RESEARCH ARTICLE

Solitary caecal diverticulitis: Comparison of operative and non-operative treatment

Cemal Kaya, Mustafa Fevzi Celayir, Emre Bozkurt, Sinan Omeroglu, Onur Guven, Mehmet Mihmanlı

Abstract

Objective: To evaluate the treatment options applied to solitary caecal diverticulitis patients, and to explore the possibility of non-operative treatments.

Methods: The retrospective study was conducted a tertiary referral centre, and comprised data of patients who presented with acute abdominal pain and were diagnosed either preoperatively or intraoperatively as cases of solitary caecal diverticulitis between January 2009 and December 2017. Data on demographics, physical examination findings, laboratory results, treatment modalities and outpatient clinical records was noted, and analysed analysed using SPSS 21.

Results: Of the 580 patients whose medical records were reviewed, 11(1.89%) were diagnosed as cases of solitary caecal diverticulitis. Of them, 6(54.5%) patients were treated conservatively, and 5(45.4%) surgically. The disease recurred in 1(9%) patient who was treated conservatively. Among those treated surgically, 1(20%) patient had hemicolectomy, and the rest had appendectomy and/or diverticulectomy and drainage procedures. There were no major complications during the follow-up.

Conclusions: With accurate diagnosis during preoperative period, the spread of the pathology helps to choose the best suitable surgical technique. Appendectomy should be performed to avoid future diagnostic confusion.

Keywords: Acute appendicitis, Appendectomy, Caecum, Diverticulitis, Diverticulectomy.

(JPMA 70: 1926; 2020) **DOI: https://doi.org/10.5455/JPMA.12674**

Introduction

Solitary Caecal Diverticulitis (SCD) is a rare disease, and the description was first published 1912.[1] SCD is seen more in Eastern than in Western world with a reported incidence ranging from 0.04% to 2.1%.[2-4] While in Western societies colonic diverticulitis was detected in descending and sigmoid colon by 85%, in the Eastern societies it was detected in the caecum up to 71%.[5] In 80% of these patients, SCD is located on the anterior part of caecum and is generally of congenital origin with the involvement of all layers of the colonic wall.[4,6] Unlike other colonic diverticula, SCD is detected at an earlier age and male-to-female ratio is 3:2.[7] Increased inflammation of the SCD makes the right lower quadrant pain symptom dominant and leads to preoperative confusion between SCD and acute appendicitis.[5]

In the past, SCD could be diagnosed during surgery, but nowadays radiological techniques enable the preoperative diagnosis and prevent unnecessary surgical procedures.[8] Although there is no defined treatment algorithm for intraoperatively diagnosed SCD, the choice of surgical treatment is still controversial, as more complex surgical procedures, such as appendectomy or right hemicolectomy, may be needed.[9] Studies prove that conservative treatment methods for uncomplicated SCD diagnosed by preoperative radiological methods may be sufficient, but if recurrent disease, abscess, fistula or ileus are detected, surgical treatment of SCD is suggested.[10-12]

The current study was planned to compare the treatment options applied to the patients with diagnosed SCD, and to evaluate the efficacy of non-operative treatment in such patients.

Patients and Methods

The retrospective study was conducted at a tertiary referral centre and comprised data of patients who presented with acute abdominal pain and were diagnosed either preoperatively or intraoperatively as SCD cases between January 2009 and December 2017.

After approval from the institutional review board and the ethics committee of the University of Health Sciences, Hamidiye Etfal Training and Research Centre, Istanbul, Turkey, data was collected of patients who underwent medical and surgical treatment of colonic diverticulitis, including gender, age, presenting complaints, time related to hospital admission, hospital stay and follow-up, laboratory and radiological findings, details related to the performed treatment procedures, and clinical follow-up. Sample size was verified according to the formula: $n= c^2Np(1-p):((A^2N)+c^2p[1-p])$, and a sample of 11 patients was found to be adequate at 80% study power.[13]

SBU Sisli Hamidiye Etfal Research and Education Hospital General Surgery Clinic Sisli Istanbul, Turkey.

