Ann Med Res

Current issue list available at AnnMedRes

Annals of Medical Research

journal page: www.annalsmedres.org

Colorectal sessile serrated lesion and synchronous neoplasm or polyps: An update and critical assessment analysis of 167 consecutive cases undergoing total colonoscopy and found 343 polyps

Ali Koyuncuer

University of Health Sciences, Umraniye Training and Research Hospital, Department of Pathology, Istanbul, Türkiye

ARTICLE INFO

Keywords:
Sessile
Serrated
Lesion
Polyp
Synchronous
Carcinoma

Received: Jul 08, 2022
Accepted: Aug 22, 2022
Available Online: 23.12.2022

DOI:
10.5455/annalsmedres.2022.07.209

Abstract

Aim: Sessile serrated lesions (SSL) have the potential for malignant transformation into colorectal carcinoma (CRC), which develops via the serrated pathway of carcinogenesis.

Materials and Methods: Based on colonoscopy and pathology reports, all sessile serrated lesions or polyps in the risk screening group were studied at an urban medical research center between July 2018 and July 2022. We prospectively included consecutive colorectal polyps classified as hyperplastic polyp (HP), sessile serrated lesion (SSL), traditional serrated adenoma (TSA), unclassified serrated adenoma, and synchronous neoplasm or polyp.

Results: During the 48-month study period, 167 cases of sessile serrated lesions or polyps were diagnosed. In the study, 97 (58.1%) of the patients were male, 70 were female (41.9%), and the mean age was 59.74 (± 11.1). Hematoxylin-eosin preparations were available for complete analysis for 226 SSL, and 117 had synchronous adenomatous polyps or carcinomas. Approximately 88.1% of all polyps were ≤10 mm or less in diameter. There was a significant correlation between polyp size (≤10 mm) and epithelial polyps (p=0.000). In particular, polyps detected in the sigmoid colon with the rectum were relatively larger than in other locations. The sigmoid colon and rectum were the most common locations for sessile serrated lesions in our study. There was a significant association between epithelial polyps and anatomical locations (p=0.000). The distribution of all epithelial polyps was as follows; HP was the most frequently observed epithelial polyp with 57.7% (194 polyps), SSL was 6.8% (23 polyps), and TSA was 2.1% (7 polyps), unclassified serrated adenoma was 0.6% (2 cases), synchronous conventional was seen in 31% (104 polyps) of SSL or polyps, and carcinoma with polyps was detected in three (0.9%) cases.

Conclusion: Hyperplastic polyps are the most common sessile serrated lesions, and synchronous conventional tubular adenomas were most commonly accompanied by hyperplastic polyps. HPs were most commonly observed in the distal colon, particularly in the sigmoid colon and rectum. Future prospective studies using uniform diagnostic criteria and considering clinical outcomes are needed to make accurate decisions regarding surveillance and treatment of patients with serrated lesions.

Introduction

The main goals of colorectal carcinoma examinations are not only to detect malignant lesions but also to detect and remove premalignant lesions. During a colonoscopy, polypectomy is also performed, and histopathological examinations are performed. Although conventional adenomas are the precursor lesions of colorectal carcinomas, it is known that approximately one-fifth of carcinomas develop from serrated lesions. This refers to serrated lesions or polyps characterized by sawtooth or stellate. The presence of at least one distorted crypt was considered sufficient for SSL diagnosis in the new 2019 edition of the World Health Organization's Classification of Tumors of the Digestive System (WHO) [1]. Today, L-shaped and inverted T-shaped crypts are included in the definition of abnormal crypts. Abnormal crypts growing along the muscularis mucosa with basilar asymmetric dilatation of the crypts and various degrees of nuclear atypia or dysplasia with lateral epithelial fissuring can be observed. Serrated adenomas usually account for approximately 1-2% of all

