

# OUTCOMES OF ISOLATED SIGMOID COLON THICKENING DETECTED ON ROUTINE COMPUTED TOMOGRAPHY EXAMINATIONS



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## ABSTRACT

### Objective

To determine outcomes of isolated sigmoid colon thickening detected on computed tomography (CT) and to evaluate certain clinical and CT findings that could help in diagnoses.

### Method

This retrospective observational study was performed evaluating CT imaging data of all consecutive adult patients who presented with acute lower abdominal pains in emergency departments and were found to have isolated sigmoid colonic thickening on routine venous phase CT studies, between January 2020 to January 2022. Previously operated cases, known inflammatory bowel disease patients, and those with known sigmoid malignancies were excluded. CT findings regarding the length of the sigmoid segment affected (less or more than 10 cm), mucosal pattern (symmetric or asymmetric), presence of diverticula, lymph nodes, and additional features (pericolonic abscess or fistula formation, extra-luminal air foci or perforation, local invasion) were documented. Two experienced radiologists made consensus reporting. Final diagnoses were confirmed on (endoscopic) biopsy results. Patients who did not have endoscopies or were medically treated were excluded. Age, gender, and CT findings were compared with outcomes, and any association was determined by the Chi-squared test.

### Results

Out of 30 patients (aged between 20-75 years), the majority were males (n=21) and above 40 years (n=22). Twelve patients had colonic malignancies while 18 had benign findings. Acute presentation, younger patients, and those showing presence of diverticula on CT scans were associated with benign biopsies.

### Conclusion

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Younger patients who present acutely and show diverticula on CT imaging may have benign causes of sigmoid thickening.

#### أهداف الدراسة

تحديد النتائج الإكلينيكية للمرضى الذين لديهم ارتفاع في سماكة القولون السيني حسب نتائج الأشعة المقطعية وتقييم هذه النتائج التي يمكن أن تساعد في التشخيص.

#### الإجراءات

تم إجراء هذه الدراسة بأثر رجعي في قسم الأشعة في مستشفى مجمع الملك فهد الطبي العسكري بالظهران في الفترة من يناير 2020 إلى 2022. قمنا بتقييم بيانات التصوير المقطعي لجميع المرضى البالغين الذين يعانون من آلام حادة في أسفل البطن في أقسام الطوارئ ووجدنا أن لديهم سماكة القولون السيني في دراسات التصوير المقطعي بالمرحلة الوريدية الروتينية.

تم استبعاد الحالات التي خضعت لعملية جراحية، ومرضى التهاب الأمعاء، والذين يعانون من الأورام الخبيثة. المرضى الذي كان طول الجزء السيني المتأثر أقل أو أكثر من 10 سم، أو كان نمط الغشاء المخاطي (متماثل أو غير متماثل)، ومرضى رتج القولون، والعقد الليمفاوية، ومن كان لديهم خراج أو ناسور.

قدم اثنان من استشاريي الأشعة ذوي الخبرة تقريراً بالإجماع. تم تأكيد التشخيصات النهائية على نتائج الخزعة (بالمناظر). تم استبعاد المرضى الذين لم يخضعوا للتظهير أو تم علاجهم طبياً. تمت مقارنة نتائج العمر والجنس والتصوير المقطعي المحوسب تحديد من خلال اختبار مربع كاي.

#### النتائج

من بين 30 مريضاً (تتراوح أعمارهم بين 20-75 عاماً)، كانت الغالبية من الذكور (عدد = 21) وما فوق 40 عاماً (عدد = 22). كان اثنا عشر مريضاً يعانون من أورام خبيثة في القولون بينما كان لدى 18 مريضاً نتائج حميدة. ارتبطت هذه النتائج الحميدة مع وجود رتجاً في الأشعة المقطعية للقولون السيني وكون هؤلاء المرضى من صغار السن ووجود أعراض حادة لديهم.

#### الخلاصة

المرضى من صغار السن الذين يعانون من أعراض حادة ويظهر لديهم رتجاً حسب التصوير المقطعي قد يكون لديهم أسباب حميدة لارتفاع سماكة القولون السيني.

