Virchows Archiv (2019) 474:309–313
https://doi.org/10.1007/s00428-018-2489-8

ORIGINAL ARTICLE

Clinicopathologic analysis and subclassification of benign lipomatous lesions of the colon

Samuel L. Barron[1] · Raul S. Gonzalez[2,3]

Received: 20 September 2018 / Revised: 25 October 2018 / Accepted: 14 November 2018 / Published online: 19 November 2018

Abstract

Benign lipomatous lesions of the colon are generally asymptomatic. A few histologic subtypes are appreciable, but this is poorly studied. We categorized 404 benign colonic lipomatous lesions as vascular lipoma, fibrolipoma, mucosal lipoma, or lipoma not otherwise specified (NOS). We compared patient age and sex, tumor site and size, symptoms, whether the lesion was flat or pedunculated, and whether an overlying epithelial lesion was present. Symptomatic cases (4%) were larger on average than non-symptomatic ones (mean 3.70 cm vs. 1.30 cm, $P < 0.0001$). Lipoma NOS was commonly right-sided ($P < 0.001$) and commonly had an associated epithelial proliferation ($P = 0.0004$). Vascular lipomas were larger (mean 1.93 cm, $P < 0.0001$) than other types; they were the most commonly symptomatic, though this was not statistically significant. Mucosal lipomas were smallest on average (mean 0.48 cm) and were not associated with any clinical syndromes. Some colonic lipomas are non-incidental. Vascular lipomas are more often large, while lipomas NOS more often have an associated epithelial proliferation. Colonic lipomas are generally sporadic.

Keywords Colon · Lipoma · Benign · Classification

The vast majority of colonic polyps are epithelial, such as tubular adenoma and hyperplastic polyp. As mesenchymal polyps are much less common and generally less clinically relevant, they have received less attention in the literature. The most common of these is lipoma, which represents a localized benign fatty growth of the mucosa or submucosa. These lesions are typically small and benign, causing no symptoms and discovered incidentally during colonoscopy.

Most case series of colonic lipomas are from the surgical literature prior to the year 2000 [1–4], with pathology series primarily examining autopsy cases [5]. With the increase in screening colonoscopy since 2001 [6], incidental colonic lipomas are now often encountered in biopsy specimens. Colonic liposarcomas remain much rarer, with fewer than 20 cases reported in the literature [7].

A few recent studies have noted particular clinicopathologic aspects of colonic lipomas, such as the observation that they often underlie a sessile serrated adenoma/polyp [8, 9]. Additionally, intramucosal lipomas have frequently been observed in patients with Cowden syndrome [10, 11]. Some authors have also made a vague attempt to subclassify submucosal colonic lipomas, as seen in case reports of colonic "angiolipoma" [12] and "fibrolipoma" [13]. Still, a large, systematic review of benign colonic lipomas has not been undertaken, prompting us to perform the current study.

Materials and methods

Patient cohort

With appropriate Institutional Research Board approval, we searched the pathology departmental archives of the University of Rochester for specimens from 1998 to 2016 that showed a benign colonic lipomatous lesion that was observed as a discrete, distinct lesion on colonoscopy or gross examination. We excluded cases without available original hematoxylin- and eosin-stained slides, cases that did not appear to represent a clinically or grossly identifiable discrete

✉ Raul S. Gonzalez
rgonzal5@bidmc.harvard.edu

[1] University at Albany, Albany, NY, USA

[2] Department of Pathology and Laboratory Medicine, University of Rochester, Medical Center, Rochester, NY, USA

[3] Present address: Department of Pathology, Beth Israel Deaconess Medical Center, 330 Brookline Avenue, Boston, MA 02215, USA

mass lesion, cases showing benign fat but not specifically identified as a lesion, and cases where the histologic interpretation was in doubt upon re-review (including cases with scant [< 0.2 cm] adipose tissue, cases representing pseudolipomatosis [14], and cases representing ileocecal valve lipohyperplasia [15]).

For each case meeting inclusion criteria, we recorded the following data: patient age, sex, and symptoms; lesion site, size (endoscopically or grossly, as applicable), endoscopic architecture (flat/sessile or polypoid/pedunculated, where applicable), and histologic appearance; and whether any epithelial lesion (e.g., tubular adenoma) was microscopically associated with the lipomatous lesion. Based on histology, the cases were divided into four groups: vascular lipoma (more than 30% of the lesion composed of large or ectatic blood vessels), fibrolipoma (more than 30% of the lesion composed of fibrous bands), mucosal lipoma (any amount of benign fat predominantly or entirely situated within the colonic mucosa), and lipoma not otherwise specified (NOS) (benign adipose tissue without particular distinction). This categorization was performed via eyeball estimation by one of the authors (SLB) and subsequently reviewed by another author (RSG); disagreements were resolved via in-person consensus.