*Corresponding author:
Email address: alikoyuncuer@hotmail.com (Ali Koyuncuer)

colorectal polyps. Serrated adenomas can occur throughout the adult colon and rectum, but large polyps are most commonly observed in the right colon. They may appear flat or sessile and may be part of a syndrome [2]. However, in many studies, serrated lesions are often sessile, a preference for the proximal colon, and thus may be missed by the endoscopist or colonoscopist. In contrast to the conventional adenoma-carcinoma pathway, KRAS and BRAF mutation of a hyperplastic polyp (HP) have been implicated in the development of serrated neoplasia and MMR-proficient colorectal carcinoma [1]. Contrary to the opinion that there is no potential for malignancy, recent publications have shown that serrated polyps play a role as precursor lesions in 30% of colorectal carcinomas [3]. According to the WHO 2019 classification, 3 main subtypes were defined: HP, sessile serrated lesion (SSL, formerly known as sessile serrated adenoma/polyp), traditional serrated adenoma (TSA), and unclassified serrated adenoma [1].HP is relatively more commonly observed than other polyps with serrated morphology and accounts for 15-30% of all polyps removed by colonoscopy, while SSL range from 1.7-9% and is detected in about 10% overall.TSA, on the other hand, are the least commonly observed serrated lesions and account for 0.5-1.9% of all colorectal polyps [2]. The distinction between TSA and SSL is important because these two types of lesions or polyps not only have structural/histologic differences but may also differ on a molecular basis [4]. The results of screening colonoscopy and surveillance programs will be discussed to track the resulting progression of serrated lesions, and an update on the classification and terminology of serrated lesions will also be provided.

Materials and Methods

Case selection and histologic evaluation

Ethical approval was obtained from the Local Ethics Committee (Health Sciences University, Umraniye Training and Research Hospital Health Research Ethics Committee. Protocol number: B.10.1.TKH.4.34.H. GP.0.01/ 212 and 203). This study does not include any experiments on animals. Available hematoxylin and eosin (H&E) preparations and immunohistochemistry slides (if available) of 1137 colorectal polyps from 678 patients who underwent colonoscopic polypectomy between July 1, 2018, and July 1, 2022, at the Department of Pathology, Umraniye Training and Research Hospital, University of Health Sciences, Istanbul, Turkey were retrospectively reviewed. In a total of 167 patients studied polypectomy materials were evaluated in the serrated lesion and polyp (SSL/P) morphology and coexistence with polyps. Other well-characterized pure polyp types were excluded from this study (pure conventional adenomas, Peutz-Jeghers polyps, hamartomatous polyps, inflammatory pseudopolyps, and juvenile polyps). Polyps associated with inflammatory bowel disease, familial adenomatous polyposis, patients younger than 18 years, and polyps incidentally discovered in the colon and rectal resection specimens were excluded from the study. The World Health Organization (WHO) 2019 classification of tumors of the digestive system was used to evaluate histologic polyp types.

Statistical analysis

These histopathological groups were statistically analyzed using the diagnostic criteria of WHO. Analysis was performed with the McNemar test to determine whether the type, number, size, and location (proximal or distal) of polyps detected in each individual differed, with the Pearson-Pearson $\chi 2$ test or Fisher's exact test for the association between polyps and sex, and the age of the patients was analyzed with Student's t-test as a continuous variable. SPSS version 22 was used for statistical analysis (SPSS Statistics for Windows; IBM, Armonk, New York, USA). A. A P value of < 0.05 was considered statistically significant.

Results

Histologic, demographic, and anatomic distribution data of colonic polyps

Of the 343 colorectal polyps, 58.1% (97 patients) occurred in men and the remaining 41.9% (70 patients) in women. This resulted in a male-to-female ratio of approximately 1.3:1. The age of the patients ranged from 32 to 88 years with a mean age of 59.74 ±11.1 years. Fifty-two percent

Table 1. Demographic and pathological characteristics of serrated lesions of colorectum.

