

Acute Diverticulitis: A Small Retrospective Study Leaving Many Questions Unanswered

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Abstract

Diverticulitis is a common cause of abdominal pain in patients presenting to emergency departments. The incidence increases with age. Guidelines for its diagnosis and treatment are evolving. Computerized axial tomography (CT) scanning has been the most commonly used diagnostic tool. There are concerns for the increasing number of CT scans routinely ordered, with the resultant radiation exposure. We discuss this controversy as well as those regarding medical and surgical treatment. In addition, we have reviewed cases of patients who presented with abdominal pain and were diagnosed with uncomplicated diverticulitis based on clinical parameters and CT findings. We analyzed outcomes and presented a number of issues being questioned about this frequent illness. The study, which was retrospective and small, did not allow for definitive conclusions but highlights that randomized investigations need to be performed in the future to further clarify ongoing questions about diverticulitis.

Introduction

Diverticulitis is most often uncomplicated – without perforation, obstruction, abscess, or fistula. Current standards of care in diagnosis and treatment of this disease are being revised.¹⁻⁴ We wished to explore this controversial topic and analyze presentation, progression of care, and outcomes of patients diagnosed and treated with diverticulitis in our institution over a 15-month period. The patients considered did not require surgical intervention.

Study Design

This was a retrospective study based on an administrative database search audit to identify emergency department (ED) patients diagnosed with diverticulitis during a 15-month period of January 1, 2010, to March 31, 2011. The study was exempted by the Institutional Review Board.

Study Setting and Population

The emergency department is a division of a large metropolitan Veterans Administration Healthcare Center, federally run, which predominantly serves a male population. The Healthcare Center provides emergency services as well primary care. Patients receive medical, surgical, mental health, and dental care at the Center. The computerized patient record system allows access to notes from all visits, whether in the emergency department or in the clinic setting. It also provides complete records of all laboratory data, results of radiological examinations, as well as communication with patients via telephone conversations. This computerized system ensures accurate information regarding follow-up of patients.

Study Protocol

The focus of the study was to determine the effectiveness of treatment of patients presenting to the emergency department who were diagnosed with diverticulitis, not requiring surgical intervention, based on clinical parameters and CT findings.

The cases included in the study were captured from the Hospital's data base using the International Classification of Diseases Ninth Revision (ICD-9) diagnosis codes. The charts of the patients with ICD-9-CM 562.11 code (diverticulitis) were reviewed and analyzed for clinical findings, CT scan findings, prescribed therapy, admission decisions, and clinical outcomes, as well as initial physical examination. We also evaluated treatment strategies for clinical complications, resolution of disease, and change in management strategy. Patients in septic shock or those hemodynamically compromised were excluded from the study. Patients with generalized peritonitis were likewise excluded, since the goal of the study was to evaluate conservative therapy of patients not requiring aggressive surgical treatment.

Data Analysis

Chart reviews of the patient population yielded descriptive statistics allowing for analysis of multiple variables. These included length of hospital stay, findings of CT scans, prescribed therapy with outcome, initial treatment success, age range, most common presenting symptoms, clinical assessment of emergency medicine attending physicians, and ultimate outcome of patients with initial treatment failure.

Results

A total of 50 case records were identified in the hospital data base indicating eligibility for the study. All but one patient were male; the ages ranged from 28-89 years old, with median age of 62. The emergency department complaints were: isolated left lower quadrant pain 40%; generalized abdominal pain (with history of diverticular disease) 35%; non-localized abdominal pain with multiple episodes of soft stool 25%. On physical examination, all of the patients in the study exhibited left lower quadrant tenderness without peritonitis. All of the patients underwent CT scans of the abdomen and pelvis with oral and intravenous contrast during their index Emergency Department visit. The physicians wished to document the diagnosis definitively before disposition was determined. Of all, 42 patients were diagnosed with diverticulitis without abscess, and eight patients had diverticulitis with abscesses ranging in size from 1.5cm to 5cm. Of the 42 patients with diverticulitis without abscess, 21 were admitted and treated with intravenous antibiotics, and 21 were treated with oral antibiotics as outpatients. Patients treated with oral antibiotics were considered reliable, able to tolerate the PO medication, lacked significant co-morbidities, and had adequate social support. The decision was made by experienced emergency attending physicians who weighed the clinical picture and were certain of rapid follow-up. These factors were documented in the chart notes of the attending physicians.

