



Laparoscopic nissen fundoplication in children

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Abstract

Gastroesophageal reflux disease (GERD) is common in pediatric age group due to incomplete maturation of the antireflux mechanism. Vomiting and regurgitation are frequent manifestations in pediatric age group and are important for consideration when they adversely affect their nutritional status and recurrent chest infection due to aspiration. Medical treatment may not control (GERD), so surgical treatment is the remaining choice to control GERD and late complications. In this study, we present our experience in laparoscopic Nissen fundoplication for the management of (GERD) in children over 5 year period, acceptability, safety, efficacy and outcome. The data of all patients undergoing fundoplication for (GERD) at Queen Rania Hospital for Children / King Hussein Medical Center were retrospectively reviewed of prospectively collected data from April 2008 to 2013. Ages ranged from 3 months to 15 years. All laparoscopic fundoplications were performed by a single surgeon. Patients were evaluate for the indications for surgery, diagnostic modalities, duration of surgery, peroperative complications, pain management , hospital stay , post operative course, morbidity, mortality and the need for re operation. We used the Enseal vessel sealing device and hook diathermy through 5 and 3 mm ports for dissection and division of short gastric vessels and excision of the hernia sac. Over the last 5 years, 80 laparoscopic Nissen fundoplication for GERD were performed, 12 patients had GERD associated with thoracic stomach, 3 patients had esophageal achalasia underwent cardiomyotomy & fundoplication, 14 patients had neurological impairment. Weight ranged from 3, 5 to 82 kg. Mean age 5 years, range (3 months – 15 years), 50 males and 30 females. The indications for surgery were thoracic stomach and Barret esophagus due to (GERD), other indications were severe esophageal ulceration, stricture, recurrent bleeding, para-esophageal hernia and recurrent aspiration pneumonia. Five patients had previous repair of esophageal atresia. Mean operating time was 120 min (range 45 -240 minutes). The mean hospital stay was 2 days, range from 1 to 4 days. There were no intra-operative and post-operative complications. One conversion to open fundoplication was required due to technical fault of the CO2 insufflator. Six patients had laparoscopic gastrostomy insertion in addition to Nissen fundoplication. Blood transfusion was not required in any case and no mortality. There was no need for re do surgery. The vast majority of patients showed significant respiratory improvement as well as control of emesis and hematemesi. This study shows that laparoscopic Nissen fundoplication for GERD in children is rapidly becoming the procedure of choice for surgical correction because of the advantages of reduced discomfort and decreased hospitalization. It is feasible, effective and safe technique. Laparoscopic Nissen fundoplication operation times in children reduced by experience. The surgical skills are important to improved outcomes include adequate length of intraabdominal esophagus, minimal hiatal dissection and tension-free wrap. The results are superior to the traditional open fundoplication. Laparoscopic Nissen fundoplication should be considered the gold standard for anti reflux procedures. The length of hospital stay and convalescence is short and hence rapid return to normal activity is expected with less analgesia requirements. Follow-up examination verified perfect clinical, radiological and endoscopic findings. The cosmetic, endoscopic and functional results were excellent with very good patients and family satisfaction.

Key words: Laparoscopic nissen fundoplication, GERD, children

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Introduction

Gastroesophageal reflux disease (GERD) occurs when the contents of stomach pass through the lower esophageal sphincter (LES) backward to the esophagus. The competent function of the gastroesophageal junction plays a great role in preventing reflux, also known as the anti reflux mechanism. Clinical manifestations started at early age and are characterized by the regurgitation of milk, frequently after feeds. In spite of that the child maintains near normal growth and development [1-

3]. Usually the condition is considered as physiological phenomenon and resolve when infants grow up [4]. Persistence of gastro-esophageal reflux disease (GERD) will cause complications like oesophagitis, chronic respiratory symptoms, failure to thrive and even sudden infant death syndrome [5]. The neurologically impaired group of children is particularly at risk for symptomatic GERD and increased rate of complications. GERD is higher in infants than in older children and adults reaching 80-85% which encountered more in males. These higher rates are due to incomplete gastric and esophageal maturation in infants and the liquid diet in infancy [6,7]. Over the past 2 decades; laparoscopy had a widespread implementation as minimally invasive anti-reflux surgical tool. Laparoscopic fundoplication being at least as safe and as effective as its open counterpart [8]. Children at high risk for GERD include those with cerebral palsy, after repair of esophageal atresia and patients suffering from hiatal hernia [2]. Drugs such as anticholinergics, calcium-channel blockers, benzodiazepines, and dopamine [9] usually induce relaxation of the LES with potential increased chance for GERD. Convictive tissue disease especially scleroderma and chronic obstructive pulmonary disease increase the risk of GERD [10,11]. Careful and adequate history about the nature and frequency of vomiting is of great help for the diagnosis of GERD (2). Other diagnostic modalities include imaging studies with contrast mainly to exclude obstruction and not specific for the diagnosis of GERD with high rate of false negatives [2,12]. Gama scan can be used with limited indications. Upper endoscopy can be utilized to assess the esophagus and degree of esophagitis and for the presence of other causes of oesophagitis and monitoring the clinical course of Barrett's esophagus [2, 10].