Age (year, mean ± SD)	59.74	±11.1
Gender, n (%)		
Male	97	58.1
Female	70	41.9
Polyp size (mm, mean ± SD)	5.09	±4.46
A-Benign epithelial tumours and precursors (WHO-2019)	n	%
A.1-Colorectal serrated lesions and polyps		
Hyperplastic polyp;	194	56.6
Sessile serrated lesion;	23	6.7
Sessile serrated lesion with dysplasia		
Traditional serrated adenoma	7	2.0
Serrated adenoma, unclassified	2	0.6
Traditional serrated adenoma synchronous adenocarcinoma	2	0.6
A.2- With synchronous conventional colorectal adenoma		
Tubular adenoma, low grade	100	29.2
Tubulovillous adenoma, low grade	7	2.0
Advanced adenoma (intramucosal adenocarcinoma)	2	0.6
B- Other synchronous polyps or lesions		
Inflammatory Polyps	5	1.5
Inflammatory Pseudopolyp		
Mesenchymal Polyps	1	0.3
Lipoma		
Total	343	100

Table 2. The anatomical distribution of colorectal sessile serrated polyps/lesions and synchronous polyps.

Polyps/lesions site in the colon	n	%
Proximal colon	97	28.3
Distal colon	246	71.7
Total	343	100
Cecum	13	3.8
Ileocecal valve	1	0.3
Ascending colon	38	11.1
Hepatic flexure	8	2.3
Transverse colon	37	10.8
Splenic flexure	5	1.5
Descending colon	45	13.1
Sigmoid colon	101	29.4
Rectosigmoid region	10	2.9
Rectum	85	24.8
Total	343	100

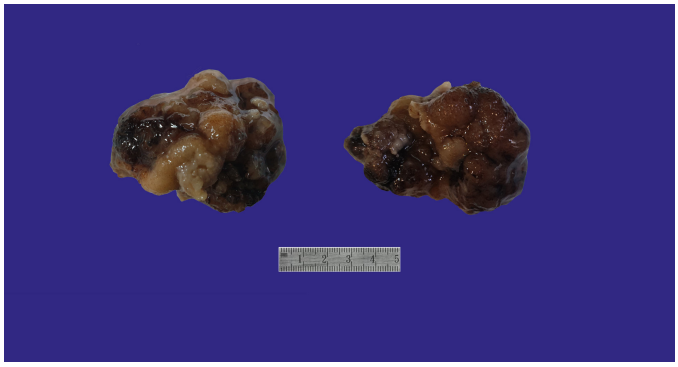

Figure 1. Gross appearance of the large bowel in sessile serrated lesion/polyp.

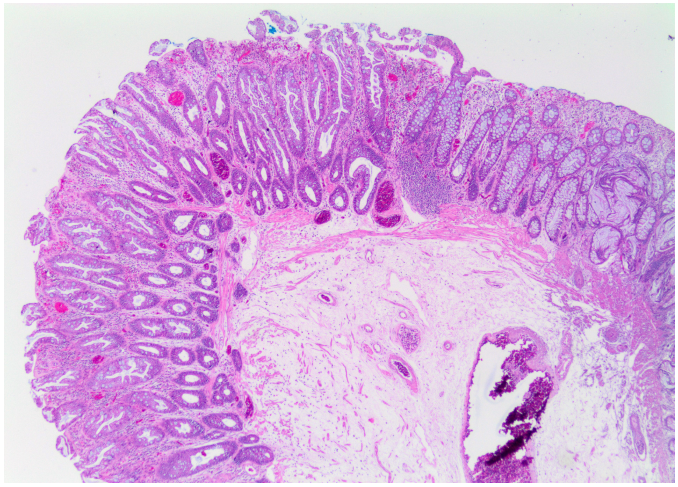

Figure 2. Low magnification view of the hyperplastic polyp. Epithelial serration predominantly on the surface and in deeper crypts to varying degrees, elongation of crypts, vesicular mucinous epithelial cells, enlarged cilia covering half of the mucosa, regularity of basilar portion of crypt.

