

Case Analysis

Incidental Appendectomy is Unnecessary in Colorectal Surgery: The Experience of a Single Surgeon in a Single Center

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Key Words

Incidental appendectomy;

Colorectal surgery

Purpose. Incidental appendectomies are frequently done during primary colorectal surgery. The benefits and possible adverse side effects of an incidental appendectomy lack evidence; thus, the procedure is controversial. We reviewed the 25-year experience of one specific surgeon in a single center by analyzing the benefits and possible complications, especially adhesion ileus, of incidental appendectomy.

Methods. Medical records from 1987 to 2011 were retrospectively analyzed. Emergency operations and right-side colectomies were excluded.

Results. We enrolled 701 patients of elective colorectal surgeries (mean age: 63.3 ± 12.2 years old); 106 patients had undergone an incidental appendectomy. There were no significant differences in gender, age, or diagnosis between patients with or without elective appendectomies. There were no significant increase of ileus or decrease it.

Conclusion. Incidental appendectomy is a safe procedure without additional risks. It will not increase postoperative ileus, but neither will it decrease the already low incidence of appendicitis after colorectal surgery; therefore, incidental appendectomy did not prove beneficial.

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Is appendectomy during colorectal surgery a good procedure? There are few published articles on this topic. Synchronous neoplasms of the appendix were found in 4.1% of 169 patients undergoing an incidental appendectomy during colorectal cancer resection.¹ Therefore, Khan et al.¹ suggested that incidental appendectomy was justified to eliminate future appendicitis or neoplasms. Lohsiriwat et al.² reported a 0.3% incidence of synchronous primary appendiceal neoplasm and a 1.0% secondary (metastatic) appendiceal neoplasm in patients of the right-sided colon cancer.

However, Exner et al. found no clinical relevance between CRC and appendiceal neoplasms in patients given an incidental appendectomy.³ Incidental appendectomy during urological or gynecological surgery unnecessary because the risk of subsequent appendicitis is extremely low.⁴

Does incidental appendectomy increase postoperative complications? The literature generally agrees that it does not increase postoperative complications such as infections.^{3,6} We reviewed the 25-year experience of one surgeon at National Cheng Kung Univer-

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sity Hospital (NCKUH) by analyzing the benefits and possible complications, especially adhesion ileus, of incidental appendectomies during colorectal surgery.

Materials and Methods

We retrospectively reviewed medical records from 1987 to 2011 and identified 789 recruited patients who had undergone major colorectal surgery by a surgeon. We also excluded emergency surgeries, patients who had undergone an appendectomy before their major colorectal surgery, and 88 patients who lost to follow-up. Pathological diagnoses, clinical symptoms, current medication, and operative records of the remaining 701 patients were reviewed. The χ^2 test or Fisher's Exact test was used to compare categorical variables. SPSS 19.0 for Windows (SPSS, Chicago, IL, USA) was used for all statistical analyses. Significance was set at $p < 0.05$.

Results

The mean age of the 701 patients enrolled was 63.3 ± 12.2 years old. 391 (55.8%) were male (Table 1). The pathological diagnosis were colorectal carcinoma ($n = 694$; 99%), colo-visceral fistula ($n = 4$), chordoma ($n = 1$), ovarian carcinoma with colon invasion ($n = 1$), and leiomyosarcoma ($n = 1$). The types of operation included anterior resection/low anterior resection ($n = 518$), left-side colectomy ($n = 59$), abdomino-perineal resection ($n = 89$) and Hartmann's procedure ($n = 35$). Incidental appendectomy was done in 106 (15.1%) cases. There were no significant differences in gender, age, or diagnosis between the groups with and without incidental appendectomy (Table 2). Postoperative ileus occurred in 268 (38.2%) patients, but the difference between groups was not significant: with incidental appendectomy 39.6% (42/106); without incidental appendectomy 38.0% (226/595) ($p = 0.37$).