Endoscopy is only indicated if there is a suspicion of complications of GERD. There are many surgical techniques for GERD: the Nissen total fundoplication, the anterior partial fundoplication (Thal fundoplication), and the posterior partial fundoplication (Toupet fundoplication). Laparoscopic surgery is preferred [13, 14] over conventional open surgery. Fundoplication relieves symptoms in up to 92% of patients with a mortality that varies between 0% and 5% [15]. Dysphagia is the commonest complication [16], mostly due to tight wrap, other postoperative complications can occur, such as dumping syndrome, dysphagia, vagal nerve paralysis, hemorrhage, infection, and adhesions [2]. Nissen fundoplication, standardized definitively in 1972, and transposed without modifications to laparoscopy and

considered as an effective and safe surgical procedure for pediatric populations with GERD [17,18]. With the advancement of minimally invasive surgery, laparoscopic fundoplication has been used widely and has gained importance in the treatment of GERD in children even for neurologically impaired children [19,20]. The aim of this study was to retrospectively review the results and efficacy of laparoscopic Nissen fundoplication. In this review, we described this technique in 80 cases to eliminate a primary gastro-oesophageal reflux (GERD) alone or in association with hiatal hernia, thoracic stomach as well as to prevent reflux secondary to a surgical procedure such as Heller's myotomy.

Patients and methods

With Institutional Review Board approval, the data of all patients undergoing fundoplication for (GERD) at Queen Rania Hospital for Children / King Hussein Medical Center were retrospectively reviewed of prospectively collected data from April 2008 to 2013. A total of 80 children with a documented GERD resistant to medical therapy underwent laparoscopic Nissen fundoplication. Ages ranged from 3 months to 15 years. All laparoscopic fundoplications were performed by a single surgeon. Patients were evaluated for the indications for surgery such as recurrent aspiration pneumonia, bronchospasm, emesis, hematemesis, chronic anemia and failure to thrive. The neurologically impaired patients had failure to thrive and feeding difficulties necessitate fundoplication and gastrostomy. Diagnostic modalities in the form of upper contrast study and endoscopy to assess the status of oesophagitis and to obtain biopsy. The duration of surgery, peroperative complications, pain management, hospital stay, post operative course, morbidity, mortality and the need for re operation were evaluated. The minimum follow up period was 6months. We perform the laparoscopic Nissen fundoplication under general endotracheal anesthesia, insertion of nasogastric tube prior to pneumoperitoneum. We maintain the intra abdominal pressure between 8-14 mmHg according to the age, weight of the patient, the parameters of blood pressure and ventilation observed by the anesthetist. We use size 3 and 5mm trocars according to the age and body weight. We used routinely 30° laparoscopic lens. Retraction of the liver by the liver retractor and percutaneous sutures through the falciform ligament. Mobilization of the intra abdominal part of the esophagus at the hiatus mainly posteriorly avoiding any extensive dissection anteriorly using hook

diathermy. We use the Enseal sealing devise to mobilize the fundus of the stomach by limited sealing and cutting of the short gastric vessels. After creating the retrogastroesophageal junction widow and exposing the right and left crus. Excision of the hernial sac if present is mandatory to prevent recurrence in case of hiatal hernia or thoracic stomach. Tension free cruroplasty is accomplished using non absorbable ethibond sutures. We try to have a floppy wrap by bringing the fundus behind and round the intra abdominal esophagus. Fixation of the wrap by non absorbable ethibond sutures as recommended by many authors [21, 22]. In six patients, under vision laparoscopic gastrostomy was performed after completing the fundoplication, usually in the left upper quadrant. In one patient who had situs inversus totalis, the gastrostomy placed in the right upper quadrant. All patients were followed up post-operatively in out-patient clinics by the surgeon and the gastroenterologist with minimum period of 6 months. Precise questions for the parents regarding the outcome of laparoscopic fundoplication and quality of life of patients was recorded.