Statistical analysis

Clinicopathologic features were compared across the four groups, using the Kruskal–Wallis test for continuous variables (patient age and lesion size) and Fisher's exact test for categorical variables (all others). Fisher's exact test was also used to compare flat and pedunculated polyps with regard to the presence of an associated epithelial proliferation, and the unpaired *t* test was used to compare size of symptomatic and asymptomatic polyps. Fisher's exact test was performed using Astatsa software online (http://astatsa.com, Astatsa, Toronto, ON, last accessed 09/12/2018), and the other tests were performed using VassarStats software online (http://vassarstats.net, VassarStats, Poughkeepsie, NY, last accessed 09/10/2018). *P* values of < 0.05 were considered statistically significant.

Results

Clinical characteristics

The study cohort included 404 lesions from 395 patients, which came from 339 biopsy/polypectomy specimens and 65 resection specimens; six patients had polyps removed during more than one colonoscopy at different points in time.

Information on clinical presentation was available for 281 cases overall; among these, the vast majority (246; 88%) were discovered incidentally, usually during screening colonoscopy. The average age of the patients was 63 years, with a slightly higher occurrence in females (217 to 187). While most cases were discovered incidentally during colonoscopy or surgery for unrelated reasons, the lipomatous lesions were the apparent reason for medical management in 30 cases. In most of these cases (19; 63%), this simply represented prior identification of the relatively asymptomatic lipoma. However, some patients experienced obstruction/intussusception (4; 13%), rectal bleeding (4; 13%), abdominal pain (1; 3%), rectal pressure (1; 3%), and a prolapse-like sensation (1; 3%). Sixteen cases in our study (4%) were 4.0 cm or larger, with seven of these causing symptoms (including the largest, which was 7.0 cm). Symptomatic lipomas had a mean size of 3.70 cm, compared to 1.30 cm for asymptomatic ones ($P < 0.0001$).

Colonoscopy reports were available for 216 of the 339 cases removed by biopsy; among them, 71 (33%) were clinically identified as a lipoma. Operative notes were available for 63 of the 65 surgical cases; five of these cases (8%) were clinically suspected to represent lipoma, including three where the lipoma was the lesion of interest rather than an incidental finding.

No patients were known to have a genetic syndrome (e.g., Cowden syndrome), and no patients underwent workup for any syndrome following diagnosis of their colonic lipoma.

Differences among subtypes

As summarized in Table 1, significant clinicopathologic differences were identified among the four histologic groups. Vascular lipoma ($n = 24$ [6%]; Fig. 1a) was generally the largest lesion type (mean 1.93 cm, $P < 0.0001$); it was also the most commonly symptomatic, though this was not statistically significant ($P = 0.12$). Fibrolipoma ($n = 57$ [14%]; Fig. 1b) was relatively unremarkable with regard to clinicopathologic comparisons. Mucosal lipomas ($n = 24$ [6%]; Fig. 1c) were smallest on average (mean 0.48 cm); none of the associated patients had a clinically documented syndrome. By far the most prevalent subtype, lipoma NOS ($n = 299$ [74%]; Fig. 1d) was most commonly found in females ($P = 0.041$), was most commonly located in the right colon ($P < 0.001$), was most commonly flat/sessile, rather than polypoid/pedunculated ($P = 0.013$), and was mostly likely to be associated with an overlying epithelial lesion ($P = 0.0004$; see below).