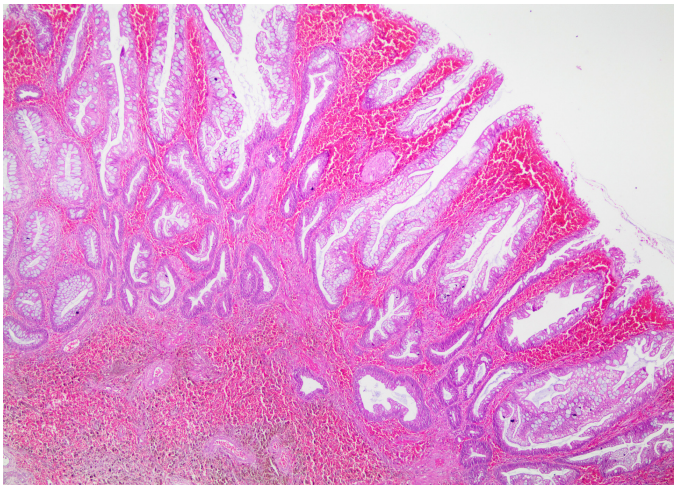

Figure 3. Microscopic appearance of the sessile serrated lesion. Typical histomorphologic features of sessile serrated lesions include branched crypts with asymmetric proliferation leading to deep serrations, horizontal growth along the muscularis mucosae, and dilation of the crypts, inverted L-shaped crypts.

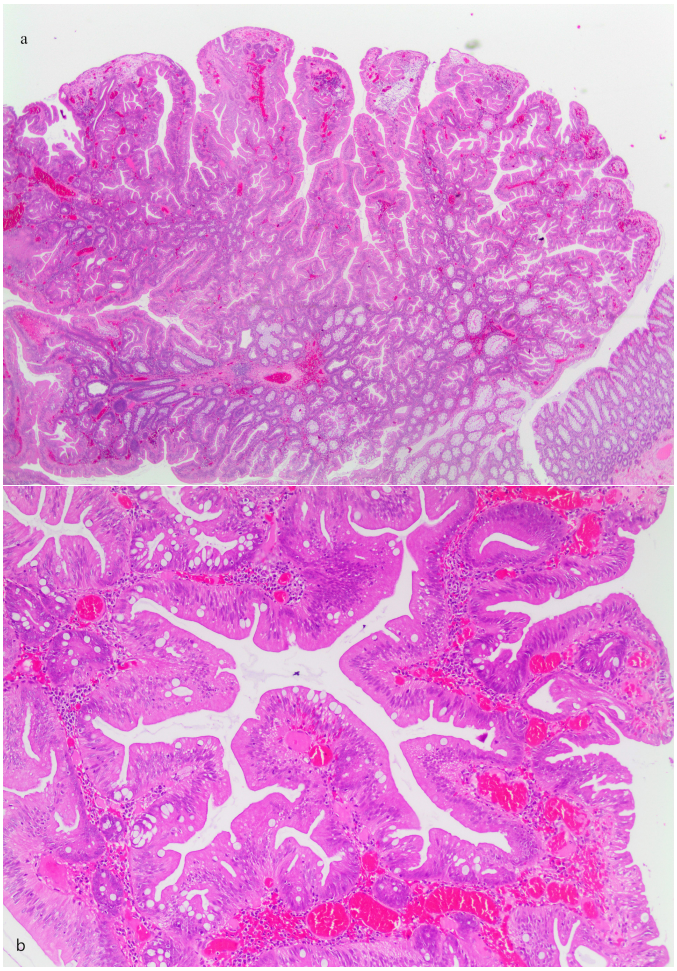

Figure 4. a: Microscopic appearance of traditional serrated adenoma. b: High-power view of slit-like serration pencillate nucleus, eosinophilic cytoplasm, and ectopic crypt formation.

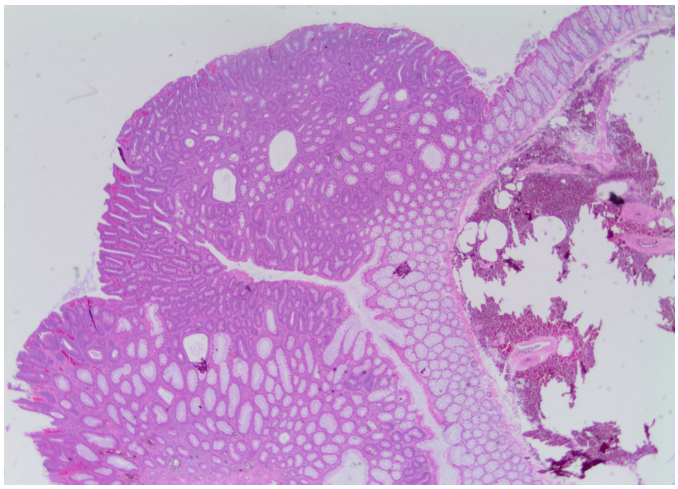

Figure 5. Microscopic features of conventional (tubular) adenoma.