Of the 21 patients diagnosed with diverticulitis on CT scan and treated as outpatients, three required subsequent admission for persistent pain. Each of these patients improved within two days once intravenous antibiotics were started and required no

intervention. Of the patients who failed outpatient treatment, none had leukocytosis, significant tenderness, or a high fever on the initial visit.

Of the 21 patients admitted to the hospital with diverticulitis without abscess, all improved within two days of inpatient treatment, at which time they were tolerating food and had very mild or no abdominal pain. Of the eight patients with diverticulitis and abscess, three declined admission and were discharged with oral antibiotics. There were no treatment failures in the group. The other five patients with abscesses were admitted for intravenous antibiotics. None of the abscesses were drained by interventional radiology or surgically. One patient who initially had a 3 cm abscess was re-scanned after 16 days of intravenous antibiotics, and his abscess had decreased to 1.5 cm. The patient with the largest abscess of 5 cm did not have percutaneous drainage because of past hernia repair with mesh placement thought to be problematic by interventional radiologists. He improved rapidly and was discharged after four days of intravenous antibiotics. Chart documentation of clinical improvement consisted of lack of fever, lack of abdominal pain, and ability to tolerate diet. The patients treated with intravenous antibiotics received metronidazole and ampicillin/sulbactam for ten days.

The percentage of treatment failures of those treated with oral antibiotics, including those with Abscesses, was 12.4%. Oral antibiotics consisted of ten days of treatment with metronidazole and ampicillin/sulbactam. None of the patients in this cohort with abscesses and treated with antibiotics failed treatment, despite no drainage.

All of the patients were followed post-discharge in out-patient clinics or by telephone to confirm resolution of symptoms and no recurrence. None returned to the emergency department.

Discussion

Although diverticulitis is common, multiple questions remain about its diagnosis, treatment, and prevention.

Diverticulitis is a common illness and incidence will increase as the population ages.^{4,5} There are multiple aspects of this disease requiring further study and clarification. Our small, retrospective study did not provide conclusive evidence and only highlighted some of the questions that need to be clarified with prospective, randomized trials.

The most effective medical as well as surgical treatment of uncomplicated diverticulitis, for example, is being reviewed by experts. The use of antimicrobials, type of antimicrobials, and route of required antibiotics are also being questioned. Furthermore, the need for drainage of small-to-moderate abscesses by interventional radiologists or with traditional open surgery is currently controversial, as is the most effective manner to prevent recurrence.

Diagnostic Testing

There are those who feel that clinical acumen is sufficient to make accurate diagnoses of some causes of abdominal pain, such as renal colic or recurrent acute diverticulitis, without obtaining an immediate Computerized Axial Tomographic Scan. This would decrease exposure of patients to harmful radiation and increase costs.⁶ This commonly occurs in clinic settings, where patients are diagnosed clinically with recurrent diverticulitis and discharged home to start bowel rest and antimicrobials.⁷ A recent study was performed suggesting some parameters may be helpful to accurately diagnosis uncomplicated diverticulitis, and use of these parameters may reduce the need for CT imaging in some cases. These parameters included localized left lower quadrant tenderness, no vomiting, and elevated CRP.⁸

Some agree that patients with localized left lower quadrant tenderness without peritoneal signs, who are able to tolerate oral antibiotics, have no significant co-morbidities, and are reliable to return if their symptoms worsen, can be safely discharged with presumptive diagnosis of mild diverticulitis. They would be instructed to follow bowel rest and take antimicrobials. This is advocated particularly in patients who have previous history of documented diverticulitis.⁹ There are advocates who support the notion that, if patients have rapid follow-up or will return for CT scan within 48 hours if their condition worsens, foregoing an immediate scan from the emergency department may be considered. If a patient presents with localized left-sided abdominal pain and has no peritoneal signs and is presumptively diagnosed with uncomplicated diverticulitis, but there are subsequent questions about the accuracy of the diagnosis, the CT scan can be performed after a short interval of treatment and observation.³ This approach might be possible under selected circumstances with very reliable patients who have family support and understanding. In case of possible underlying malignancy, patients would undergo a colonoscopy after the acute symptoms improve and the patient is clinically stable. Certainly a colonoscopy would be recommended if the patient improved clinically and did not have a colonoscopy within the previous five years.