Only one patient, a 69-year-old man developed acute appendicitis 5 months after a low anterior resection for rectal adenocarcinoma. The final pathological

diagnosis was simple appendicitis. In our series, the incidence of subsequent appendicitis was 0.17%.

Discussion

Incidental appendectomy is a simple, low-cost, and low-morbidity procedure. Usually, it takes a very short time of about 3-10 minutes. Theoretically, there is a possibility of postoperative leakage, but this did not occur in any of our cases. In the literature review, there were no significant differences in the length of hospital stay or postoperative complications between groups that did

Table 1. Demographic data of the patients ($n = 701$)

Demographic data	n	%
Gender (male/female)	391/310	55.8/44.2
Mean age \pm SD (years)	63.3 ± 12.2	
Pathological diagnosis		
Colonic adenocarcinoma	694	99.0
Fistula ¹	4	0.6
Chordoma	1	0.1
Ovarian carcinoma	1	0.1
Leiomyosarcoma	1	0.1
Surgical procedure		
Hartmann's procedure	35	5.0
Left hemicolectomy	59	8.4
APR	89	12.7
AR/LAR	518	73.9
Incidental appendectomy		
Yes	106	15.1
No	595	84.9

SD: standard deviation; APR: abdominoperineal resection; AR: anterior resection; LAR: low anterior resection.

¹Diverticulitis-related colovaginal or colo-bladder fistula.

Table 2. Subgroup comparison and long-term result

Basic information	Incidental appendectomy	No appendectomy	<i>p</i>
Number of patients	106	595	N/A
Male/female	56/50	335/260	0.56
Age (years)	62.4 ± 12.1	63.8 ± 12.0	0.16
Malignancy	104 (98.1%)	590 (99.2%)	0.29
Long term medication ¹	42 (39.6%)	226 (38.0%)	0.37
Ileus needed surgical intervention	7 (6.6%)	17 (2.9%)	0.17

¹Laxatives: 62% w/w sterculia and 8% w/w frangula bark (*Normacol® Plus granules*), magnesium oxide, and sennosides.

and did not undergo an incidental appendectomy.⁷⁻⁹

Although McVay¹⁰ found, in a autopsy study in 1964, a positive correlation between appendectomy and the subsequent development of cancer, other studies^{11,12} 25 years later reported that an association between an appendectomy and the development of colorectal cancer was controversial.

Some authors have suggested doing a routine incidental appendectomy during colorectal surgery. Khan and Moran¹ found that 4.1% of patients undergoing an incidental appendectomy during colorectal cancer resection had a synchronous neoplasm of the appendix. Lohsiriwat et al.² also reported a primary appendiceal neoplasm of 0.3% and a secondary (metastatic) appendiceal neoplasm of 1.0% in patients with colorectal cancer.² Connor et al.,¹³ in a large scale retrospective analysis of 7970 incidental appendectomies at a single center, showed a high incidence rate of synchronous and metachronous colorectal cancers in all appendiceal tumors. They also found a 0.9% rate of neoplasms as well as a 0.1% rate of primary malignant appendiceal tumors. However, according to Exner et al.,³ which found only a nonsignificant trend of increased of appendiceal neoplasms, clinical relevance between remains questionable. We found no abnormal pathological findings in removed appendixes: 99% of our cases had a colorectal malignancy, but there were no appendiceal tumors nor appendiceal metastasis cases during the long-term follow-up. We conclude that an incidental appendectomy afford the patient no benefit against metastasis. The relevance of a synchronous appendiceal neoplasm and CRC is not clear for now. Therefore, we do not favor incidental appendectomies to prevent appendiceal neoplasms.