of the cases in our study were observed at age 60 years and older. There was no statistically significant difference between the presence of gender and all epithelial polyps (p=0.608). The size of the polyps varied from 0.5 mm to 25 mm, with an average size of 5 mm (Figure 1). There was a significant correlation between the size of polyps (≤10 mm) and epithelial polyps (p=0.000). While an average of 2 polyps were detected in a patient on examination, 49.1% (82 cases) had one polyp; 50.9% (85 cases) had more than 2 polyps. Ninety-eight percent of polyps were epithelial; inflammatory polyps accounted for 1.5%, and mesenchymal polyps accounted for 0.3% (Table 1). The distribution of all epithelial polyps was as follows; HP was the most frequently observed epithelial polyp with 57.7% (194 polyps) (Figure 2), SSL was 6.8% (23 polyps) (Figure 3), and TSA was 2.1% (7 polyps) (Figure 4), unclassified serrated adenoma was 0.6% (2 cases), synchronous conventional adenomas (tubular, villous, and tubulovillous adenomas) (Figure 4) were seen in 31% (104 polyps) of SSL or polyps, and carcinoma with polyps was detected in three (0.9%) cases (Figure 5). Polyps were most frequently detected in the sigmoid colon (29.4%), rectum (24.8%), descending colon (13.1%), and ascending colon (11.1%). There was a significant association between epithelial polyps and anatomical locations (p=0.000). Patients with one polyp were most frequently observed in the sigmoid colon and rectum, and most cases with 2 or more polyps followed in the sigmoid colon, rectum, and descending colon, respectively (Table 2).

Discussion

Interpretation and recognition of polyps with an architecturally serrated component are not easy among pathologists. Especially when it was found that such polyps are precursors for the development of colorectal carcinoma, their importance has increased. Management of colonoscopic polyps is based on accurate WHO pathologic definitions and appropriate use of international protocols. In a retrospective study by Hetzel et al, it was shown that the detection of serrated lesions changed over time between endoscopists (colonoscopists) and pathologists (0.2 in 2006 to 4.4 in 2008). In this study, the diagnosis of sessile serrated adenomas increased significantly with training and classification in both groups [5]. Reassessment of large serrated polyps after an educational procedure resulted in the reclassification of 12.5% of all lesions, mainly in the right colon [6]. Hyperplastic polyps were not generally considered malignant in the past, but recent studies have shown, through both clinical and molecular studies, that some polyps may be the precursors of neoplastic lesions. For this reason, it is accepted that hyperplastic polyps are a heterogeneous group and some of them show progression to neoplasia [7]. Previous studies have found evidence of an association between serrated lesions and the development of malignancy, and the presence of dysplasia has been reported in about 14% and the development of carcinoma in about 1% [8,9]. Bettington et al demonstrated that conventional adenomatous polyps were the most commonly observed polyps (48.7%), most of which were tubular adenomas (86.4%). More than half of these polyps are located in the proximal colon. Hyperplastic polyps account for one-third of all polyps and are most commonly observed in the distal colon or rectum. SSA is observed in 12.1% of all polyps, and 80% of them are found in the proximal colon. 0.9% of all colonic polyps are TSA, which are most commonly detected in the distal colon and rectum [10].