Correspondence: Mustafa Fevzi Celayir. e-mail: fcelayir@gmail.com

Figure-1: Computed tomography image of solitary caecal diverticulitis (increased caecum wall thickness, pericaecal fluid collection, inflammation and free air).

While all patients were examined with abdominal ultrasound (US), those with suspicious findings were also examined with abdominal computed tomography (CT) imaging for SCD diagnosis. Diagnostic criteria on abdominal CT for the SCD diagnosis was determined as increased caecum wall thickness, pericaecal fluid collection, inflammation, abscess or free air (Figure-1).

Medical treatment was applied to patients who were diagnosed with SCD prior to surgical intervention. Surgical procedures were planned in patients who developed intra-abdominal sepsis despite medical treatment.

After the diagnosis of SCD, broad-spectrum intravenous (IV) anti-biotherapy was given to patients till the regression of inflammatory findings.

Data was analysed using SPSS 21. at 95% confidence level and $p<0.05$ significance level. Quantitative variables were reported as mean and standard deviation (SD), while qualitative variables were described as frequencies and percentages.

Results

Of the 580 patients whose medical records were reviewed, 11(1.89%) were diagnosed as SCD cases. Of them, 4(36.3%) were males and 6(54.5%) were females. The overall mean age was 49.2±9.9 years (range: 32-67 years). All 11(100%) patients presented with abdominal pain.

Table: Patients' demographics, symptoms and computed tomography (CT) findings.

Patients' demographics	
Mean Age (years)	49.2±9.9 (32-67)
Gender	
Female	4
Male	7
Patients' symptoms	**n (%)**
Abdominal pain	11 (100)
Fever	5 (45)
Weakness	5 (45)
Nausea-Vomiting	3 (27)
Loss of appetite	2 (18)
CT findings of patients	
Pericaecal oedema	8 (100)
Increased caecum wall thickness	7 (87)
Healthy appendix appearance	6 (75)
Pericaecal fluid collection	3 (37)
Suspicion of acute appendicitis	2 (25)

The average time between onset of symptoms and admission to hospital was 2.45±1.29 days (range: 1-5 days). The mean white blood cell (WBC) count was 15250±3,877/mm^3 (range: 9,800-22,000/mm^3). The median C-reactive protein (CRP) level at the time of diagnosis was 43mg/L (interquartile range [IQR]: 15-110 mg/L). All 11(100%) patients underwent abdominal US, and 8(72.7%) also had an abdominal CT imaging. Pericaecal oedema and increased caecal wall thickness were the most common findings in abdominal CT of patients (Table).

Of the total, 6(54.5%) patients with no radiological sign of acute appendicitis were treated conservatively. Empirical therapy of metronidazole 500 mg/8 hrly IV and ceftriaxone 1g/12 hrly IV was used as part of the conservatively treatment. Also, 5(45.4%) patients were treated surgically due to radiological signs of acute appendicitis. Of these, 2(40%) had diverticulectomy + appendectomy, 2(40%) had drainage + appendectomy and 1(20%) had right haemicolectomy and ileotransversostomy.

Mean hospital stay was 4.83±1.32 days (range: 3-7 days) in he conservatively treated patients, the duration of hospital stay was 4.6±2.3 days (range: 3-8 days) for the surgically treated patients. No postoperative complication was detected except surgical site infection in 2(40%) patients. Percutaneous abscess drainage was performed on the second day of admission on 1(16.6%) conservatively-treated patient due to intra-abdominal abscess which was removed after US control on the 6th day of admission. No mortality was observed during the entire observation period. All 11(100%) patients underwent colonoscopy

examination at 6 weeks. Patients were called by phone or their hospital records were documented within a median time of 52 months (IQR: 16-110 months). Only 1(9%) patient had a complaint of right lower quadrant pain after the fifth month of discharge, and was cured with the use of oral anti-biotherapy without hospitalisation.

