Original Article

Clinical Appearance and Surgical Treatment of Colonic Lipomas: Shuang-Ho Hospital Experience

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Key Words
Colon;
Lipoma;
Intussusception

Background. Colonic lipoma is an uncommon benign non-epithelial neoplasm, which may mimic colonic malignancy. With limited data on this pathology, we evaluated the clinical appearance and surgical management of colonic lipoma.
Methods. Fourteen patients with colonic lipomas from July 2008 to December 2020 were reviewed. Patients were divided into two groups, elective surgery group and emergency surgery group, and analyzed these data.
Results. The mean age of all patient was 64.7 years. Symptoms were noted in 11 patients and 3 patients were asymptomatic. Half of patients had colonic lipoma located in the cecum, four in the transverse colon, one in the descending colon, and two in the sigmoid colon. Nine patients underwent elective surgery and five underwent emergency surgery. The tumor size is larger in the emergency group than in the elective group (5 ± 1.6 cm vs. 3.5 ± 0.9 cm, $p < 0.01$), and colonic intussusception was present in all emergency group patients ($p < 0.01$). Univariate and multivariate analysis showed that tumor size larger than 5 cm and intussusception are risk factors for colonic lipoma causing emergency surgery.
Conclusions. Tumor size larger than 5 cm and bowel intussusception are risk factors for colonic lipoma causing emergency surgery.
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Lipomas may occur in any part of the gastrointestinal tract but most commonly in the colon, accounting for 65%-75% of gastrointestinal lipomas.[1] The incidence of colonic lipoma in autopsy ranges between 0.2%-4.4%.[2] Lipomas are the second most common benign tumor of the colon after adenomatous polyps. Most colonic lipomas are asymptomatic, smaller than two centimeters, and are often incidentally found during colonoscopy, surgery, or autopsy.[3,4] However, large colonic lipomas are more likely to cause symptoms, such as abdominal pain, lower gastrointestinal bleeding, bowel obstruction, or intussusception.[5]

It is challenge to make accurate diagnosis before surgery because of the low incidence of colonic lipoma and its varied symptoms.[6-9] In this study, we retrospectively evaluated and analyzed the clinical characteristic and outcome of surgical treatment for colonic lipoma.

Materials and Methods

The medical records of all patients received colon

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resection at Taipei Medical University Shuang-Ho Hospital from July 2008 to December 2020 were reviewed. The inclusion criteria was lipoma which diagnosed from pathological report and patients with other diagnosis were excluded. We evaluated the clinical features of the patients from medical records, symptoms, duration of symptoms, surgical method, tumor size, tumor type, and their outcomes. Patients were divided into two groups: elective surgery group and emergency surgery group. Emergency surgery is defined as patients undergoing surgical treatment within 24 hours of admission from the emergency department. Tumor size and tumor type in this study was according to pathological report and operation note. Tumor with a stalk and protruding into bowel lumen was defined as pedunculated type and tumor with a wide base without a stalk was defined as sessile type.

Quantitative variables were presented as the mean and standard deviation. Differences in the patient's baseline characteristics were compared with Student's t-test and Chi-squared test (or Fisher's exact test, if necessary) for patients categorized into elective surgery and emergency surgery groups. All statistical tests were two-tailed, and a $p < 0.05$ was considered statistically significant.

Results

Fourteen patients were diagnosed as colonic lipoma. The presenting clinical picture of these patients is shown in Table 1. The mean age of these patients was 64.7 years (range, 38-87 years). The male-to-female ratio was 1:1. Nine patients underwent elective surgery and five underwent emergency surgery for the colonic lesion. The mean size of the colon lipomas was 4.2 cm (range, 2.5-7.5 cm). The pedunculated type colon lipoma was diagnosed in six patients and the rest had the sessile type. Lipoma was diagnosed by CT scan in all five emergent patients; malignant tumor, polyp, or lipoma was diagnosed in pre-operative CT scan in 9 elective patients. All nine elective patients received pre-operative colonoscopy and colon cancer was suspect in three patients whereas submucosal tumor was diagnosed in other six patients. All