**Keywords:** Sigmoid colon: computed tomography, thickening, diverticula

## 1. INTRODUCTION

Lower abdominal pain is a common presentation in patients visiting the emergency department [1]. Although provisional diagnosis can be made on clinical presentation and examination, the role of imaging remains pivotal for establishing the diagnosis and directing clinical management [2]. Acute diverticulitis is among the common causes of left iliac fossa pain [3]. History may vary from a few months of insidious pain to rapidly evolving or severe pain especially strain during defecation. Symptoms may affect middle-aged to old age persons and depend upon the severity of the disease or its complications. The sigmoid colon is a commonly affected segment [4]. Colonic malignancy can also affect the same bowel segment. The presentation may be acute or of prolonged duration mimicking acute or chronic diverticulitis respectively thereby delaying the diagnosis.

Imaging findings can also overlap with benign inflammatory or infectious colitis and colonic malignancy [5]. Also, secondary diverticula can be seen as related to obstructive motility in malignancies. Therefore, meticulous evaluation of the clinical presentation and imaging findings is vital for reaching a correct diagnosis. Subsequent endoscopy and histopathologic correlation may be necessary to establish a diagnosis for the early management of sinister pathology and not to overlook malignancy [6].

Radiologists commonly encounter isolated sigmoid colonic thickening on emergency CT examinations in their clinical practice for patients presenting with left lower abdominal pain or related symptoms, but unfortunately due to non-prepared bowel (for routine CT studies and for emergency cases), differentiating benign inflammatory/ infectious conditions (like diverticulitis, colitis) from cancer (sigmoid carcinoma) can be difficult. Therefore, we sought to evaluate imaging findings of computed tomography in such patients who came with isolated sigmoid colon thickening found on their CT studies and correlate these with biopsy results.

## **2. METHOD**

A retrospective observational study was conducted in the radiology department at King Fahad Military Medical Complex (KFMC) hospital in Dhahran, evaluating clinical and imaging data of patients who presented with lower abdominal pain. The study was approved by Hospital Ethics Committee and the need for informed written consent was waived considering its retrospective nature and non-disclosure of patient information. The research was conducted in accordance with the Helsinki Declaration.

### **Sample Selection Method**

All consecutive adult patients who presented with acute left lower abdominal pains or related symptoms in emergency departments were found to have isolated sigmoid colonic thickening on routine computed tomographic studies, between January 2020-2022, were selected. Previously operated cases, patients with known inflammatory bowel disease, and sigmoid malignancy cases were excluded.

### **Examination Protocol**

Routine CT studies were performed on a 128-slice CT machine (SOMATOM Definition, Siemens Healthcare, Germany), using 90-110 ml intravenous water-soluble contrast (Iomiron, GE Healthcare, Cork, Ireland) at 70-90 seconds after contrast administration by the power injector (at a rate of 4 ml/ min.). CT findings regarding the length of the sigmoid segment affected (less or more than 10 cm), mucosal pattern (symmetric and less than 10 mm thickness or asymmetric and more than 10 mm thickness), presence of divertic-

ula, lymph nodes, and other features (pericolonic abscess or fistula formation, extra-luminal air foci or perforation, local invasion) were documented. Two experienced radiologists made consensus reporting and minor differences were resolved by mutual agreement with another senior staff member. Final diagnoses were confirmed on colonoscopic biopsy results. Patients who did not have endoscopies or were medically treated were not taken in the study.

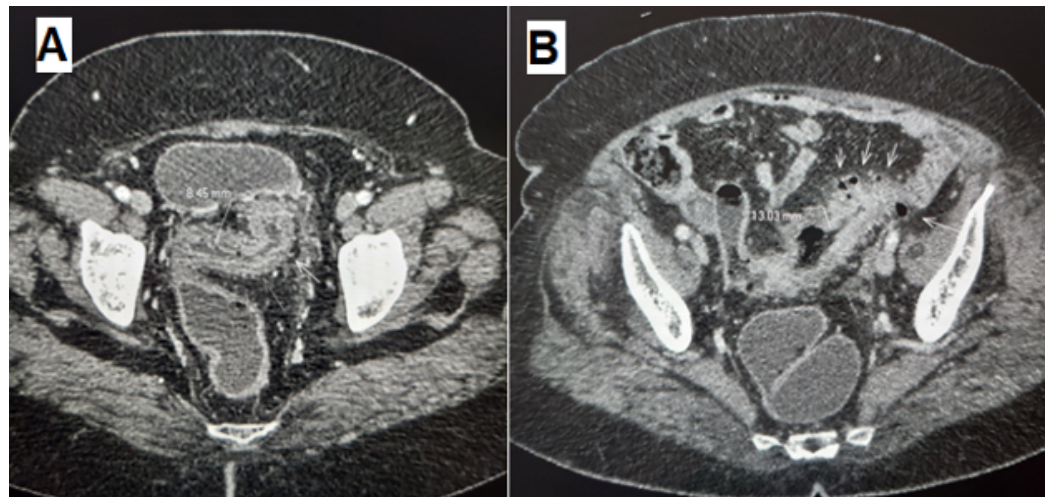
#### Data collection and statistical analysis