Discussion

The diverticulum of caecum is believed to be a congenital anomaly arising during the 6th week of gestation.[14] The diverticulum of caecum is asymptomatic in most patients and diagnosed in cases of inflammation, bleeding and perforation.[15,16] SCD usually mimics acute appendicitis and is often diagnosed during surgery. Appendectomy is performed for up to 75% of SCD patients due to the fact that patients with SCD are usually admitted to an emergency department with right lower quadrant pain, fever and leukocytosis.[7,17] SCD is differentiated from acute appendicitis by long-term abdominal pain, absence of findings of systemic inflammation, presence of vomiting and nausea as a predominant symptom, and the abdominal pain starts on the right lower quadrant with no migration.[2] Despite this clinical information, it is very difficult to diagnose SCD before surgery. The appearance of diverticular formation and healthy appendix in radiological methods are clues for diagnosis. The rate of preoperative accurate diagnosis has increased with the use of CT.[9,10,18]

Compared to the average age of the patients, SCD is detected earlier (mean age in our study: 49,2 years) than the left colon diverticulitis. The mean age in the current study was 49.2 years. Acute appendicitis-like clinical and laboratory findings were detected in all patients. USG is the first preferred radiological modality at the facility where the current study was conducted for patients with right lower quadrant abdominal pain. Abdominal contrast-enhanced CT scans may be preferred in cases if clinical signs and US findings are unclear or controversial. Six of 8 patients with non-diagnostic abdominal USG were diagnosed as SCD by the use of CT without the need of surgical treatment.

Abdominal CT provides detailed information on SCD and its relation to adjacent organs.[19] Lee at al. reported that the CT finding of acute right colon diverticulitis was bowel wall thickening, submucosal thickening with diffuse low density, peri-colic fat stranding, presence of diverticula or an inflamed diverticulum, evidence of peri-colic phlegmon, and the presence of a normal appendix.[20] Another study reported that 91.6% patients had colonic wall thickening and oedema, and 75% had peri-colonic fat infiltration.[10] Several published series demonstrate that correct preoperative clinical diagnosis occurs in 4% to 16% cases.[21] In our study, while 87% of the 8 abdominal CT-performed patients had caecum wall thickening, 100% of them had oedema, and 75% (n: 6) of these patients had a normal appendix appearance and diverticula formation in the caecum. Six of the patients who were diagnosed with the use of abdominal CT were treated conservatively while the other 2 patients were operated because of the perforation of diverticula and existence of peri-colonic abscess that could not be distinguished from acute appendicitis. As seen in our study, abdominal CT imaging is important in cases of unexplained diagnosis to clarify pathology and may prevent unnecessary surgical procedures.

Lack of randomised controlled trails (RCTs) and symptomatic cases causes one to choose from various treatment options ranging from conservative to surgical treatment of SCD. Conservative treatment methods, including antibiotic, analgesic and IV fluid therapy, can be successfully applied to SCD patients diagnosed preoperatively.[10,18,22,23] Within a mean of 3 years, 20% of patients treated conservatively will have a recurrent attack and, all over again, if the diagnosis of SCD is definite, conservative treatment can be applied.[21] In our group, one patient with peri-colic abscess was treated with percutaneous abscess drainage, IV anti-biotherapy and bowel rest. No complications were observed in the patients treated conservatively. Recurrence rate was 16.6% and the third attack was not detected during our follow-up examinations.

In SCD patients if the diagnosis is made intraoperatively, the treatment approach is highly controversial. In some studies, it is suggested that if diverticulectomy is not possible, the right hemicolectomy is performed in the presence of generalised inflammation or the tumour suspicion cannot be ruled out.[23,24] A study emphasised that appendectomy could be justified to avoid misdiagnosis in case of future episodes of SCD.[23] Similar studies have reported that diverticulectomy and appendectomy can be done safely with laparoscopic or open method to these patients.[25,26] For the patients diagnosed peroperatively, the surgical procedure was determined according to the extent and aetiology of the disease. In a patient with hemicolectomy, the extent of inflammation and the presence of perforation on the caecum wall was the guiding factor in determining the surgical technique. For the remaining patients treated by the surgical approach, we applied appendectomy and/or diverticulectomy and drainage. The reason of performing appendectomy is to avoid misdiagnosis in case of future episodes of right lower quadrant pain.