Table 1. Clinical characteristics of 14 colon lipomas

Patient number	Age/ sex	Underlying disease	BMI	Symptoms	Symptoms duration	Location	Emergency operation	Cause of emergency operation	Operation method	Pre-OP diagnosis (CT)	PreOP diagnosis (Colonoscopy)	Pre-OP biopsy	Tumor size (cm)	Tumor type
1	87/M	-	20.8	Constipation	1 year	S			L. AR	Malignancy	Malignancy	Adenomatous hyperplasia	5	P
2	58/F	-	23.9	Abdominal pain	2 days	C	+	Intussusception	RH	Lipoma	-	-	6.5	P
3	87/F	CAD	25.1	Abdominal pain	1 week	T			L. segmental resection	Malignancy	Submucosal tumor	-	3.5	P
4	63/M	HTN	26.4	Bleeding	2 days	S	+	Intussusception	L. AR	Lipoma	-	-	7.5	P
5	38/M	-	24.5	Abdominal pain	2 weeks	D			LH	Lipoma	Malignancy	Chronic inflammation	4.5	Se
6	64/F	-	27.4	Nil	-	T			L. Wedge resection	Polyp	Submucosal tumor	-	2.8	Se
7	46F	-	20.3	Abdominal pain	1 day	T	+	Intussusception	RH	Lipoma	-	-	6	Se
8	59/F	-	25.8	Abdominal pain	1 week	C			Ileocecal resection	Lipoma	Submucosal tumor	-	3	P
9	38/M	-	22.6	Nil	-	C			L. RH	Malignancy	Submucosal tumor	-	2.5	Se
10	73/F	DM/HTN	23.8	Abdominal pain, Bleeding	1 month	C			L. RH	Malignancy	Malignancy	Adenomatous polyp	4.1	Se
11	72/M	DM	26.6	Nil	-	C			L. Ileocecal resection	Malignancy	Submucosal tumor	-	2.5	Se
12	76/M	DM	21.2	Abdominal pain	3 days	C	+	Intussusception	RH	Lipoma	-	-	3.2	Se
13	70/F	HTN/ autoimmune diseae	27.3	Constipation	2 months	C			Ileocecal resection	Not mentioned	Submucosal tumor	-	3.7	Se
14	75/M	HTN	21.9	Abdominal pain	1 month	T	+	Intussusception	L. RH	Lipoma	-	-	5.8	P

DM: diabetes mellitus; CAD: cardiovascular disease; HTN: hypertension; S: sigmoid colon; C: cecum; T: transverse colon; D: descending colon; L: laparoscopic; AR: anterior resection; RH: right hemicolectomy; LH: left hemicolectomy; P: pedunculated; Se: Sessile; Pre-OP: pre-operative; N/A: no analysis; BMI: body mass index.

three patients who suspect colon cancer by colonoscopy underwent pre-operative biopsy and the results were adenomatous hyperplasia, chronic inflammation and adenomatous polyp.

The most common presenting symptom was abdominal pain and it was seen in eight patients. Constipation and lower gastrointestinal bleeding were noted in some of these patients; however three patients had asymptomatic colonic lesions that were found incidentally by colonoscopy examination and these three patients received surgical treatment due to unclear pre-operative diagnosis. Five patients underwent emergency surgery because of acute abdominal pain that resulted from colonic intussusception. Half of our patients had their colonic lipoma located in the cecum (n = 7), four in the transverse colon, one in the descending colon, and two in the sigmoid colon. All fourteen patients had no post-operative complication and recovered smoothly after operation.

In the elective surgery group (n = 9), four patients were male and five were female, with a mean age of 65.3 years and a mean tumor size of 3.5 cm. Three patients had pedunculated colonic lipoma and six had the sessile type. In the emergency surgery group (n = 5), three patients were male and two were female, with a mean age of 63.6 years and mean tumor size was 5.0 cm, which is larger than the elective group ($p < 0.01$), and all had colonic intussusception ($p < 0.01$). Pedunculated colonic lipoma was noted in three patients and the sessile type lipoma was noted in the other two patients. There was no difference in age, gender, duration of symptoms, tumor type, and tumor location between the two groups as shown in Table 2.

Table 3 demonstrated risk factors for colonic lipoma causing emergency operation. Tumor size larger than 5 cm and intussusception are both risk factors in univariate and multivariate analysis.

Discussion

Colonic lipomas are benign colonic lesions of unknown etiology with no malignant potential; however, when examined histologically, some lipomas have atypical "pseudosarcomatous" features.[10] Regarding sex distribution, female predominance (66.7%) and equal sex distribution have been reported.[1] The most common age is the fifth or sixth decades of life. The most common site of colonic lipoma is the right

Table 2. The difference between elective group and emergency group

	Elective group	Emergency group	*p*-value
Number of patients	9	5	
Sex (male/female)	4/5	3/2	0.61
Age (years)	65.3 ± 18.0	63.6 ± 12.5	0.42
Intussusception	0	5	**< 0.01**
BMI	24.9 ± 2.2	22.7 ± 2.4	0.82
Tumor size (cm)	3.5 ± 0.9	5 ± 1.6	**< 0.01**
Tumor type (Pedunculated/Sessile)	3/6	3/2	0.37
Location			0.7
Ceceum	5	2	
Transverse colon	2	2	
Descending colon	1		
Sigmoid colon	1	1	

Descriptive were expressed by mean ± standard deviation.

