylene blue was injected into the stomach using an orogastric tube to confirm the absence of a leak. A nasogastric tube was then placed for post-operative drainage. Omentum was then layered over the anastomosis. The ports were removed and closed after evacuating the pneumoperitoneum. Total operative time was 252 min.

1.2. Post-operative course

The patient was extubated at the end of the procedure and monitored in the Pediatric Intensive Care Unit. Pain control was achieved using an epidural catheter. The nasogastric tube was removed on post-operative day 5 and her diet was advanced. On post-operative day 7, she was tolerating a full liquid diet and was discharged home. The patient was asymptomatic at 6-month follow up. The incisions had healed well with excellent cosmetic appearance (Fig. 3).

2. Discussion

The first laparoscopic repair of a congenital duodenal anomaly was reported over 10 years ago [2,3]. Laparoscopic repairs initially had a significant rate of conversion to open laparotomy [4]. Procedures that were completely laparoscopic were often complicated by postoperative leaks at the anastomosis. Moreover the procedure was found to be tedious and difficult. Therefore, few reports of successful laparoscopic repairs are found in the literature in the years that followed [4]. Other centers continued to report on repairs performed using laparotomy [5]. Very few reports have demonstrated laparoscopic repair of the duodenum with enteric anastomoses to have low morbidity and high rates of success [4,6,7].

The combination of laparoscopic and robotic techniques offers a promising alternative to open or purely laparoscopic repair of congenital duodenal anomalies. The use of robotic instruments allows for greater dexterity then can be achieved with the traditional rigid laparoscopic instruments [1,6]. This becomes more pertinent with the intra-corporeal enteric anastomosis which needs to be adequate to prevent a post-operative leak. Our patient had the initial mobilization and identification of the anastomotic loop done laparoscopically as this part of the surgery covers a wider operative area and makes the application of the robot difficult. However, the anastomosis itself is performed on a focused area and the robotic system with its 3D vision, depth perception and wristed instruments of the robotic system can perform the anastomosis with more ease than possible using traditional laparoscopic instruments.

Recovery time with robotic surgery is similar to purely laparoscopic procedures and less than those seen with open procedures [7]. Robotic repair also preserves the cosmetic advantage provided by laparoscopy while making a crucial part of the surgery easier. A combination of laparoscopy and robotic surgery, as performed in our patient, combines the advantages of both approaches to provide an optimal outcome in children requiring surgical correction for duodenal obstruction.

References

[1] Meehan JJ. Robotic repair of congenital duodenal atresia: a case report. J Pediatr Surg 2007;42:E31–3.
[2] Rothenberg SS. Laparoscopic duodenoduodenostomy for duodenal obstruction in infants and children. J Pediatr Surg 2002;37:1088–9.
[3] Bax NMA, Ure BM, van der Zee DC, van Tujil I. Laparoscopic duodenoduodenostomy for duodenal atresia. Surg Endosc 2001;15:217.
[4] Van der Zee DC. Laparoscopic repair of duodenal atresia: revisited. World J Surg 2011;35:1781–4.
[5] Sarkar S, Apte A, Sarkar N, Sarkar D, Longia S. Vomiting and food refusal causing failure to thrive in a 2 year old: an ususual late manifestation of congenital duodenal web. BMJ Case Rep 2011. http://dx.doi.org/10.1136/bcr.01.2011.33779.
[6] Meehan JJ, Sandler A. Pediatric robotic surgery: a single-institutional review of the first 100 consecutive cases. Surg Endosc 2008;22(1):177–82.
[7] Spidle TL, St Peter SD, Keckler SJ, Holcomb III GW, Snyder CL, Ostlie DJ. Open vs laparoscopic repair of congenital duodenal obstructions: a concurrent series. J Pediatr Surg 2008;43:1002–5.