Results

Over the last 5 years, 80 laparoscopic Nissen fundoplication for GERD were performed, 12 patients had GERD and thoracic stomach, 3 patients had esophageal achalasia underwent cardiomyotomy & fundoplication and 14 patients had neurological impairment. Weight ranged from 3, 5 to 82 kg .Mean age 5 years, range (3 months – 15 years), 50 males and 30 females. The indications for surgery were thoracic stomach and Barret esophagus due to (GERD), other indications were severe esophageal ulceration, stricture, recurrent bleeding, para-esophageal hernia and recurrent aspiration pneumonia. Five patients had previous repair of esophageal atresia. Mean operating time was 120 min (range 45 -240 minutes). The mean hospital stay was 2 days, range from 1 to 4days. There were no intra-operative and post-operative complications. One conversion to open fundoplication was required due to technical fault of the CO2 insufflator. Six patients had laparoscopic gastrostomy insertion in addition to Nissen fundoplication. Blood transfusion was not required in any case and no mortality. There was no need for re do surgery. The vast majority of patients showed significant respiratory improvement as well as control of emesis and hematemeses. Clinical recurrence of GERD was not observed in any patient. Morbidity mainly from the gastrostomy in the form

of infection, controlled leak and granuloma, all managed conservatively. There was no other significant post operative complains suggestive of dumping syndrome or dysphagia.

Discussion

Laparoscopic fundoplication is considered the treatment of choice for pediatric age group with GERD resistant to medical and conservative therapy. Laparoscopic fundoplication was first described in early 1990s [23-27]. This procedure is the third most common in pediatric age group [28]. Laparoscopic Nissen fundoplication has gained popularity in recent years due to its advantages over open surgery in terms of shorter hospital stay, postoperative pain, quick recovery and cosmesis. Laparoscopic repair gives the potential to treat GERD effectively [29, 30, 31] with less complications and morbidity associated with open surgery and large abdominal incisions. The laparoscopic approach provides an unparalleled view of the diaphragmatic hiatus compared to open fundoplication which can lead to poor exposure of the hiatal structures, especially in obese patients. The outcomes have been reported extensively [13, 24, 26, 32]. In recent studies, laparoscopic fundoplication procedure provided satisfactory outcomes in patients with and without neurological and neuromuscular impairment. [22-25,33,34]. In our study, we managed the normal children and the neurologically impaired population. All patients underwent laparoscopic Nissen fundoplication with or without laparoscopic gastrostomy successfully, no conversion without per-operative mortality and morbidity. There was a satisfactory relief and control of the gastrointestinal symptoms which will improve patient's quality of life and survival rate.

We encounter no recurrence of GERD in our patients at least from clinical point view. This would suggest that laparoscopic Nissen fundoplication may represent the best surgical option in controlling clinically significant GERD symptoms in pediatric age group even for those with neurological impairment. The respiratory symptoms control may not be achieved in few patients, others will improve by adding gastrostomy with fundoplication to reduce aspiration and chest infection [21, 35-36]. From our observations, we noticed that symptomatic patients with respiratory symptoms should be controlled pre operatively to achieve the best results of fundoplication. Other conditions which may increase the recurrence of GERD include chronic malnutrition, chronic lung

disease and spasticity. Finally, our protocol of management of GERD in children, surgical techniques results and outcome are compatible with the recent international reports.

Conclusion

This study shows that laparoscopic Nissen fundoplication for GERD in children is rapidly becoming the procedure of choice for surgical correction because of the advantages of reduced discomfort and decreased hospitalization. It is feasible, effective and safe technique. Laparoscopic Nissen fundoplication operation times in children reduced by experience. The surgical skills are important to improved outcomes include adequate length of intraabdominal esophagus, minimal hiatal dissection and tension-free wrap. The results are superior to the traditional open fundoplication. Laparoscopic Nissen fundoplication should be considered the gold standard for antireflux procedures. The length of hospital stay and convalescence is short and hence rapid return to normal activity is expected with less analgesia requirements. Follow-up examination verified perfect clinical, radiological and endoscopic findings. The cosmetic, endoscopic and functional results were excellent with very good patients and family satisfaction.

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