Laparoscopic Right Hemicolecotomy for Mucocele Due to a Low-Grade Appendiceal Mucinous Neoplasm

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ABSTRACT

Tumors of the appendix are rare entities causing mucoceles. The majority of them are discovered incidentally during investigation for other conditions. Laparoscopic surgery for appendiceal tumors is still controversial, as inadvertent rupture of the lesion due to improper handling will cause pseudomyxoma peritonei. The patient was incidentally discovered to have an appendiceal tumor and referred to us for laparoscopy. Because the tumor involved the entire appendix, a laparoscopic right hemicolecotomy was performed without directly handling the tumor. Postoperative recovery was uneventful. Pathological diagnosis was low-grade appendiceal mucinous neoplasm. The safety of laparoscopic appendectomy for the management of incidentally discovered appendiceal tumors has not yet been established. Several reports in the literature support both laparoscopic and open surgery. The main concerns to be addressed are the adequacy of resection and intraperitoneal rupture of the tumor. Our patient successfully underwent laparoscopic surgery without any complications. A formal right hemicolecotomy was performed because the tumor involved the entire appendix. We now think laparoscopic surgery for appendiceal tumors is safe, feasible, and even may be beneficial.

Key Words: Appendiceal tumor, Appendicitis, Mucinous cystadenoma, Laparoscopic right hemicolecotomy.

INTRODUCTION

Appendiceal tumors are rare entities, occurring in less than 2% of all appendectomies. These tumors are rarely associated with clinical manifestations; therefore, they are usually discovered incidentally at the time of surgery, frequently in association with acute appendicitis. Mucinous cystadenoma is the commonest mucinous neoplasm of the appendix. Its clinical significance lies in the possible rupture and consequent spillage of mucin into the peritoneal cavity, leading to pseudomyxoma peritonei. Even if laparoscopy has been successfully used to perform appendectomy, some concerns exist regarding its use in dealing with mucinous secreting lesions because of possible spillage of mucin during surgery. The role of laparoscopic resection in the management of appendix tumors is not well defined in the literature. We report the case of a large (10 cm x 6 cm) low-grade appendiceal mucinous neoplasm, for which a formal right hemicolecotomy was successfully performed using a laparoscopic approach.

CASE REPORT

The patient was a 60-year-old doctor who was recently diagnosed with an appendicular tumor while being investigated for vague abdominal pain. He came to our institution for possible minimally invasive therapy. Colonoscopy and serum CEA level were normal. Routine blood and urine tests including VMA were done that revealed no abnormality. Diagnostic laparoscopy was planned for him. Pneumoperitoneum was achieved via a Veress needle and intraabdominal pressure maintained at 12 mm Hg. The patient was placed in the Trendelenburg position with a left lateral tilt to facilitate the bowels to fall away from the right abdomen. The monitor was placed at the level of the patient’s right shoulder. The camera assistant stood to the left of the patient.

Five ports were placed in the upper abdomen: (1) 10-mm port 2 cm above the umbilicus; (2) 5-mm port (right working hand) in the left midclavicular line; (3) 5-mm port (left working hand) in the right iliac fossa; (4) 10-mm port (for bowel retraction) in the epigastrium; (5) 10-mm port in the hypogastrum.
Initially, with the telescope in the umbilical port, the lesion was identified as a large spherical tumor (Figure 1). The telescope was now moved to the hypogastric port, a 5-mm Harmonic shears was placed in the umbilical port, and an atraumatic grasper was placed in the right iliac fossa port. The grasper was used to gently probe the tumor, taking care not to grasp it or handle it. The tumor was seen to be involving the entire appendix up to the base. So the decision to perform a formal right hemicolectomy was made, and dissection was commenced by incising the visceral peritoneum adjacent to the ileocecal junction (Figure 2). The dissection was now continued in the avascular facial plane of Toldt (Figure 3), visualizing and preserving the right ureter and gonadal vessels. The ileocolic, right colic, and right branch of the middle colic vessels were ligated with the LigaSure (Valleylab, USA) sealing device (Figure 4). The right paracolic gutter was opened by cutting along the white line of Toldt. The hepatic flexure and gastrocolic adhesions were mobilized with Harmonic shears. A 5-cm incision was made by enlarging the umbilical port and a wound protector applied to it. The specimen was brought out of this mini-laparotomy incision and resected. End-to-end ileocolic anastomosis was performed extracorporeally with 00 PDS sutures in a single-layer fashion. The peritoneal cavity was drained with a tube in the right flank.