Our results show that hyperplastic polyps are the most common type of serrated lesions and that the percentage is very similar to that reported in the literature. In our study, hyperplastic polyps were observed mainly in the distal colon and rectum, while the average size of these polyps was less than 5 mm in 80% of them and was consistent with the literature. SSLs differ from HP and TSA, especially structural and cytological features help in diagnosis. One study showed that SSLs are generally larger than 5 mm and are mostly located in the proximal colon. The same study emphasized that polyps with localization in the right colon larger than 5 mm may be SSLs, so both the pathologist and endoscopist should be careful and even reevaluate [11]. In the study by Bettington et al, SSA cases were observed predominantly in women [10]. Similarly, in our study, 66.6% of SSLs were larger than 5 mm, and the detection of serrated lesions was also increased in the proximal colon (52.1%) and slightly in the ascending colon, and on the other hand, our results differ from other series. However, SSLs and TSAs were predominantly observed in males in our study and evaluated differently from this literature. While most serrated polyps are due to KRAS and BRAF mutations, most BRAF mutations cause common methylation of CpG islands, termed the CpG Island to Methylate phenotype (CIMP) [12]. Arain et al. recently analyzed that interval carcinomas likely have a molecular pathway in the proximal colon and the CpG island methylator phenotype (CIMP) and SSLs may be precursors of CIMP+ colorectal carcinomas [13].

Some recent studies have found that shallow and incompletely resected SSL, in particular, may contribute to the increase in interval carcinomas. Interval carcinomas may develop from lesions that were not completely removed or were missed at colonoscopy, rather than from a pathogenetic pathway. Increasing size, particularly of sessile, serrated lesions, leads to an increase in the rate of incom-

plete excisions. Some of the adenomas may be incompletely excised at colonoscopy, and the remaining neoplastic tissue may develop into a malignancy. In some studies, 19-27% of interval tumors have been shown to occur in the region of prior polypectomy. Re-examination of sessile polyps larger than 2 cm revealed residual adenomatous tissue in 17% [14]. Notably, among serrated lesions, traditional serrated adenomas (TSAs) are probably the least understood serrated polyps as a type of polyp with characteristic histomorphology and generally easy recognition due to their rarity. TSAs can arise from a histologically preexisting HP or SSL lesion, and one study reported that the rates of KRAS and BRAF mutations are close [15]. In 2003, Torlakovic et al. identified polyps representing TSA in their study; mostly in the left colon, followed by pencil-shaped nuclei, eosinophilic cytoplasm, villous growth pattern, and exophytic configuration [16]. In his 2004 study in Montgomery, he showed that serrated polyps, particularly in the right colon, had a larger size, abnormal proliferation, pseudostratification, and crypt distortion than on the left side [17].In 2008, they found that ectopic crypt formation (ECF) was originally defined only in TSAs and even in all TSAs by Torlakovic [4]. In another article, TSA was found to be more common in men [7]. In our study, TSAs were observed in men and at older ages compared with other serrated lesions (mean age: 66 years) in the distal colon or rectum, which is consistent with the literature. In their study, Bettington et al. found that BRAF (47%) and KRAS (31%) mutations were observed in TSAs, with BRAF mutation polyps developing from precursor polyps and having more slit-like serrations than KRAS mutation polyps [18]. Although there is no high-quality evidence for surveillance, it has been reported that TSAs should be treated with close follow-up and complete resection when advanced TSAs are potentially aggressive. In particular, BRAF-mutated TSAs have been reported to be aggressive BRAF mutants and precursors of MSI colorectal cancer [19]. Although in some studies patients with distal HP have a moderate risk of proximal neoplasia, the risk of proximal neoplasia is not increased in those with distal adenomas or those without distal polyps [20].On the other hand, another study found no association between hyperplastic polyps and adenomas [21]. In a recent study, the size of sessile serrated polyps was found to be important for risk; in particular, polyps larger than 10 mm or with dysplasia posed a high risk. The 10-year risk of colorectal cancer is 4.4% for SSP and 2.3% for conventional adenomas. On the other hand, it was reported that 47% of SSPs had synchronous adenoma and the development of advanced neoplasia was accelerated after SSPs with synchronous adenoma, comparable to high-risk adenomas [22]. Dysplasia is generally not common in SSLs, with approximately 14% reported [23]. However, dysplasia in serrated lesions is not clearly defined, and the cytologic changes that are generally considered dysplasia are different from the dysplasia of conventional adenomas. One study has shown that conventional dysplasia is observed in approximately 30% of adenomas and is usually located in the crypt bases [4]. The use of the term "adenoma" is confusing because dysplasia is not always present in SSL. For this reason, not all serrated lesions are defined as adenomas, and the term "lesion" is considered more appropriate (since all colonic adenomas have at least low-grade dysplasia). The term "lesion" has become accepted as a pathologic term that both covers previous clinical studies and demonstrates biologic potential (replacing the sessile serrated "adenoma"). The development of dysplasia (SSL with dysplasia) in SSL is related to MLH1 methylation or the p53 gene [24, 25, 26]. In our study, low-grade dysplasia was observed in 8% of all serrated polyps/lesions.Today advanced adenoma is defined as adenoma with a size ≥10 mm, tubulovillous, villous, or high-grade dysplasia, or intramucosal adenocarcinoma [1]. In our study, synchronous conventional adenomas were detected in 31.9% of SSL or polyps, synchronous intramucosal adenocarcinoma in one case, and adenocarcinoma arising from an adenoma in two cases. According to the recommendations on "Surveillance and Screening Intervals in Individuals at Average Baseline Risk 2012," it is recommended that SSL without dysplasia and smaller than 10 mm be monitored every 5 years, TSA or lesions larger than 10 mm or dysplasia and SLL be monitored every 3 years with a colonoscopy interval [14].

