Polish Journal of Veterinary Sciences Vol. 19, No. 1 (2016), 75–77

DOI 10.1515/pjvs-2016-0010

Original article

Laparoscopic pyloromyotomy and pyloroplasty in dogs

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Abstract

This article describes clinical experiments involving laparoscopic pyloromyotomy and pyloroplasty in six dogs diagnosed with hypertrophy of the pyloric sphincter. Laparoscopic pyloromyotomy was performed in three dogs, and pyloroplasty was carried out in the remaining three animals. The patients were operated on based on the authors' previous experiences with experimental pyloromyotomy and pyloroplasty in pigs. Pyloromyotomy and pyloroplasty resulted in full recovery and complete subsidence of symptoms in all patients.

Key words: pylorus, endoscopy, dogs

Introduction

Minimally invasive surgical techniques increasingly often provide an alternative to classical surgical procedures in veterinary practice. Laparoscopy is not only a diagnostic method (Holak et al. 2010, Chyczewski et al 2011, Holak et al. 2013), and it has a growing number of surgical applications (Bouchard et al. 1999, Adamiak et al. 2011). Various surgical procedures in the peritoneal cavity have been described in veterinary literature, but there is a general lack of data relating to surgical interventions in the canine pylorus. Hypertrophy of the pyloric sphincter is one of the most common disorders of this section of the gastrointestinal tract, leading to pyloric stenosis. Pyloric stenosis delays gastric emptying and causes vomiting immediately after and within one hour after eating. The condition affects dogs of various ages, but it is most frequently diagnosed in young animals, in particular in brachycephalic breeds. The etiology of muscular hypertrophy of the pyloric sphincter has not been fully elucidated. The disorder can appear on its own or in combination with secretory or neurological dysfunctions of the digestive tract. Pyloric function can also be compromised by factors that stimulate the sympathetic nervous system, such as stress or inflammation, as well as diseases of the nervous system. Pyloromyotomy and pyloroplasty are surgical procedures of choice in the treatment of hypertrophy of the pyloric sphincter.

Materials and Methods

Laparoscopic pyloromyotomy and pyloroplasty were performed in six dogs of both sexes, aged 11 months to 10 years, including two mixed-breed dogs, two American Staffordshire terriers, a German pointer and a boxer. All dogs were admitted to the Department of Surgery and Radiology at the Faculty

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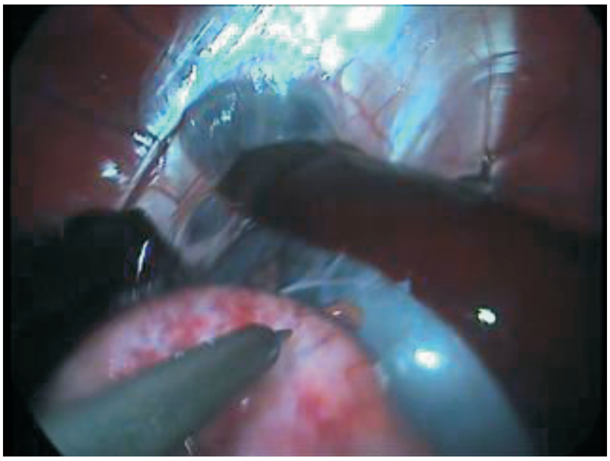

Fig. 1. Pyloromyotomy performed with the use of Berci's laparoscopic scalpel.

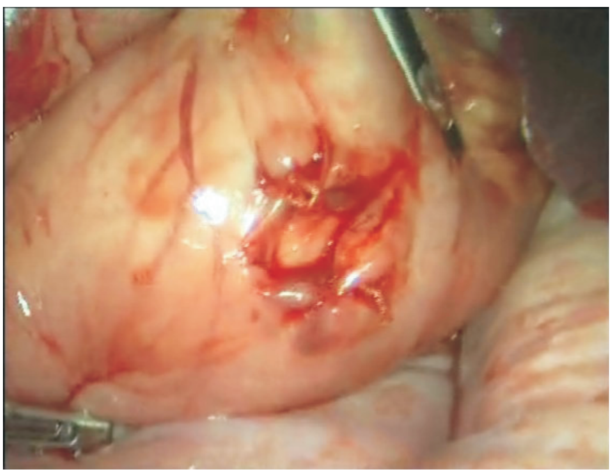

Fig. 2. Pyloroplasty of the canine pylorus – two single sutures are visible.

of Veterinary Medicine of the University of Warmia and Mazury in Olsztyn. The described procedures were carried out between 2010 and 2013.

All dogs vomited immediately after or within one hour after eating. Projectile vomiting where the gastric contents were expelled with great force was also observed. The patients had normal appetite, normal stools and behavior. Loss of body weight was noted in the range of 0.5 kg to 2 kg. Blood morphology was within normal ranges in all dogs. All patients were subjected to standard radiological examinations of the abdominal cavity. The exams were repeated two hours after the administration of barium sulfate contrast medium. Radiological images revealed thickening of pyloric walls, delayed gastric emptying and a „string sign" which is a thin stream of barium sulfate in the narrowed pyloric outlet. Based on the information supplied by the dogs' owners and the results of clinical examinations, the patients were referred for pyloromyotomy and pyloroplasty. Dogs in which symptoms of pyloric stenosis had persisted for up to two weeks were qualified for pyloromyotomy, and the remaining patients were referred for pyloroplasty.