Treatment without immediate CT scan on presentation, however, is reasonable only under select circumstances. In obese, elderly, or immunosuppressed patients with abdominal pain who may present atypically, CT scan of the abdomen and pelvis would be the appropriate immediate diagnostic tool in the emergency department. Likewise, patients with diffuse abdominal pain of unknown etiology, septic patients, or those demonstrating peritoneal signs on examination would require this test emergently.³ Older patients who may not reveal peritonitis despite having perforations should also undergo CT scans upon presentation. Such patients would also certainly require rapid assessment by surgeons.

D.J. Brenner, at the Center for Radiological Research Columbia University Medical Center, New York, has written of the increasing numbers of CT scans being done which may not be necessary. Dr. Brenner suggests scans may be reasonably

replaced with other radiological imaging tests. He feels that developing and using new guidelines for patient disposition and treatment would decrease unneeded CT scans.¹⁰ His approach should be used cautiously under limited circumstances.

It is true, however, that emergency physicians commonly underestimate radiation doses from CT scans of the abdomen and pelvis, which is 15.0 mSv, while the dose from one chest x-ray is 0.1 mSv. In addition, estimates that 1.5% to 2.0% of all cancers in the United States are attributable to radiation exposure from CT scans have been published.¹¹ It is imperative, therefore, that when CT scans are ordered by emergency physicians, the risks and benefits are weighed carefully.

The cost effectiveness of CT scans has only been demonstrated in patients clinically suspected of acute appendicitis. It has been suggested that ultrasound may serve well as an initial diagnostic test in patients with abdominal pain to decrease cost and avoid radiation exposure.¹² There is evidence that ultrasound can be quite useful for making accurate diagnosis of uncomplicated diverticulitis and is also an effective tool to monitor response to treatment. The sensitivity in diagnosing acute colonic diverticulitis for ultrasound is 92% versus 94% for CT scan. Specificity for ultrasound is 90% as opposed to 99% for CT scan. Its use should be considered with caution, however, since its reliability is somewhat dependent on technical skill.¹³

Use, Choice, and Duration of Antibiotics Also Uncertain

Some recent publications have demonstrated that uncomplicated diverticulitis may be treated successfully with a short course of antibiotics, and others, in fact, demonstrate that antibiotics are not needed at all.^{14,15,16} There are ongoing studies to reassess these notions. Uppsala University is sponsoring ClinicalTrials.gov Identifier NCT01008488 to evaluate if antimicrobial treatment is necessary to treat uncomplicated colonic diverticulitis and to test if not treating with antibiotics will result in complications. A second study sponsored by University of Amsterdam, Clinical Trials.gov Identifier NCT0111253, is investigating whether using antimicrobials lessens time to full recovery from an attack of mild diverticulitis compared to supportive therapy only.

Which antibiotics are best is also being questioned. Most current recommendations for the appropriate selection of antimicrobials for treatment of diverticulitis are based on studies of severe intra-abdominal infections, tradition, clinical consensus, and indirect evidence. They are not based on careful prospective trials. The optimum duration antimicrobials should be administered is also unclear.^{9,17,18} A recent study compared the efficacy of four days therapy with ertapenem and seven days therapy with standard antibiotics in treatment of uncomplicated sigmoid diverticulitis. The overall success rate at one month following treatment was 94% versus 96.2%.¹⁴ Furthermore, multiple studies have been published concluding that ambulatory treatment of simple diverticulitis is effective and safe provided patients can tolerate PO medication and have adequate support of families.^{18,19,20,21}

Effective Treatment of Abscesses in Dispute

There is on-going dispute regarding the size of abscesses that can be treated effectively with only antibiotics, oral or intravenous, and those which need drainage.²²⁻²⁴ Recent publications have reported patients with abscesses less than 3 cm responding well to oral antibiotics, with a success rate of almost 95%.²⁵ One publication compared two groups with abscesses, the first with median size 6 cm, treated with percutaneous drainage, and the second with median size 4 cm treated with antimicrobials alone. The failure rate in the first group was 33%, and the failure rate in the second was 19%, despite more aggressive treatment of the first.²⁶ Another recent study demonstrated an overall success rate over 90% in treating patients non-operatively with complicated diverticulitis, some with abscesses greater than 4 cm or with free air distant from the site of perforation.²⁷ This issue needs clarification.