Conclusion

Although HPs were the most frequently observed serrated lesions in this study, the ratio of sessile serrated lesions or polyps was observed more frequently than in previous publications. Our results indicate that the proportion of all colorectal polyps increases when the diagnostic criteria for the most appropriate SSL surveillance and treatment are properly applied. Larger series and long follow-ups are required for the association between SSL and malignancy. To reduce the risk of the main critical step, colorectal carcinoma, we recommend complete colonoscopic removal of polyps first.

Ethics approval

Ethical approval was obtained for the study from the Health Sciences University, Umraniye Training and Research Hospital Health Research Ethics Committee (protocol number: B.10.1.TKH.4.34.H. GP.0.01/ 212 and 203).

Data availability

All datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

References

1. Pai RK, Makinen RJ, Rosty C. Colorectal serrated lesions and polyps.Digestive system tumors.World Health Organization; 5th edition 2019; 163-170.
2. Fenoglio-Preiser, Cecilia M.; Noffsinger, Amy E.; Stemmermann, Grant N.; Lantz, Patrick E.; Isaacson, Peter G.Serrated Polyps.Epithelial Neoplasms of the Colon: Gastrointestinal Pathology: An Atlas and Text 4th edition, 2017.
3. Okamoto K, Kitamura S, Kimura T, Nakagawa T, Sogabe M, Miyamoto H, Muguruma N, Takayama T. Clinicopathological characteristics of serrated polyps as precursors to colorectal cancer: Current status and management. J Gastroenterol Hepatol 2017;32(2):358-367.
4. Torlakovic EE, Gomez JD, Driman DK, Parfitt JR, Wang C, Benerjee T, Snover DC. Sessile serrated adenoma (SSA) vs. traditional serrated adenoma (TSA). Am J Surg Pathol. 2008;32(1):21-9. Erratum in: Am J Surg Pathol 2008;32(3):491.