A few other noteworthy histologic findings were observed. Four cases (two lipoma NOS, one vascular lipoma, and one fibrolipoma) showed overlying mucosal reactive change, generally consisting of erosion/ulceration (Fig. 2a). All four were the reason the patient received medical attention, and three were larger than 4.0 cm. Eighteen of the 24 intramucosal lipomas showed an associated spindle cell proliferation (Fig. 2b), which has recently been described in that subtype

Table 1 Clinicopathologic features of colonic lipoma subtypes

	Vascular lipoma ($n = 24$)	Fibrolipoma ($n = 57$)	Intramucosal lipoma ($n = 24$)	Lipoma NOS ($n = 299$)	*P* value
Average age (years)	64	62	60	63	0.34
Average size (cm)	1.93	0.91	0.48	1.24	< 0.0001
Sex (male/female)	15 M: 9 F (63%: 37%)	32 M: 25 F (56%: 44%)	14 M: 10 F (58%: 42%)	126 M: 173 F (42%: 58%)	0.041
Site (right/left)	6 R: 16 L (25%: 75%)	13 R: 43 L (23%: 77%)	12 R: 12 L (50%: 50%)	181 R: 107 L (63%: 37%)	< 0.001
Symptomatic	3 yes, 18 no (14%: 86%)	1 yes, 38 no (3%: 97%)	0 yes, 8 no (0%: 100%)	7 yes, 206 no (3%: 97%)	0.12
Clinically identified as lipoma	4 yes, 17 no (19%: 81%)	6 yes, 32 no (16%: 84%)	0 yes, 7 no (0%: 100%)	66 yes, 147 no (31%: 69%)	0.068
Architecture (flat/pedunculated)	2 f, 7 p (22%: 78%)	9 f, 7 p (56%: 44%)	1 f, 1 p (50%: 50%)	50 f, 19 p (72%: 28%)	0.013
Associated epithelial proliferation	0 yes, 24 no (0%: 100%)	4 yes, 53 no (7%: 93%)	1 yes, 23 no (4%: 96%)	65 yes, 234 no (22%: 78%)	0.0004