Data was collected and analyzed using IBM SPSS Statistics for Windows, version 22 (IBM Corp., Armonk, NY, USA). Demographic information and CT findings were compared with outcomes, and any association was determined by the Chi-square test.

### 3. RESULTS

Out of 30 patients (aged between 20-75 years), the majority were males (n=21) and above 40 years (n=22) [Table 1].

Twelve patients had colonic malignancies while 18 had benign findings (Figure 1). Acute presentation, younger patients, and those showing presence of diverticula on CT scans were seen as associated with benign biopsies. Benign findings included inflammatory colitis (n=13), infectious causes (n=3), and segmental colitis associated with diverticulosis (SCAD) in 2 patients.



**Figure 1** Selected axial CT images of two patients with sigmoid thickening with benign (A) and malignant (B) results.

**Table 1** Patient characteristics, CT findings, and endoscopic biopsy results

| Study Variables                       | Endoscopic Result |           | Total | P-value |
|---------------------------------------|-------------------|-----------|-------|---------|
|                                       | Benign            | Malignant |       |         |
| <b>Age group</b>                      |                   |           |       |         |
| Less than 40 years                    | 7 (87.5)          | 1 (12.5)  | 8     | 0.06    |
| More than 40 years                    | 11 (50)           | 11 (50)   | 22    |         |
| <b>Gender</b>                         |                   |           |       |         |
| Male                                  | 13 (61.9)         | 8 (38.1)  | 21    | 0.75    |
| Female                                | 5 (55.6)          | 4 (44.4)  | 9     |         |
| <b>Clinical Presentation</b>          |                   |           |       |         |
| Acute                                 | 13 (81.3)         | 3 (18.8)  | 16    | 0.01*   |
| Chronic                               | 5 (35.7)          | 9 (64.3)  | 14    |         |
| <b>Length of the affected segment</b> |                   |           |       |         |
| Less than 10 cm                       | 8 (61.5)          | 5 (38.5)  | 13    | 0.88    |
| More than 10 cm                       | 10 (58.8)         | 7 (41.2)  | 17    |         |
| <b>Mucosal thickening</b>             |                   |           |       |         |
| Asymmetrical                          | 3 (37.5)          | 5 (62.5)  | 8     | 0.13    |
| Symmetrical                           | 15 (68.2)         | 7 (31.8)  | 22    |         |
| <b>Presence of diverticula</b>        |                   |           |       |         |
| Present                               | 12 (85.7)         | 2 (14.3)  | 14    | 0.01*   |
| Not present                           | 6 (37.5)          | 10 (62.5) | 16    |         |
| <b>Lymph Node</b>                     |                   |           |       |         |
| Present                               | 9 (52.9)          | 8 (47.1)  | 17    | 0.37    |
| Not present                           | 9 (69.2)          | 4 (30.8)  | 13    |         |
| <b>Additional findings</b>            |                   |           |       |         |
| Present                               | 12 (63.2)         | 7 (36.8)  | 19    | 0.64    |
| Not present                           | 6 (54.5)          | 5 (45.5)  | 11    |         |

#### 4. DISCUSSION

Sigmoid thickening can be a non-specific finding with wider possibilities ranging from peristaltic contraction to colitis or even malignancy [3, 6]. Imaging evaluation of isolated sigmoid colon thickening can be challenging particularly in patients with advanced age or in susceptible young populations with a family history of colon cancer and polyposis syndromes. Advanced imaging modalities may sometimes be needed like positron emittance tomography (PET), however, the availability of such tests in many hospitals is limited [7]. Our study emphasizes the importance of clinical presentation and the role of routine computed tomography in benign versus malignant causes of sigmoid thickening that can make a difference in difficult or challenging cases.