RESULTS

Total operating time was 122 minutes, and blood loss was insignificant. Orally, liquids were allowed on the second postoperative day (POD) and semisolids the next day. The drain tube was removed on the fourth POD, and the patient was discharged on the fifth POD. Histopathology report was consistent with low-grade appendiceal mucinous neoplasm characterized by herniation of mucin into the muscularis propria, forming a "diverticulum." The lesion was seen involving the base of the appendix, with no evidence of malignant cells or infiltrating pattern (Figure 5). The patient was followed up for 24 months and has had no recurrence so far.

Figure 1. Large appendiceal tumor visible on diagnostic laparoscopy.

Figure 2. Commencement of hemicolecction without handling the tumor (arrow).

Figure 3. Retroperitoneal dissection along Toldt fascia.
Appendiceal tumors account for less than 0.4% of neoplasias in the gastrointestinal tract. They are found in less than 2% of appendectomies and are associated with appendiceal perforation in 20% of cases.3 Quite often, other neoplasia like adenocarcinoma of the colon and ovaries coexist, so an intraoperative exploration of the whole abdomen and colonoscopy, especially in patients over 60 years of age, is desirable.4 The 5-year survival rate is 100% in cases of benign mucocele and about 45% in malignant cases.5 The existing terminology on appendiceal tumors do not provide an accurate description, underplaying the considerably high mortality and morbidity associated with these lesions. So the term “low-grade appendiceal mucinous neoplasm” was coined by Misdraji et al6 at Harvard Medical School to provide a more realistic perspective. No current consensus exists as to the diagnostic criteria or treatment of appendiceal tumors.7 A radically removed appendix is curative in most cases of appendiceal tumors. However, a right hemicolecction should be considered for patients with malignant mucinous lesions or if a benign tumor involves the base of the appendix. The latter was the case in our patient making it impossible to achieve a tumor-free margin at surgery, so we proceeded with a formal laparoscopic right hemicolecction. Also, if a mucocele is more than 2 cm in size, it is more likely to be neoplastic. In our patient, the tumor size was 10 cm x 6 cm.8 The indications for the laparoscopic approach to the resection of these tumors have not yet been established definitively. Some investigators have argued that laparoscopy does not increase the risk of local recurrence or metastasis after tumor resection over that associated with open surgery.9 As evidence of the benefits associated with laparoscopic appendectomy accumulates, an increasing number of resections for appendiceal tumors are being performed via laparoscopy. Despite growing evidence favoring the laparoscopic approach, Gonzales et al10 reported a case of laparoscopic mucocele resection that was followed by early peritoneal progression, forcing them to conclude that this entity was a contraindication to laparoscopic resection. We have published our series of 8 patients with appendiceal mucocele who successfully underwent laparoscopic resection at our institute.11 Data indicate that whether the resection of appendiceal carcinoids is accomplished via laparoscopy or the open approach, long-term results are similar.12 However, only a few cases of appendiceal tumors not of the carcinoid type have been resected thus far by the laparoscopic approach. Even though our patient had no recurrence or spillage, experience with the laparoscopic resection of appendiceal neoplasms is still not sufficient, and therefore it may be wise to use the open approach in centers with little laparoscopic experience. As the technique of laparoscopic appendectomy evolves, the feasibility of resecting appendiceal neoplasms via this approach should also be assessed.13 Data from some studies indicate that laparoscopic appendectomy for the management of appendiceal neoplasms is associated with long-term results comparable to those obtained with open appendectomy.14 Our case report adds to the existing data regarding the safety of laparoscopy for cases of appendiceal neoplasm. We did not touch or handle the lesion during any part of the procedure. The wound protector that we applied will