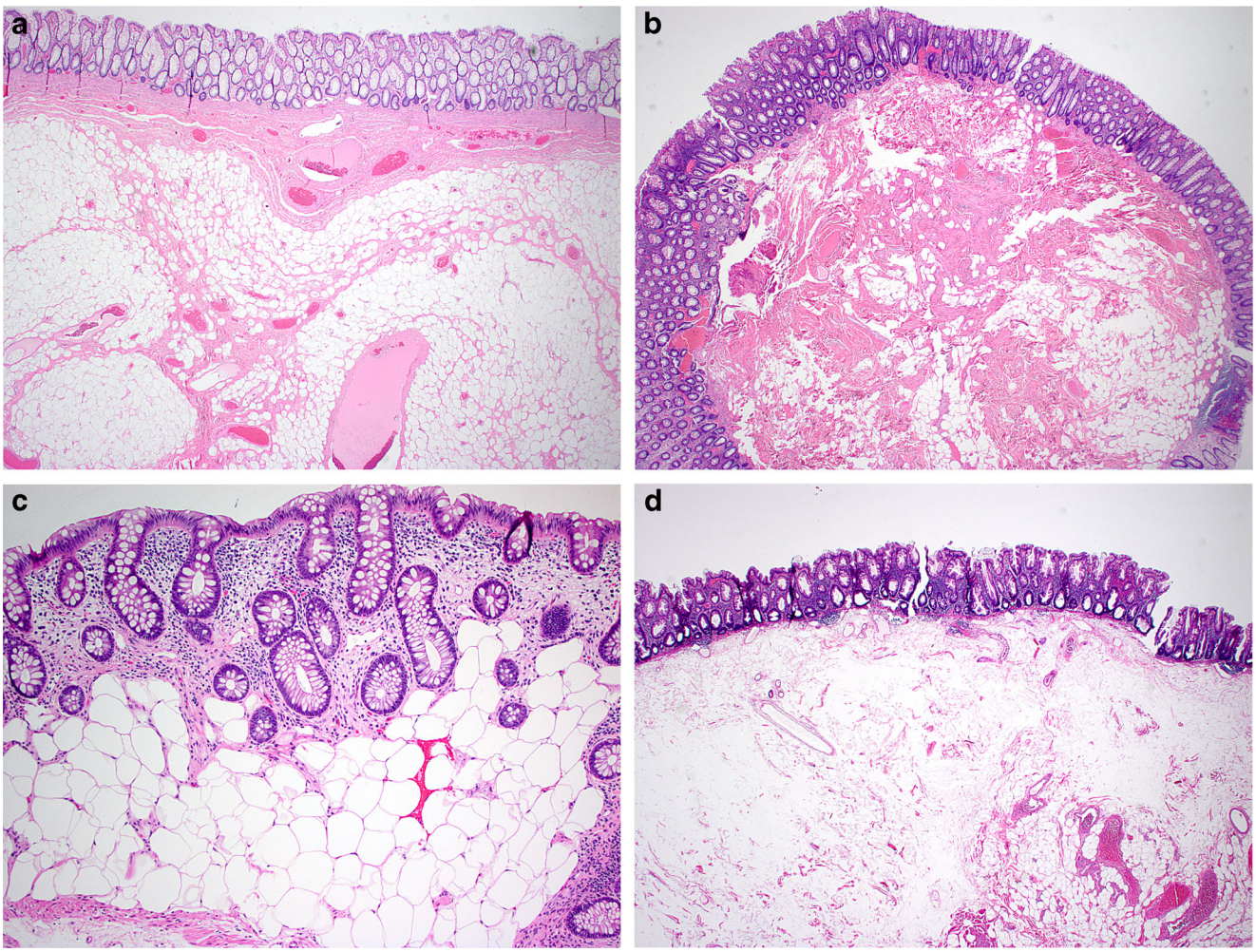

Fig. 1 **a** Vascular lipoma, with large, thick blood vessels present within submucosal adipose tissue. **b** Fibrolipoma, with short bundles and fascicles of fibrosis interspersed throughout adipose tissue. **c** Intramucosal lipoma, with adipose tissue intermingled along colonic crypts. **d** Lipoma NOS, composed predominantly of nondescript adipose tissue. A sessile serrated adenoma/polyp involves the overlying mucosa

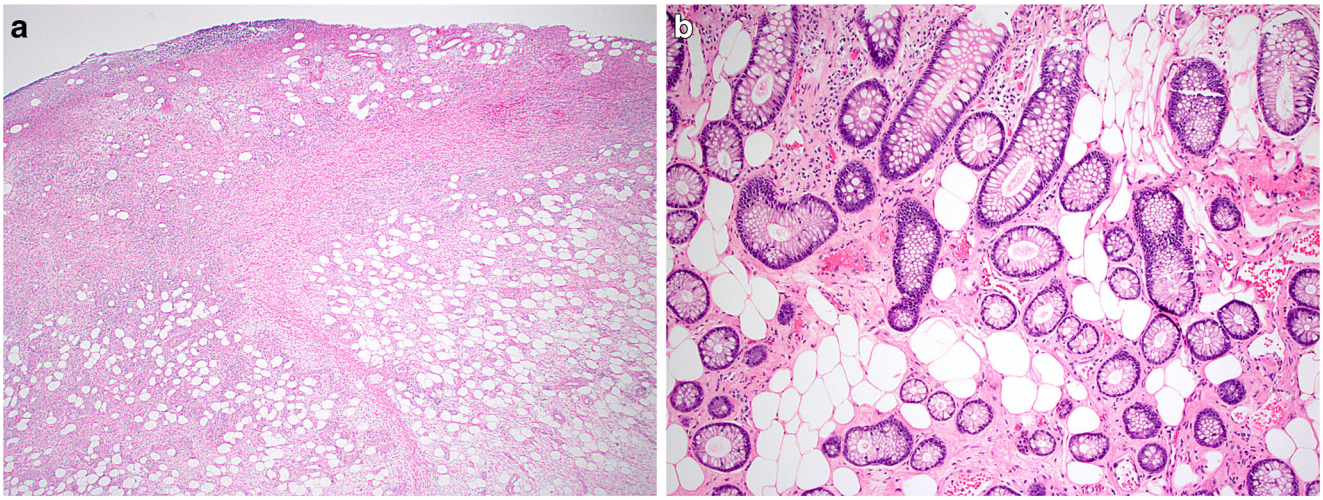

Fig. 2 **a** Ulceration of a large, symptomatic lipoma, with reactive/reparative change extending into the lesion. **b** Bland spindle cell proliferation within a colonic intramucosal lipoma

[11]. Seventy cases were associated with an overlying epithelial proliferation; these included sessile serrated adenoma/polyp (49, 70%), hyperplastic polyp (13, 19%), and tubular adenoma (8, 11%). Flat lipomas were more likely than pedunculated one to demonstrate an associated epithelial proliferation (34/62 [55%] vs. 2/34 [6%], $P < 0.0001$).