In line with our findings, we developed an algorithm related to diagnosis and treatment of SCD patients with right lower quadrant pain (Figure-2).

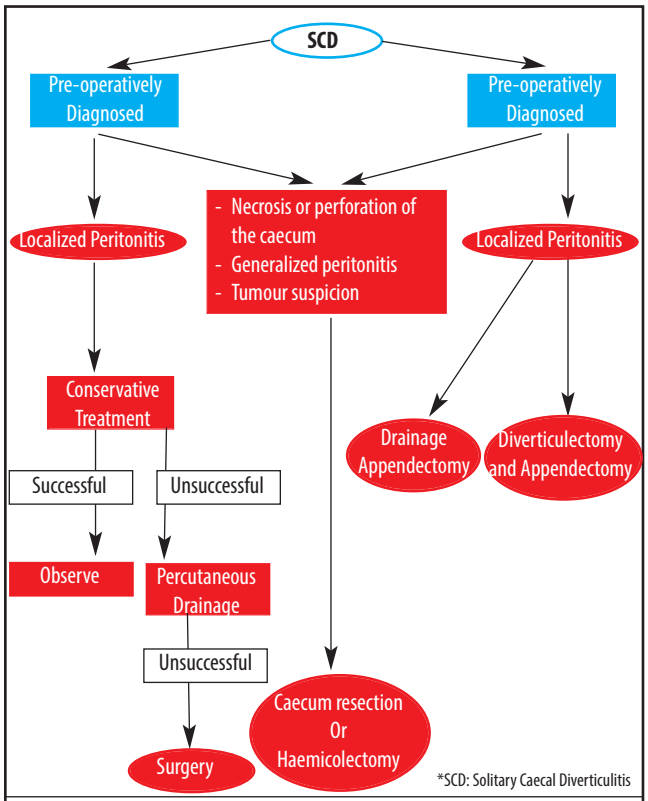

Figure-2: Algorithm for diagnosis and treatment of patients with Solitary Caecal Diverticulitis (SCD).

Conclusion

Although SCD is operated due to acute appendicitis-like symptoms, it is possible to diagnose it by use of abdominal CT in cases where appendix is not seen in US. The success ratio of conservative treatment is high except in cases with the generalised peritonitis. If the accurate diagnosis is made during the preoperative period, the spread of the pathology helps to choose the best suitable surgical technique. Appendectomy should be performed to avoid future misdiagnosis.

Disclaimer: None.

Conflict of interest: None

Source of Funding: None.