5. Hetzel JT, Huang CS, Coukos JA, Omstead K, Cerda SR, Yang S, O'Brien MJ, Farraye FA. Variation in the detection of serrated polyps in an average risk colorectal cancer screening cohort. Am J Gastroenterol 2010;105(12):2656-64.
6. Racho RG, Krishna M, Coe SG, Thomas CS, Crook JE, Diehl NN, Wallace MB. Impact of an Endoscopic Quality Improvement Program Focused on Adenoma Detection on Sessile Serrated Adenoma/Polyp Detection. Dig Dis Sci 2017;62(6):1464-1471.
7. Kim KM, Lee EJ, Ha S, Kang SY, Jang KT, Park CK, Kim JY, Kim YH, Chang DK, Odze RD. Molecular features of colorectal hyperplastic polyps and sessile serrated adenoma/polyps from Korea. Am J Surg Pathol 2011;35(9):1274-86.
8. Lash RH, Genta RM, Schuler CM. Sessile serrated adenomas: prevalence of dysplasia and carcinoma in 2139 patients. J Clin Pathol 2010;63:681–686.
9. Snover D, Ahnen D, Burt R, et al. Serrated polyps of the colon and rectum and serrated polyposis. In: Bozman F, Cameiro F, Hurban R, et al, eds. World Health Organization classification of tumours. Tumors of the digestive system. 4th ed. Lyon, France: International Agency for Research on Cancer (IARC) Press, 2010:160–165.
10. Bettington M, Walker N, Rosty C, Brown I, Clouston A, Wockner L, Whitehall V, Leggett B. Critical appraisal of the diagnosis of the sessile serrated adenoma. Am J Surg Pathol 2014;38(2):158-66.
11. Niv Y. Changing pathological diagnosis from hyperplastic polyp to sessile serrated adenoma: systematic review and meta-analysis. Eur J Gastroenterol Hepatol 2017;29(12):1327-1331.
12. Crockett SD, Nagtegaal ID. Terminology, Molecular Features, Epidemiology, and Management of Serrated Colorectal Neoplasia. Gastroenterology 2019;157(4):949-966.e4.
13. Arain MA, Sawhney M, Sheikh S, Anway R, Thyagarajan B, Bond JH, Shaukat A. CIMP status of interval colon cancers: another piece to the puzzle. Am J Gastroenterol 2010;105(5):1189-95.
14. Lieberman DA, Rex DK, Winawer SJ, Giardiello FM, Johnson DA, Levin TR. Guidelines for colonoscopy surveillance after screening and polypectomy: a consensus update by the US Multi-Society Task Force on Colorectal Cancer. Gastroenterology 2012;143(3):844-857.
15. Wiland HO , Shadrach B, Allende D, Carver P, Goldblum JR, Liu X, Patil DT, Rybicki LA, Pai RK. Morphologic and molecular characterization of traditional serrated adenomas of the distal colon and rectum. Am J Surg Pathol 2014;38(9):1290-7.
16. Torlakovic E, Skovlund E, Snover DC, Torlakovic G, Nesland JM. Morphologic reappraisal of serrated colorectal polyps. Am J Surg Pathol 2003 Jan;27(1):65-81.
17. Montgomery E. Serrated colorectal polyps: emerging evidence suggests the need for a reappraisal. Adv Anat Pathol 2004;11(3):143-9.
18. Bettington M, Rosty C, Whitehall V, Leggett B, McKeone D, Pearson SA, Walker N. A morphological and molecular study of proposed early forms of traditional serrated adenoma. Histopathology 2018:1023-1029.
19. Bettington ML, Walker NI, Rosty C, Brown IS, Clouston AD, McKeone DM, Pearson SA, Klein K, Leggett BA, Whitehall VL. A clinicopathological and molecular analysis of 200 traditional serrated adenomas. Mod Pathol 2015;28(3):414-27.
20. Lin OS, Gerson LB, Soon MS, Schembre DB, Kozarek RA. Risk of proximal colon neoplasia with distal hyperplastic polyps: a meta-analysis. Arch Intern Med 2005;165(4):382-90.
21. Thiis-Evensen E, Hoff GS, Sauar J, Majak BM, Vatn MH. Flexible sigmoidoscopy or colonoscopy as a screening modality for colorectal adenomas in older age groups? Findings in a cohort of the normal population aged 63-72 years. Gut 1999;45(6):834-9.
22. Symonds E, Anwar S, Young G, Meng R, Coats M, Simpson K, Bampton P, Fraser R, Cock C. Sessile Serrated Polyps with Synchronous Conventional Adenomas Increase Risk of Future Advanced Neoplasia. Dig Dis Sci 2019;64(6):1680-1685.
23. Lui RN, Sung JJY. Sessile serrated adenoma/polyps: Why we should be working flat out to understand more about these flat lesions? J Gastroenterol Hepatol 2019;34(10):1667-1668.
24. Rosty C, Bettington M. Serrated colorectal polyps and polyposis. Diagnostic Histopathology 2013;20:1.
25. Odze RD. "Sessile Serrated Lesion":The Art and Science of Naming a Disorder. Arch Pathol Lab Med 2021;145:1190-91.
26. Nagtegaal ID, Snover DC. Head to head: should we adopt the term 'sessile serrated lesion'? Histopathology 2022 DOI: 10.1111/his.14618.