Table 3. The univariate and multivariate analysis of risk factors for emergency operation of colonic lipoma

	Univariate		Multivariate	
	OR	*p* value	OR	*p* value
Sex				
Male	1	0.58	1	0.61
Female	0.53		0.27	
Age				
≥ 65	1	0.58	1	0.61
< 65	0.53		0.27	
BMI				
≥ 25	1	0.20	1	0.23
< 25	0.2		0.62	
Tumor type				
Pedunculated	1	0.33	1	0.37
Sessile	0.33		0.86	
Location				
Right side	1	0.92	1	0.93
Left side	0.88		0.10	
Intussusception				
Yes	1	< 0.01	1	< 0.01
No	< 0.01		< 0.01	
Tumor size				
< 5 cm	1	0.01	1	< 0.01
≥ 5 cm	32		10.8	

side colon, especially in the ascending colon near the ileocecal valve (45%-75%).[8,10] Ten percent patients have multiple colonic lipomas, especially in the cecum.[11] In this study, half of the patients (n = 7) had colonic lipomas at the cecum and 11 (78.5%) at the right colon. This result is consistent with previous research.[8,10]

Microscopically, 90% of colonic lipomas are located in the submucosal layer, and numerous fibrous intervals can be observed in the adipose tissue, resulting in the lobulated appearance of lipomas. Submucosal colonic lipomas usually grow toward the intestinal lumen and the overlying mucosa may become atrophy, ulceration, or necrosis. Another 10% of patients with colonic lipoma have the subserosal type that originates from the appendiceal epiploicae and grows toward the peritoneal cavity.[12] Compared to the subserosal type lipoma, the submucosal type lipoma grows into the bowel lumen and can easily produce symptoms or be detected by colonoscopy. Such characteristics also appeared in this study; even though their appearance was sessile or pedunculated, all the patients had the submucosal type.

The mean size of the reported colonic lipomas was ranged from 0.35 cm to 10 cm and only 30% of them exceeded 2 cm in diameter.[10] Most colonic lipomas do not cause obvious symptoms, and the size of the lipoma is the main predictor of the development of symptoms.[10] Colonic lipomas < 2 cm are usually asymptomatic, those > 2 cm are probably symptomatic, and lesions > 4 cm become symptomatic in 75% of cases.[13] Symptoms may vary depending on the location and size of the tumor; these include abdominal pain, changes in bowel habits, gastrointestinal bleeding, bowel obstruction, perforation, and intussusception. Large lesions can develop superficial ulcers, leading to bleeding and producing a varied combination of symptoms.[8] In our study, all tumors were > 2 cm in diameter. Although three patients were asymptomatic, their tumor was < 3 cm and between 2.5-2.8 cm on colonoscopy.

Colonic intussusception is a rare condition in adults, representing 1% of bowel obstructions. Ninety percent of adult intussusceptions have an organic cause and 60% are caused by neoplasms (60% malignant and 24%-40% benign).[14] Among malignant tumors, primary adenocarcinoma is the most common cause of intussusception in adults, and colonic lipoma is the most common benign tumor causing intussusception in adults, accounting for about 3.4% of all adult intussusceptions.[15,16] Most of the reported intussusceptions caused by colonic lipoma were pedunculated,[5,17] and it may be related to the mechanism of intussusception. In this study, sessile type colonic lipoma can also cause intussusception, and interestingly, all emergency surgeries for colonic lipoma resulted from intussusception (Fig. 1). Also, large tumors are more likely to cause intussusception, and tumors are significantly larger in the emergency group than the elective group in this study.

Various imaging modalities can aid diagnose colonic lipomas. Barium enema may demonstrate a filling defect, and the lesion may exhibit a lobulated appearance;[6,18] however, these features are nonspecific, and the lesion may be mistaken for another type of tumor. Computed tomography and magnetic resonance imaging are the preferred methods to diagnose because their imaging characteristics are relatively typical for adipose tissue and can provide rapid diagnosis.[7,18] However, diagnosis will become difficult when

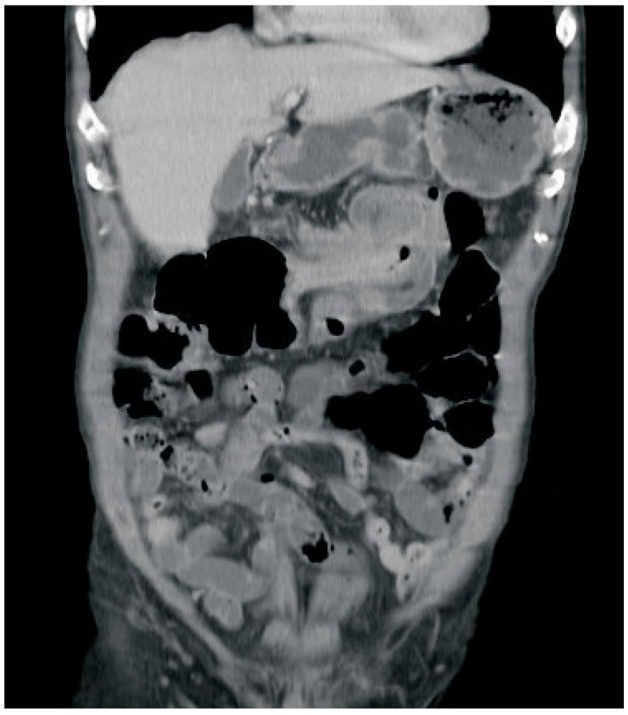

Fig. 1. The computed tomography showed intussusception at transverse colon in patient 14.

