Our Three Year Clinical Experience at Appendiceal Incidental Neoplasms and Management of Appendicular Tumors

Hançerlioğulları O, Kahraman S, Peker YS, Yilmaz M, Kılıbaşi Z, Menteş O, Kozak O, Gülhane Military Medical Academy, Department of Pathology, Ankara, Turkey

Subject: Appendectomy; Appendicectomy; Histopathology; Human; Appendicular neoplasms; Peritoneal carcinomatous; Pseudomyxoma peritonei

Introduction

Appendectomy due to acute appendicitis is one of the most common emergency operations that is applied at the general surgery clinics [1]. For this reason other pathologies of appendix such as benign appendicular tumors (adenoma, leiomyoma, neuroma, lipoma etc) or malignant appendicular tumors (carcinoid (neuroendocrine), adenocarcinoma, mucinous neoplasms) may commonly be unforeseen [2]. Unforeseen benign lesions may not cause any health problems for patient and medicolegal problems for the surgeon because of short survival and cause medicolegal problems for the surgeons. For this reason, surgeons must keep in mind that all appendectomy specimens may not be acute appendicitis.

Subjects and Methods

1332 patients who were performed appendectomy at Gulhane Military Medical Academy between October 2012 and May 2015 were re-evaluated by two pathologists from pathology department for histopathologic results of the appendectomy according to WHO Classification of Tumours of the Digestive System 2010. The appendectomy specimens were fixed in buffered formalin and were stained with hematoxylin and eosin. 20 of 1332 appendectomy patients were found to have histopathologically appendicular tumor and 20 patients with hystopathological appendicular tumors were then re-evaluated respectively for age, gender, preoperative white blood cell (WBC) count, preoperative ultrasonographic (USG) results, preoperative radiological appendicular diameter, meckel diverticulum status, type of appendicular tumor and type of operation. Fallow up duration for the patients were from day of appendectomy till to December 2015. Retrospective data analysis was performed with SPSS 22.0 for statistical analysis.

Results

For the 20 patients evaluated for the neoplasms of appendix, mean age of patients was 44.6 ± 14.41 years. 13 (65%) were male and 7 (35%) were female. The mean preoperative white blood cell count was 9645.0 ± 4490.3/mm³. 9 (45%) patient's appendix were able to be evaluated by preoperative abdominal ultrasound and the mean diameter of appendix was 10.65 ± 4.16 mm. None of the patients had meckel diverticulum. Appendectomy was performed to 19 (95%) patients and partial resection of caecum with appendectomy was performed to 1 (5%) patient.

The malignant tumors of appendix are adenocarcinomas, carcinoid tumors and extremely rare stromal tumors which they all may mimic acute appendicitis. Adenocarcinomas are believed to be more common than carcinoid tumors as it was not in past. Unforeseen neoplasms of appendix may come up with peritoneal carcinomatosis with short survival and cause medicolegal problems for the surgeons. For this reason, surgeons must keep in mind that all appendectomy specimens may not be acute appendicitis.

Abstract

Appendectomy due to acute appendicitis is one of the most common emergency operations that is applied at the general surgery clinics and for this reason neoplasms of appendix may commonly be unforeseen. Because unforeseen neoplasms of the appendix may cause health problems for the patient and medicolegal problems for the surgeon, we decided to evaluate the histopathological results of the appendectomy specimens that were excised at our clinic between 2012 and 2015. 1332 patients were evaluated and 20 of them were found to have appendicular neoplasms of low-grade mucinous neoplasm in 9 (45%), appendiceal adenoma in 6 (30%), neuroendocrine tumor in 4 (20%) and metastases of gastric adenocarcinoma in 1 (5%) patient. Mean age of patients was 44.6 ± 14.41 years. 13 (65%) were male and 7 (35%) were female. The mean preoperative white blood cell count was 9645.0 ± 4490.3/mm³. 9 (45%) patient's appendix were able to be evaluated by preoperative abdominal ultrasound and the mean diameter of appendix was 10.65 ± 4.16 mm. None of the patients had meckel diverticulum. Appendectomy was performed to 19 (95%) patients and partial resection of caecum with appendectomy was performed to 1 (5%) patient.

The malignant tumors of appendix are adenocarcinomas, carcinoid tumors and extremely rare stromal tumors which they all may mimic acute appendicitis. Adenocarcinomas are believed to be more common than carcinoid tumors as it was not in past. Unforeseen neoplasms of appendix may come up with peritoneal carcinomatosis with short survival and cause medicolegal problems for the surgeons. For this reason, surgeons must keep in mind that all appendectomy specimens may not be acute appendicitis.