References

1. Potier F. Diverticulite et appendicite. Bulletins et Memoires de la Societe Anatomique de Paris 1912; 71: 29-31.
2. Shyung LR, Lin SC, Shih SC, Kao CR, Chou SY. Decision making in right-sided diverticulitis. World J Gastroenterol 2003; 9: 606–8.
3. Law WL, Lo CY, Chu KW. Emergency surgery for colonic diverticulitis: differences between right-sided and left-sided lesions. Int J Colorectal Dis 2001; 16: 280–4.
4. Connolly D. Solitary caecal diverticulitits. Ulster Med J 2006; 75: 158.
5. Mudatsakis N, Nikolaou M, Krithinakis K, Matalliotakis M, Politis N, Andreadakis E. Solitary Cecal Diverticulitis: An Unusual Cause of Acute Right Iliac Fossa Pain—A Case Report and Review of the Literature. Case Rep Surg 2014; 2014: 131452.
6. Keidar S, Pappo I, Shperber Y, Orda R. Cecal diverticulitis: A diagnostic challenge. Dig Surg 2000; 17: 508–12.
7. Cole M, Ayantunde AA, Payne J. Cecal diverticulitis presenting as acute appendicitis: a case report. World J Emerg Surg 2009; 4: 29.
8. Park HC, Chang MY, Lee BH. Nonoperative management of right colonic diverticulitis using radiologic evaluation. Colorectal Dis 2010; 12: 105-8.
9. Griffiths EA, Date RS. Acute presentation of solitary caecal diverticulum. J Med Case Reports 2007; 1: 129.
10. Yardımcı E, Hasbahçeci M, İdiz UO, Atay M, Akbulut H. Is surgery necessary to confirm diagnosis of right-sided diverticulitis in spite of relevant clinical and radiological findings? Ulus Travma Acil Cerrahi Derg 2017; 23: 61-5.
11. Jacobs DO. Clinical practice. Diverticulitis. N Engl J Med 2007; 357: 2057–66.
12. Hildebrand P, Kropp M, Stellmacher F, Roblick UJ, Bruch HP, Schwandner O. Surgery for right-sided colonic diverticulitis: results of a 10-year- observation period. Langenbecks Arch Surg 2007; 392: 143–7.
13. How to Guide. University Hospitals Bristol NHS Foundation Trust. [Online] 2012 [Cited 2019 May 10]. Available from: URL: http://www.uhbristol.nhs.uk/for-clinicians/clinicalaudit/how-to-guides/
14. Ruiz-Tovar J, Reguero-Callejas ME, Palacios FG. Inflammation and perforation of a solitary diverticulum of the cecum. A report of 5 cases and literature review. Rev Esp de Enferm Dig 2006; 98: 875-80.
15. Griffiths EA, Bergin FG, Henry JA, Mudawi A. Acute inflammation of a congenital cecal diverticulum mimicking appendicitis. Med Sci Monit 2003; 9: 107–9.
16. Papapolychroniadis C, Kaimakis D, Fotiadis P, Karamanlis E, Stefopoulou M, Kouskouras K, et al. Perforated diverticulum of the caecum. A difficult preoperative diagnosis. Report of 2 cases and review of the literature. Tech Coloproctol 2004; 8: 116–8.
17. Papaziogas B, Makris J, Koutelidakis I, Paraskevas G, Oikonomou B, Papadopoulos E, et al. Surgical management of cecal diverticulitis: is diverticulectomy enough? Int J Colorectal Dis 2005; 20: 24–7.
18. Kim MR, Kye BH, Kim HJ, Cho HM, Oh ST, Kim JG. Treatment of Right Colonic Diverticulitis: The Role of Nonoperative Treatment. J Korean Soc Coloproctol 2010; 26: 402-6.
19. Andrew L, Andrew C. Right-Sided Sigmoid Diverticular Perforation. West J Emerg Med 2012; 13: 103-5.
20. Lee IK, Jung SE, Gorden DL, Lee YS, Jung DY, Oh ST, et al. The diagnostic criteria for right colonic diverticulitis: prospective evaluation of 100 patients. Int J Colorectal Dis 2008; 23: 1151-7.
21. Telem DA, Buch KE, Nguyen SQ, Chin EH, Weber KJ, Divino CM. Current recommendations on diagnosis and management of right-sided diverticulitis. Gastroenterol Res Pract 2009; 2009: 359485.
22. Cristaudo A, Pillay P, Naidu S. Caecal diverticulitis: presentation and management. Ann Med Surg 2015; 4: 72-5.
23. Koshy RM, Abusabeib A, Al-Mudares S, Khairat M, Toro A, Carlo ID. Intraoperative diagnosis of solitary cecal diverticulum not requiring surgery: is appendectomy indicated? World J Emerg Surg 2016; 11:1.
24. Park SM, Kwon TS, Kim DJ, Lee YS, Cheung DY, Oh ST, et al. Prediction and management of recurrent right colon diverticulitis. Int J Colorectal Dis 2014; 29: 1355–60.
25. Connolly D, McGookin RR, Gidwani A, Brown MG. Inflamed solitary caecal diverticulum - it is not appendicitis, what should I do? Ann R Coll Surg Engl 2006; 88: 672–4.
26. Hot S, Eğin S, Gökçek B, Yeşiltaş M, Alemdar A, Akan A, et al. Solitary caecum diverticulitis mimicking acute appendicitis. Ulus Travma Acil Cerrahi Derg 2015; 21: 520-3.