intussuscepted lipoma does not exhibit normal fat density, and it may have a heterogeneous appearance, reflecting the degree of infarction and fat necrosis present at the time of image evaluation.[17] Since most colonic lipomas are submucosal, colonoscopy can directly visualize the tumor; thus, preoperative diagnosis mainly depends on colonoscopy. The typical appearance under colonoscopy is smooth, round, slightly yellowish polyps of variable size, with or without a stalk.[19] Also, biopsy probing also helps the diagnosis, including the "cushion sign"[20] (probing the polyp with a closed biopsy forceps will often yield a pillow-like indentation), "tenting effect"[20] (grasping the overlying mucosa with the biopsy forceps presents a tent-like appearance), and the "naked fat sign"[16] (biopsies may result in an extrusion of yellowish fat). Although colonoscopy is reliable for diagnosing typical types of colonic lipoma, if the lesion has ulceration or irregular shapes, it will be mistaken for a malignant tumor (Fig. 2).

Endoscopic resection of colonic lipomas > 2 cm is controversial. Some studies have revealed that the removal of lipomas > 2 cm in diameter is associated with a greater risk of perforation or hemorrhage.[19,21] Conversely, some authors have reported that large pedunculated or sessile lesions can be removed without perforation.[18,22] Asymptomatic colonic lipomas of less than two centimeters can be observed.[14]

Surgical resection is controversial in lipoma ranged from 2 cm to 4 cm,[1,4,17,23] if patients have symptoms or unclear diagnosis after imagine and colonoscopy examination, surgical resection is indicated in these patients. Surgical intervention should be considered in the following: (1) colonic lipomas > 4 cm in diameter; (2) an unclear preoperative diagnosis; (3) lesions with significant symptoms, especially the appearance of intussusception; (4) muscular layer or serosal layer involvement; and (5) lesions that cannot be radically removed under colonoscopy.[4] Surgical procedures including local excision, segmental resection, hemicolectomy, or subtotal colectomy. The choice of any of the above mentioned surgical interventions mainly depends on the lipoma size, location, and the presence or absence of definite preoperative diagnosis or disease complications. Although colonic lipoma is a benign tumor, intraoperative frozen sections are required for patients with unclear pre-operative diagnosis or to ensure negative surgical margins.[4]

Fig. 2. The colonoscopy showed a tumor with ulceration and protruding into bowel lumen at sigmoid colon in patient 1.

In conclusion, colonic lipomas are benign colonic tumors with varying symptoms depending on the size and tumor location. In our study, the acute abdomen requiring surgical treatment caused by colonic lipoma resulted from intussusception, and the tumors with intussusception are significantly larger than those without intussusception.

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原　著

結腸脂肪瘤的臨床表現及手術治療：雙和醫院經驗

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背景　結腸脂肪瘤是一種少見的良性非上皮腫瘤，臨床表現常與結腸惡性腫瘤相似。由於結腸脂肪瘤臨床的經驗有限，本研究旨在評估結腸脂肪瘤的臨床表現和手術治療結果。

研究方法　2008 年 7 月至 2020 年 12 月共有 14 例結腸脂肪瘤病患接受手術治療。我們將患者分為擇期手術組和急診手術組，並對這 14 例患者的資料進行分析。

結果　這 14 名患者的平均年齡為 64.7 歲。11 名患者有症狀表現，3 名患者無症狀。一半患者的結腸脂肪瘤位於盲腸，四例位於橫結腸，一例位於降結腸，兩例位於乙狀結腸。9 個病患接受了擇期手術，5 名病患接受了結腸脂肪瘤的緊急手術。急診組腫瘤明顯比擇期組大 (5 ± 1.6 cm vs. 3.5 ± 0.9 cm, $p < 0.01$)，所有急診組得病患均有結腸腸套疊的表現 ($p < 0.01$)。單變相及多變向分析皆顯示腫瘤超過五公分及腸套疊都是結腸脂肪瘤造成急診手術的危險因子。

結論　結腸脂肪瘤超過五公分以及腸套疊都是結腸脂肪瘤造成急診手術的危險因子。

關鍵詞　結腸、脂肪瘤、腸套疊。