We found the presence of diverticula, in young patients (below 40 years) who presented acutely to be associated with benign histopathology. Although we did not estimate the number of diverticula yet the presence of these with adjacent inflammatory changes can reliably indicate thickening related to diverticulitis. The presentation can be acute or

chronic recurrent symptoms related to lower abdominal pain and/ or obstruction. Associated imaging findings like intraluminal high density/ hemorrhage (if plain study acquired), localized pericolic fluid collection/ abscess, or extraluminal air foci/ perforation can assist the diagnosis. Traditional Hinchey classification may help to grade the severity of disease in segregating patients for medical management or those requiring surgery. Fisher JK found bowel wall thickening to be a non-specific finding and the presence of finger-like projections to be associated with benign inflammatory changes [7]. The presence of a larger inflamed diverticulum showing a conical or pointed appearance and associated pericolic findings is mostly associated with acute diverticulitis. However, malignancy within a large diverticulum has also been documented as a rare entity [8]. A few studies have noted the significance of the increased number of diverticula in benign causes.

Cai O et al noted a significantly higher percentage (96%) of associated abnormalities in patients who had mucosal thickening of sigmoid on CT [9]. Therefore, careful evaluation of the whole scan can identify other abnormalities like hepatic or bony metastases that can point towards more serious or cancerous causes of sigmoid thickening. Lips LMJ et al found more than half of patients in old age to have sigmoid malignancy (115 out of 212 patients) who presented with mass-like thickening of the sigmoid on CT colonography [10]. They noted the same finding of the absence of diverticula but also shoulder phenomenon (raised mucosal margin) in these patients to be of high negative predictive value for malignancy. Such findings can be more accurately studied and picked up in specialized CT colonography studies rather than on unprepared bowel because of adequate bowel distension and negative intraluminal contrast (water). Peristalsis and collapse of bowel segment further limit thorough evaluation.

Computed tomography imaging represents the standard to classify the severity of diverticulitis. Non-operative management is primarily based on antibiotics and supportive measures, but antibiotics may be omitted in mild cases. Interval colonoscopy remains advisable after an acute attack, particularly after a complicated form. Acute surgery is needed for the most severe as well as refractory cases, whereas elective resections are individualized and should be considered for chronic, smoldering, or recurrent forms and respective complications (stricture, fistula, etc.) and for patients with factors highly predictive of recurrent attacks.

Many other specialized CT parameters can be used to identify benign and malignant causes. Goh V et al compared CT perfusion measurements with morphologic criteria in 60 prospective patients for differentiating diverticulitis from carcinoma [11]. They measured mean blood volume, blood flow, transit time, and permeability and found that these were significantly different between patients with cancer and those with diverticulitis ( $P < .0001$ ); patients with cancer had the highest blood volume, blood flow, and permeability

and the shortest transit time. The incorporation of such techniques in imaging algorithms for the evaluation of such cases needs to be emphasized.

Single-center, retrospective nature, and small sample size are a few limitations of our study. Also, CT colonography instead of routine CT studies was taken which may limit the true extent of use of CT for better differentiating mucosal details and the extent of the abnormality. Our study provides insight into important imaging (CT) findings that needs to be checked for in evaluating routine colonic/ large bowel evaluation. The presence of diverticula, symmetric mucosal involvement, and additional CT findings (of pericolic inflammation, and abscess formation) were more commonly seen in benign conditions. Bowel preparation should be undertaken and needed to interpret CT carefully if patients can tolerate rectal water and if bowel abnormality is suspected clinically. Larger scale multi-center studies are needed to validate or identify better ways in terms of imaging findings to diagnose benign conditions thereby avoiding biopsy results.

## **5. CONCLUSION**

Isolated sigmoid mucosal thickening detected on routine computed tomography examinations can be diagnostically challenging. Younger patients who present acutely and show the presence of diverticula commonly have benign conditions like diverticulitis, while patients with chronic symptoms, asymmetric mucosal thickening, and absence of diverticula are more likely to have malignancy.

## **CONFLICT OF INTEREST**

The authors declare that the research was conducted without any commercial or financial relationships that could be construed as a potential conflict of interest.

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N/A

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