Discussion

The vast majority of colonic lipomas are incidental and harmless, with little relevance to the patient [16]. However, roughly 4% can cause symptoms, as seen in our cases that caused obstruction and/or rectal bleeding. Such manifestations have previously been reported in other patients as well [16–19]. It has been suggested that 75% of colonic lipomas measuring 4.0 cm or greater will be symptomatic [16]; our study found a somewhat lower rate, as seven of 16 cases of that size (44%) caused symptoms. Microscopically, a few of the symptomatic lipomas showed ulceration and reactive change. Pseudomalignant reactive change has rarely been described in large intestinal lipomas, with bizarre nuclei and atypical mitotic figures [20]; these features were not observed in our cases, nor were florid vascular proliferations, which have also been associated with intussuscepted colonic lipomas [21].

By subdividing the colonic lipomas in our study into four subtypes, we were able to observe statistically significant relationships between subtype and tumor size, site, architectural appearance, and risk of associated epithelial proliferation. In brief, vascular lipomas were more often large (and tended to be more often symptomatic, likely due to their size), while lipomas NOS were more often flat with an associated epithelial proliferation, mostly sessile serrated adenoma/polyp. These associations currently represent little more than observed curiosities, but future study may elucidate additional clinically important relevance to subtyping colonic lipomas.

Along these lines, it has been suggested that patients with intramucosal colonic lipomas may have Cowden syndrome. Approximately one third of the intramucosal lipomas studied by Caliskan et al. [11] came from patients with known or suspected Cowden syndrome. While none of the patients in our study with intramucosal lipomas were known to have Cowden syndrome, they did not undergo focused screening or genetic testing. No other syndromes have been proven to correlate with unusual forms of colonic lipoma, though case reports of multiple colonic lipomas in the same patient (with [22, 23] and without [24] associated gastrointestinal stromal tumors) suggest the possibility of an as-yet-undiscovered syndromic association, potentially with familial multiple lipomatosis [23]. By definition, none of the polyps in this study categorized as anything other than "mucosal lipoma" contained a component of intramucosal adipose tissue.

Of note, the term "angiolipoma" has occasionally been used in the literature to describe lipomas with a prominent vascular component in the colon [12] or stomach [25]. We instead employed the term "vascular lipoma" to avoid confusion with soft tissue angiolipoma, which is a unique and often multifocal soft tissue neoplasm [26, 27].

One limitation in this study is that the majority of specimens (84%) were sampled by biopsy or polypectomy, rather than full surgical resection. As a result, some of the lipomas may have been undersampled, potentially leading to miscategorization if a key component (e.g., fibrous bands) was underrepresented. Such a limitation can of course occur in any attempt to categorize specimens based on biopsy sampling. We strove to minimize the impact of this limitation by excluding cases with minimal tissue for evaluation (less than 0.2 cm in greatest dimension). None of the biopsied cases went on to full resection.

In summary, lipomas in the colon are common and benign, but a minority can become large and even cause symptoms, necessitating resection. They can be subtyped based on histologic appearance, which bears some relationship to their clinicopathologic presentation and may potentially suggest the presence of a genetic syndrome.

Contributions SLB reviewed the slides, collected data, and co-wrote the manuscript. RSG designed the study, reviewed selected slides, analyzed the data, and co-wrote the manuscript.

Compliance with ethical standards

This research was performed with appropriate Institutional Research Board approval. Human participants were not recruited. A Waiver of HIPAA Authorization was obtained.

Conflict of interest The authors declare that they have no conflicts of interest.