Before the surgical procedure, the animals were fasted for 12 hours and subjected to general anesthesia in accordance with the anesthesiological protocol appropriate for the species.

All procedures were performed with the use of a standard laparoscopic column and a laparoscope with a 30° angle of vision. Pneumoperitoneum was achieved through insufflation with carbon dioxide at intra-abdominal pressure of 12 mm Hg. The animals were placed in the reverse Trendelenburg position during surgery.

Four ports were created for pyloromyotomy. An optical port (port 1) was placed in the midline line, approximately 10 mm cranial to the umbilicus. Working ports were created in the right axillary line, approximately 40 mm behind the last rib (port 2), in the left axillary line, approximately 60 mm behind the last rib (port 3), and in the midline between the optical port and the port in the left axillary line (port 4). Babcock forceps were inserted into ports 2 and 3, and Berci's laparoscopic scalpel was placed through port 4 (Fig. 1). The pylorus was grasped and immobilized with the Babcock forceps, the serous membrane and the muscular layer were incised along the entire pyloric sphincter with Berci's scalpel until the mucosa came into view. The remaining manipulations were performed by blunt dissection until the mucosa was visible along the entire incision. The ports were removed, and abdominal incisions were closed with two layers of single 3-0 absorbable sutures.

In laparoscopic pyloroplasty, the location of ports was identical to that in pyloromyotomy. After pyloromyotomy, the Shabo-Berci suturing kit was inserted into the abdominal cavity through ports 2 and 4. Using 3-0 absorbable sutures, the serous membrane and the muscular layer were joined with two single sutures across the incision line according to the method proposed by Brass (Fig. 2). The Babcock forceps were inserted through port 3 and were used to hold the pylorus during suturing. Trocar wounds in the abdomen were closed with two layers of sutures.

Post-operative analgesia was administered for two days, and antibiotic treatment was continued for five days. The owners were advised to feed the animals with semi-liquid food administered in small portions several times a day for seven days.

Results

Surgical and anesthesiological complications were not observed in any of the patients. The described location of laparoscopic ports provided optimal access to the pylorus, supporting surgical manipulations and the performance of pyloromyotomy and pyloroplasty.

Wound healing was normal, and sutures were removed 10 days after surgery. In two dogs that had undergone pyloroplasty, the owners reported several episodes of less intensive vomiting which subsided after three days. Two days after surgery, all patients underwent radiological examinations of the gastrointestinal tract with an aqueous solution of barium sulfate as the contrast medium. The results revealed normal passage of the digesta. The average operative time was 62 minutes for pyloromyotomy and 72 minutes for pyloroplasty. All animals rapidly gained weight after recovery.

Discussion

Six canine patients with clinical symptoms of hypertrophy of the pyloric sphincter were operated based on the results of experimental pyloromyotomy and pyloroplasty performed by the authors in pigs (Holak et al. 2015). The location of laparoscopic ports in surgical procedures performed in pigs proved to be optimal for freely manipulating the pylorus, and incising and dissecting the serous membrane and the muscular layer also in dogs. Laparoscopic tools inserted through three working ports were effectively used to grasp and stabilize the pylorus and to incise and dissect the muscular layer. In other studies, the same procedures were performed with the use of only two working ports (Muensterer et al. 2010), but in the authors' opinion, a higher number of ports permits more reliable stabilization of the pylorus and safer incision and dissection of the muscular layer.

The reverse Tendelengburg position considerably aided the procedure. The loops of the small intestine were moved in the direction of the pelvic cavity, which facilitated the grasping and manipulation of the pylorus. In the authors' opinion, Ramstedt's pyloromyotomy, which involves incision and blunt dissection of the muscular layer, is a safer alternative than incision of the entire muscular layer where the risk of perforation is much greater. In one patient with a suspicion of mucosal perforation, the abdominal cavity was insufflated with air through a stomach tube inserted in the region of the pylorus. The formation of a sac-like protrusion above the muscular layer indicated that the mucosa was intact.

The patients were qualified for pyloromyotomy or pyloroplasty within two weeks after being diagnosed with pyloric stenosis. In animals showing symptoms of pyloric stenosis for more than two weeks, muscle fibers appeared to be harder, less flexible and less susceptible to blunt dissection. These patients were referred for pyloroplasty due to considerable thickness of the pyloric muscle, which would prevent free mucosal protrusion after pyloromyotomy alone. Pyloromyotomy could lead to repeated fusion of the incised layers and recurrence of the symptoms of disease. For this reason, pyloroplasty is recommended in animals where symptoms of pyloric stenosis persist for more than two weeks.

The average operative time ranged from 62 minutes for pyloromyotomy and 72 minutes for pyloroplasty, and did not differ significantly from the duration of the classical procedure. According to the owners, normal levels of physical activity were rapidly restored in all dogs, and short convalescence is an unquestionable advantage of laparoscopic surgery.

Based on the described positive outcomes of laparoscopic pyloromyotomy and pyloroplasty in dogs, these surgical procedures can be fully recommended for use in clinical veterinary practice.

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