Keywords: Appendicitis; Appendectomy; Histopathology; Human; Appendicular neoplasms; Peritoneal carcinomatous; Pseudomyxoma peritonei
be evaluated by preoperative abdominal USG and the mean diameter of appendix was 10.65 ± 4.16 mm. All patients were evaluated for meckel diverticulum and none had it. Appendectomy was performed to 19 (95%) patients and partial resection of caecum with appendectomy was performed to 1 (5%) patient.

Histopathological examination of the specimens resulted as low-grade mucinous neoplasm in 9 (45%) patients, appendiceal adenoma in 6 (30%) patients, neuroendocrine tumor in 4 (20%) patients and metastases of gastric adenocarcinoma in 1 (5%) patient.

The mean hospital stay was 6.1 ± 2 days for 19 (95%) patients and were discharged without any complication. Mortality rate was 1 (5%) whose histopathological result was metastasis of gastric cancer to appendix where clinical presentation of acute abdomen was peritonitis with ileus and the patient had the history of heart attack.

Discussion

Appendiceal tumors are 0.08% of all cancers, 0.5% of all gastrointestinal tract tumors [3] and 1% of all appendectomies [4]. Even carcinoid tumors of appendix were thought to be the most common tumors of the appendix, now it is being debated at recent studies that mucinous tumors of the appendix may be more common than carcinoid tumors of the appendix [5], which the results of our study supports it. As an article debated the incidence of the appendiceal neoplasms, the incidence of the adenocarcinomas of the appendix tends to increase. Beside the same study also states that the distant disease at the time of diagnosis and controversially overall survival also tends to increase, where the mean age of the patients tends to decrease [6]. The malignant tumors of appendix are adenocarcinomas, carcinoid tumors and extremely rare stromal tumors (Figure 1 and 2). Incidence of appendiceal adenocarcinomas is 0.12/1.000.000 annually [7]. Because of the lack of patients and high-level data, no exact treatment guideline for the neoplasms of the appendix is present [8]. The treatment is usually planned according to published studies and suggestions. Beside; the malignant or benign histopathological type of the tumor is the main factor effecting the treatment plan.

Figure 1: Appendectomy specimen of neoplasm of appendix.

For the adenocarcinomas of the appendix, size is one of the most important distinguishing criteria for benign - malignant pathologies of the appendix. A mucocele diameter smaller than 2 cm is almost always benign mucocele whereas a giant mucocele is strongly suspicious for malign mucinous carcinoma [7,9]. Intact resection of the mucocele of the appendix is an important factor for the survival of the patient. Complete and intact resection of a small mucocele of appendix with mucinous adenocarcinoma histopathological diagnosis may result with complete cure where the perforation of the mucocele during resection may result in with peritoneal carcinomatosis which has poor survey.

Peritoneal carcinomatosis of the mucinous adenocarcinoma of the appendix is usually clinically/radiologically named as pseudomyxoma peritonei which has three subtypes passed as 'Disseminated peritoneal adenomucinosis (DPAM)', 'Intermediate peritoneal mucinous carcinomatosis (i-PMCA)' and 'Peritoneal mucinous carcinomatosis (PMCA)' [10-13]. Peritoneal carcinomatosis originating from appendix is usually releated with DPAM where i-PMCA and PMCA is more releated to with other organs derived peritoneal carcinomatosis such as stomach, colon, ovary etc [13]. There for peritoneal carcinomatosis of appendiceal adenocarcinomas has better survival with less liver-nodal metastasis [7] than usual peritoneal carcinomatosis especially with perioperative systemic chemotherapy [14] and cytoreductive surgery with hyperthermic intraperitoneal chemotherapy (HIPEC) [5]. For non-peritoneal carcinomatosis appendicial adenocarcinoma patients, intact resection of mucocele and completed appendectomy may be curative for < 1 cm appendical carcinomas (Figure 2).

Figure 2: Low grade appendicial mucinous neoplasms. Epithelium with low grade dysplasia is invaginating in to the appendical wall with broad front (HEx100).

Right hemicolectomy with complete mesocolic resection is recommanded for carcinomas >1 cm and is also being debated for carcinomas <1cm [7]. Moreover curative radical approach for mucocele such as right hemicolectomy with mesocolic resection or HIPEC, prophylactic HIPEC without cytoreductive surgery is also being debated for patients whom mucocele is perforated during resection and has the histopathological diagnosis of adenocarcinoma [15,16].