References

1. Hancock BJ, Vajcner A (1988) Lipomas of the colon: a clinicopathologic review. Can J Surg 31:178–181
2. Rogy MA, Mirza D, Berlakovich G, Winkelbauer F, Rauhs R (1991) Submucous large-bowel lipomas–presentation and management. An 18-year study. Eur J Surg 157:51–55
3. Siegal A, Witz M (1991) Gastrointestinal lipoma and malignancies. J Surg Oncol 47:170–174
4. Chung YF, Ho YH, Nyam DC, Leong AF, Seow-Choen F (1998) Management of colonic lipomas. Aust N Z J Surg 68:133–135
5. Weinberg T, Feldman M Sr (1955) Lipomas of the gastrointestinal tract. Am J Clin Pathol 25:272–281
6. Rittershaus AC, Appelman HD (2011) Benign gastrointestinal mesenchymal BUMPS: a brief review of some spindle cell polyps with published names. Arch Pathol Lab Med 135:1311–1319
7. Sawayama H, Yoshida N, Miyamoto Y, Uchihara T, Toihata T, Yagi T, Hiyoshi Y, Iwatsuki M, Baba Y, Baba H (2017) Primary colonic well-differentiated / dedifferentiated liposarcoma of the ascending colon: a case report. Surg Case Rep 3:96
8. Rex DK, Ahnen DJ, Baron JA, Batts KP, Burke CA, Burt RW, Goldblum JR, Guillem JG, Kahi CJ, Kalady MF, O'Brien MJ, Odze RD, Ogino S, Parry S, Snover DC, Torlakovic EE, Wise PE, Young J, Church J (2012) Serrated lesions of the colorectum: review and recommendations from an expert panel. Am J Gastroenterol 107:1315–1329
9. Bedeir A, Bhattacharya B, Lipoma PPS (2014) Sessile serrated adenoma/polyp, more than just a coincidence? Mod Pathol 27(Suppl 2):165A
10. Shaco-Levy R, Jasperson KW, Martin K, Samadder NJ, Burt RW, Ying J, Bronner MP (2017) Gastrointestinal polyposis in Cowden syndrome. J Clin Gastroenterol 51:e60–e67
11. Caliskan A, Kohlmann WK, Affolter KE, Downs-Kelly E, Kanth P, Bronner MP (2018) Intramucosal lipomas of the colon implicate Cowden syndrome. Mod Pathol 31:643–651
12. Wang L, Chen P, Zong L, Wang GY, Wang H (2013) Colon angiolipoma with intussusception: a case report and literature review. World J Surg Oncol 11:69
13. Yoshikane H, Hidano H, Sakakibara A, Ayakawa T, Watanabe M, Takeuchi A, Hashimoto S, Mori S (1996) Fibrolipoma of the colon with an unusual appearance. Endoscopy 28:793–794
14. Snover DC, Sandstad J, Hutton S (1985) Mucosal pseudolipomatosis of the colon. Am J Clin Pathol 84:575–580
15. Tawfik OW, McGregor DH (1992) Lipohyperplasia of the ileocecal valve. Am J Gastroenterol 87:82–87
16. Nallamothu G, Adler DG (2011) Large colonic lipomas. Gastroenterol Hepatol (NY) 7:490–492
17. Casiraghi T, Masetto A, Beltramo M, Girlando M, Di Bella C (2016) Intestinal obstruction caused by ileocolic and colocolic intussusception in an adult patient with cecal lipoma. Case Rep Surg 2016:3519606
18. Alponat A, Kok KY, Goh PM, Ngoi SS (1996) Intermittent subacute intestinal obstruction due to a giant lipoma of the colon: a case report. Am Surg 62:918–921
19. Franc-Law JM, Bégin LR, Vasilevsky CA, Gordon PH (2001) The dramatic presentation of colonic lipomata: report of two cases and review of the literature. Am Surg 67:491–494
20. Snover DC (1984) Atypical lipomas of the colon. Report of two cases with pseudomalignant features. Dis Colon Rectum 27:485–498
21. Adachi S, Hamano R, Shibata K, Yoshida S, Tateishi H, Kobayashi T, Hanada M (2005) Colonic lipoma with florid vascular proliferation and nodule-aggregating appearance related to repeated intussusception. Pathol Int 55:160–164
22. Liu X, Wilcox CM, Nodit L, Lazenby AJ (2008) Multiple gastrointestinal stromal tumors and lipomatosis. Arch Pathol Lab Med 132:1825–1829
23. Arabadzhieva E, Yonkov A, Bonev S, Bulanov D, Taneva I, Ivanova V, Dimitrova V (2015) A rare combination between familial multiple lipomatosis and extragastrointestinal stromal tumor. Int J Surg Case Rep 14:117–120
24. Santos-Briz A, García JP, González C, Colina F (2001) Lipomatous polyposis of the colon. Histopathology 38:81–83
25. Liu YJ, Karamchandani DM (2017) Gastric angiolipoma: a rare entity. Arch Pathol Lab Med 141:862–866
26. Sciot R, Akerman M, Dal Cin P et al (1997) Cytogenetic analysis of subcutaneous angiolipoma: further evidence supporting its difference from ordinary pure lipomas: a report of the CHAMP study group. Am J Surg Pathol 21:441–444
27. Hofvander J, Arbajian E, Stenkula KG, Lindkvist-Petersson K, Larsson M, Nilsson J, Magnusson L, von Steyern FV, Rissler P, Hornick JL, Mertens F (2017) Frequent low-level mutations of protein kinase D2 in angiolipoma. J Pathol 241:578–582