Role of Surgical Intervention to Prevent Recurrence Unclear

The role of surgical resection to prevent recurrence is unclear. The indications for elective sigmoid resection in patients with multiple attacks of acute diverticulitis are being challenged, as stated by The Society for Surgery of the Alimentary Tract. Several publications discuss this uncertainty.^{1-3,18,22,23,28}

Pathophysiology Under Investigation

The pathophysiology of the disease is under investigation with the goal of prevention. Increased fiber in the diet has been espoused in the past as a tool for prevention of recurrence. As diverticular disease is better understood, however, and appears to have common overlapping clinical findings with inflammatory bowel disease, the use of 5-aminosalicylic acid and probiotics may also prove effective. The inflammation of diverticulum seems to be the result of greater production of pro-inflammatory cytokines, greater intramucosal nitric oxide production, and less anti-inflammatory cytokine synthesis. There is evidence that diet which is fiber deficient results in changes in colonic microflora leading to an increase in pathogenic bacteria. The combination of rifaximin, a broad spectrum antibiotic, and mesalamine seem to prevent disease recurrence by de-activating the inflammatory cascade caused by alterations in the colonic micro-ecology. Probiotics, rifaximin, and mesalamine seem to down-regulate the inflammatory cascade caused by bacterial overgrowth with resultant increased mucosal levels of interleukin-1 and tumor necrosis factor alpha.^{1,3,18,23} This therapy may demonstrate effectiveness in the future.

On the other hand, the traditional recommendation to avoid corn, nuts, and seeds in the diet was not based on clinical trials. Antispasmodic and anticholinergic agents have been used in treatment, but, again, there have been no well controlled studies to prove their clinical efficacy.⁹ Thus, the approach for

effective treatment and prevention of recurrence is evolving as the pathophysiology is becoming clearer and the concept of diverticular disease changes.^{1,3,18,23}

Recommendations Are in Transition

The diagnostic strategies and treatment recommendations for diverticulitis are in transition. The routine ordering of immediate CT scans for emergency department and primary care clinic patients may be increasing radiation exposure without clear benefits.²⁹ There are physicians who treat patients with signs of uncomplicated diverticulitis empirically without obtaining immediate imaging studies, particularly if there is a history of diverticulosis.³⁰ Clinical judgment with presence of specific parameters or use of sonogram may be reasonable, safe alternatives to immediate CT scanning in selected patients. This group would not include, however, the elderly, obese, or immunosuppressed. Further investigations are certainly required to answer this controversy more definitively.

Shorter duration of antibiotic administration for simple diverticulitis may be curative. The absolute need for antimicrobials in addition to bowel rest to effectively treat simple diverticulitis is also being questioned. Entities such as micro-perforations and localized abscesses have been treated medically with success. The need for drainage of abscesses of moderate size remains unclear. This question is under scrutiny. Indications for elective resection also warrant further investigation. Some surgeons advocate treating non-feculent perforated diverticulitis with laparoscopy, copious lavage, and antibiotic therapy. The need for open surgery as performed in the past is another aspect of this illness that is being debated.

As the pathophysiology of the disease becomes clearer, probiotics, rifaximin, and 5-ASA may become part of the armamentarium to prevent recurrences. The effectiveness of using these adjuncts in addition to recommending high fiber diet will hopefully be revealed in the future. The other questions under investigation include employing the most effective diagnostic tools with the least risks to the patient, the best medical treatment, the need to drain small- to moderate-size abscesses, as well as the surgical approach with most benefit, and will be demonstrated by future randomized trials.^{1-28,31}

Our small retrospective study demonstrated effective treatment with antibiotics and bowel rest of 50 patients diagnosed with uncomplicated diverticulitis without and with abscesses up to 5 cm. This study merely highlights one of the on-going controversies currently being debated about this common illness, and there is no doubt that future, randomized trials must be performed to provide evidence to answer the many questions that remain.

Limitations

The first limitation of our small study is its retrospective nature. We did not study those who required immediate surgical intervention. Patients with generalized peritonitis were also

not part of the study cohort. In addition, patients who were seriously ill or septic were not included, and there was only one female in the study. We did not include patients who were thought clinically to have diverticulitis but whose CT scans revealed other diagnoses. Finally, patients with diverticulosis were not part of the study cohort. We analyzed the outcomes of patients known to have uncomplicated diverticulitis with and without abscesses, all treated with either oral or intravenous antibiotics alone. None of the patients with abscesses had surgical drainage or drainage performed by interventional radiologists.

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Conclusion

There are many on-going studies to determine the most reliable and safe diagnostic tools and treatment for uncomplicated diverticulitis. The patients in our study were diagnosed based on clinical parameters and CT findings and were found to have simple diverticulitis with or without abscess. They were all effectively treated with medication and bowel rest only, and none required abscess drainage for full recovery.