Carcinoid tumors of the appendix are also frequent as adenocarcinomas of appendix. Diagnosis of appendiceal carcinoid is usually at younger age than adenocarcinomas [17]. Carcinoid tumors of appendix are more likely to be diagnosed by the preoperative clinical presentations than adenocarcinomas with carcinoid syndrome. The treatment approach of carcinoid tumors of appendix is less aggressive than adenocarcinomas of appendix. Prognostic factors for the carcinoids of the appendix are; site of origin, size of the primary tumor and anatomical extent of disease [18]. Proximal localisation, size bigger than 2 cm, and caecal-mesoappendix-lymph node infiltration are bad prognosis for the carcinoids of the appendix. Histopathologically presentation of goblet cells is also bad prognosis. Decision for appendectomy or right hemicolectomy with total mesocolic approach is done according to the prognostic factors. As in adenocarcinomas of the appendix, carcinoids of the appendix also tend to act less aggressive than other organ carcinoids and a carcinoid of appendix with good prognostic factors is almost 100% curable with simple appendectomy [3].
Conclusion

The most common disease of appendix is acute appendicitis caused by appendicolitis. However malignant disease may cause or mimic appendicitis but seen rarely at clinic. Carcinoid tumors of appendix were thought to be the most common tumors of the appendix but now, mucinous tumors of the appendix is being debated to be more common as in our study results. These rare cases of appendix may cause problems both for doctor as medicolegal issues and patient as progressive disease. For this reason, histopathological results of excised appendix must be evaluated by the surgeon for the need of further operations, which is usually been passed over.

References

1. Santacroce L (2015) Appendectomy. Drugs & Diseases: Medscape.
2. Walters KC, Paton BL, Schmelzer TS, Gersin KS, Iannitti DA, et al. (2008) Treatment of appendiceal adenocarcinoma in the United States: Penetration and outcomes of current guidelines. Am Surg. 74: 1066-1068.
3. Appendix Cancer: Overview. Cancer.Net
4. McGory ML, Maggard MA, Kang H, O’Connell JB, Ko CY (2005) Malignancies of the appendix: Beyond case series reports. Dis Colon Rectum 48: 2264-2271.
5. Shaib WL, Goodman M, Chen Z, Kim S, Brutcher E, et al. (2015) Incidence and Survival of Appendiceal Mucinous Neoplasms: A SEER Analysis. Am J Clin Oncol.
6. Townsend CM, Beauchamp RD, Evers BM, Mattoc KL (2012) The Biological Basis of Modern Surgical Practice. Sabiston: Textbook of Surgery, Elsevier Saunders Company, Canada.
7. NCCN Guidelines, Colon Cancer V 2.2016.
8. Dhage-Ivatury S, Sugarbaker PH (2006) Update on the surgical approach to mucocele of the appendix. J Am Coll Surg 202: 680–684.
9. Bradley RF, Stewart JH, Russell GB, Levine EA, Geisinger KR (2006) Pseudomyxoma peritonei of appendiceal origin: a clinicopathologic analysis of 101 patients uniformly treated at a single institution, with literature review. Am J Surg Pathol 30: 551–559.
10. Carr NJ, Arends MJ, Deans GT, Sobin LH (2000) Adenocarcinoma of the appendix In: Hamilton SR and Aaltonen LA eds. WHO Classification of tumours, Pathology and genetics. Tumours of the digestive system. IARC press, Lyon.
11. Ronnett BM, Zahn CM, Kurman RJ, Kass ME, Sugarbaker PH, et al (1995) Disseminated peritoneal adenomucinosis and peritoneal mucinous carcinomatosis: a clinicopathologic analysis of 109 cases with emphasis on distinguishing pathologic features, site of origin, prognosis, and relationship to pseudomyxoma peritonei. Am J Surg Pathol 19: 1390–1408.
12. Bruin SC, Verwaal VJ, Vincent A, van’t Veer LJ, van Velthuysen ML (2010) A clinicopathologic analysis of peritoneal metastases of colorectal and appendiceal origin, Ann Surg Oncol 17: 2330–2340.
13. Lieu CH, Lambert LA, Wolff RA, Eng C, Zhang N, et al. (2012) Systemic chemotherapy and surgical cytoreduction for poorly differentiated and signet ring cell adenocarcinomas of the appendix. Ann Oncol 23: 652–658.
14. Honoré C, Caruso F, Dartigues P, Benhaim L, Chirica M, et al. (2015) Strategies for Preventing Pseudomyxoma Peritonei After Resection of a Mucinous Neoplasm of the Appendix. Anticancer Res 35: 4943–4947.
15. Connor J, Hanna GB, Frizelle FA (1998) Retrospective clinicopathologic analysis of appendiceal tumors from 7,970 appendectomies. Diseases of the Colon and Rectum, 41: 75–80.
16. Ronstad O (2003) Prognostic indicators for carcinoid neuroendocrine tumors of the gastrointestinal tract. J Surg Oncol 89: 151–160.