Adhesions or altered anatomy may influence the diagnosis and make the surgery more difficult, but the reported incidence of acute appendicitis in elderly patients is relatively low. Only one of our patients subsequently had appendicitis. No difficulties were encountered during the appendectomies, and no postoperative complications occurred. Neulander et al.⁴ found that an incidental appendectomy during a radical cystectomy was unnecessary and said that in the 13 departments and 26 urologists that replied to their survey of “academic centers throughout the United States”,

“9 (69%) departments and 20 (77%) individual clinicians [were] not performing routine incidental appendectomy”. Neulander et al. concluded that the risk of subsequent appendicitis was low, as did Fisher and Ross,⁵ who supported incidental appendectomy in 10- to 30-year-old patients because they have a higher incidence of acute appendicitis than do other age groups. In patients 30-50 years old, however, they recommend that incidental appendectomy should be left to the decision of the surgeon. The mean age of our patients was 63.3 years old. Theoretically, the chance of subsequent appendicitis for them is extremely low. Addiss et al.¹⁴ report that to prevent a single lifetime case of acute appendicitis in the 35- to 60-year-old population, about 166 incidental appendectomies would be required.¹⁴ For the elderly, however, many more are necessary; therefore, the cost/benefit ratio of incidental appendectomy is very low. In their retrospective case study and review of 261 incidental appendectomies done in 460 patients, Snyder and Selanders¹⁵ said that incidental appendectomies “cannot be justified” in patients older than 50.

Because all our patients underwent a laparotomy, the incidence of adhesions was high. Most patients, however, needed only medical treatment. Only 24 patients (3.4%) required additional surgical intervention. Our reoperation rate was lower than those we found in our literature review. OuaiSSI et al.¹⁶ reported a high incidence of adhesions (67-93%) after a lower abdominal laparotomy. In our study, we used one specific surgeon’s data to reduce surgical-skill-related bias. We also excluded emergency operations; therefore, the adhesion rate was lower than average. In the reintervention group, seven patients had a previous incidental appendectomy. The incidence of postoperative adhesions was not significant. We reviewed the operative records of all patients and found no adhesions over the right lower quadrant. We hypothesized that an incidental appendectomy would not increase the risk of adhesions.

Limitations

Our study has some limitations. The patient popu-

lation is small, and the study uses data from only one specific surgeon. However, this study design reduces the bias of the surgical skills of different physicians. Complications, especially adhesion ileus, may be related to surgical skill.

Conclusion

In our study, incidental appendectomy was a simple and safe procedure during colorectal surgery. There were no complications related to incidental appendectomy. Even in long-term follow-up, there was no significant difference in the incidence of ileus between the incidental appendectomy and non-appendectomy groups. Incidental appendectomy did not significantly increase the adhesion risk; therefore, incidental appendectomy is a relatively safe additional procedure for patients having a colorectal operation. Incidental appendectomy is relatively not beneficial to patients. First, the pathological finding of incidental appendectomy did not reveal any malignancy finding. Second, the incidence of appendicitis in elderly patients is relatively low. We conclude that it is an unnecessary procedure during colorectal surgery.

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病例分析

大腸直腸手術時附帶闌尾切除是否有必要？ 單一醫師經驗分享

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目的 在以前的傳統的大腸直腸外科手術中經常施行附帶闌尾切除術，但是其必要性以及帶來的好處目前仍未有定論。我們回顧單一外科醫師 15 年的手術經驗，試著分析此術式的好處以及可能帶來的併發症

方法 我們總共回顧過去 15 年的病例，分析了 701 個病人。包括比較病人的基本資料、手術相關的資料、及長期追蹤的臨床資料。

結果 病患若接受附帶闌尾切除術並不會增加術後併發症的機率，包含長期腸沾黏併發症也沒有影響。而附帶闌尾切除術並不會有預防將來急性闌尾炎的效果。

結論 附帶闌尾切除術是一個相當簡單而且安全的手術，對於術後腸沾黏的發生率並不會增加。但是依我們的經驗，因為老年患者發生急性闌尾炎的機率本來就相當低，附帶闌尾切除術也不會有預防急性闌尾炎的好處。

關鍵詞 附帶闌尾切除術、大腸直腸外科手術。