**DISCUSSION**

Appendiceal tumors account for less than 0.4% of neoplasias in the gastrointestinal tract. They are found in less than 2% of appendectomies and are associated with appendiceal perforation in 20% of cases.3 Quite often, other neoplasia like adenocarcinoma of the colon and ovaries coexist, so an intraoperative exploration of the whole abdomen and colonoscopy, especially in patients over 60 years of age, is desirable.4 The 5-year survival rate is 100% in cases of benign mucocele and about 45% in malignant cases.5 The existing terminology on appendiceal tumors do not provide an accurate description, underplaying the considerably high mortality and morbidity associated with these lesions. So the term “low-grade appendiceal mucinous neoplasm” was coined by Misdraji et al6 at Harvard Medical School to provide a more realistic perspective. No current consensus exists as to the diagnostic criteria or treatment of appendiceal tumors.7 A radically removed appendix is curative in most cases of appendiceal tumors. However, a right hemicolecction should be considered for patients with malignant mucinous lesions or if a benign tumor involves the base of the appendix. The latter was the case in our patient making it impossible to achieve a tumor-free margin at surgery, so we proceeded with a formal laparoscopic right hemicolecction. Also, if a mucocele is more than 2 cm in size, it is more likely to be neoplastic. In our patient, the tumor size was 10 cm x 6 cm. The indications for the laparoscopic approach to the resection of these tumors have not yet been established definitively. Some investigators have argued that laparoscopy does not increase the risk of local recurrence or metastasis after tumor resection over that associated with open surgery.9 As evidence of the benefits associated with laparoscopic appendectomy accumulates, an increasing number of resections for appendiceal tumors are being performed via laparoscopy. Despite growing evidence favoring the laparoscopic approach, Gonzales et al10 reported a case of laparoscopic mucocele resection that was followed by early peritoneal progression, forcing them to conclude that this entity was a contraindication to laparoscopic resection. We have published our series of 8 patients with appendiceal mucocele who successfully underwent laparoscopic resection at our institute.11 Data indicate that whether the resection of appendiceal carcinoids is accomplished via laparoscopy or the open approach, long-term results are similar.12 However, only a few cases of appendiceal tumors not of the carcinoid type have been resected thus far by the laparoscopic approach. Even though our patient had no recurrence or spillage, experience with the laparoscopic resection of appendiceal neoplasms is still not sufficient, and therefore it may be wise to use the open approach in centers with little laparoscopic experience. As the technique of laparoscopic appendectomy evolves, the feasibility of resecting appendiceal neoplasms via this approach should also be assessed.13 Data from some studies indicate that laparoscopic appendectomy for the management of appendiceal neoplasms is associated with long-term results comparable to those obtained with open appendectomy.14 Our case report adds to the existing data regarding the safety of laparoscopy for cases of appendiceal neoplasm. We did not touch or handle the lesion during any part of the procedure. The wound protector that we applied will

![Figure 4. Ligation of right branch of middle colic vessels.](image1)

![Figure 5. Histopathology: herniation of mucin into the muscularis propria, with no evidence of malignant cells or infiltrative pattern – possibility of “low-grade appendiceal neoplasm.”](image2)
prevent port-site seeding. Currently, opinion among surgeons regarding the laparoscopic treatment of appendiceal tumors stands divided. We are of the opinion that laparoscopic surgery can be used for appendiceal tumors as well, provided certain precautions are taken.

CONCLUSION

We believe that the laparoscopic approach is safe if performed by an experienced surgeon. Also, the benefits of minimally invasive surgery like reduced hospital stay, less pain, better cosmesis, and early return to work can also be utilized. Conversion to laparotomy should be considered only if the lesion is traumatically grasped and ruptures in the peritoneal cavity.

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