It is clear that diverticulitis is being more conservatively treated over time. Prospective studies are warranted to determine the best strategy for evaluation of simple, clinically-evident diverticulitis, keeping in mind the risks of intravenous nephrotoxic contrast, the radiation exposure from CT scans, and the financial burden which occurs from excessive testing. The safety of administering intravenous or oral antimicrobials in treatment of this illness complicated by small to moderate abscesses without drainage is still uncertain. Randomized trials are needed to ascertain which patients may be effectively treated without hospitalization, what antimicrobials are most appropriate, and the duration antibiotics should be administered for full recovery. There are ongoing studies to determine whether patients with uncomplicated diverticulitis require antibiotics at all or if supportive care alone is sufficient. As the physiology of diverticulitis is unfolded, the benefit of probiotics, rifaximin, and mesalamine to reduce bacterial overgrowth, inflammation, and reduce recurrences will hopefully be clarified. The most effective surgical approach for diverticulitis is also being questioned. It has become clear that this disease may range in severity from mild to life-threatening. The dogma requiring aggressive medical treatment, percutaneous drainage, and extensive surgical resection electively or emergently needs to be re-assessed with this revised view of diverticulitis.¹⁻³¹

References

1. Tursi A. Diverticular disease: A therapeutic overview. *World J Gastrointest Pharmacol Ther.* 2010;1(1):27-35.
2. Mccafferty MH, Roth L, Jorden J. Current Management of Diverticulitis. *The American Surgeon.* 2008;74(11):1041-1049.
3. Tursi A, Papagrigroriadis S. Review Article: The current and evolving treatment of colonic diverticular disease. *Aliment Pharmacol Ther.* 2009;30:532-546.
4. Liljgren G, Chabok A, Wickbom M, Smedh K, et al. Acute colonic diverticulitis: a systematic review of diagnostic accuracy. *Colorectal Disease.* 2007;9:480-488.
5. Jacobs DO. Diverticulitis. *N Engl J Med.* 2007;357(20):2057-2066.
6. Howell JM, Eddy OL, Lukono TW, Thiessen M, et al. Clinical Policy: Critical Issues in the Evaluation and Management of Emergency Department Patients with Suspected Appendicitis. *Ann Emerg Med.* 2010;55:71-116.
7. O'Connor ES, Levenson G, Kennedy G, Heise CP. The Diagnosis of Diverticulitis in Outpatients: On What Evidence? *J Gastrointest Surg.* 2010;14(2):303-308.
8. Lameris W, van Randen A, van Gulik TM, Busch R, et al. A clinical decision rule to establish the diagnosis of acute diverticulitis at the emergency department. *Dis Colon Rectum.* 2010;53(6):896-904.
9. Stollman NH, Raskin JB. Diagnosis and Management of Diverticular Disease of the Colon in Adults. *Amer J of Gastroenterol.* 1999;94:3110-3121.
10. Brenner DJ. Should we be concerned about the rapid increase in CT usage? *Rev Environ Health.* 2010;25(1):63-68.
11. Brenner DJ, Hall EJ. Computed Tomography-An Increasing Source of Radiation Exposure. *N Engl J Med.* 2007;357:2277-2284.
12. Stoker J, Van Randen A, Lameris W, Boermeester MA. Imaging Patients with Acute Abdominal Pain. *Radiology.* 2009;253(1):31-46.
13. Mizuki A, Nagata H, Tatemichi M, Kaneda S, et al. The out-patient management of patients with acute mild-to-moderate colonic diverticulitis. *Aliment Pharmacol Ther.* 2005;21:889-897.
14. Schug-Pass C, Geers P, Hugel O, Lippert H. Prospective randomized trial comparing short-term antibiotic therapy versus standard therapy for acute uncomplicated sigmoid diverticulitis. *Int J Colorectal Dis.* 2010;25(6):751-9.
15. De Korte N, Unlu C, Boermeester MA, Cuesta MA. Use of antibiotics in uncomplicated diverticulitis. *British J of Surgery.* 2011;98:761-767.
16. Hjern F, Josephson T, Altman D, Holmstrom B, et al. Conservative treatment of acute colonic diverticulitis: Are antibiotics always mandatory? *Scan J of Gastro.* 2007;42:41-47.
17. Byrnes MC, Mazuski JE. Antimicrobial therapy for acute colonic diverticulitis. *Surg Infect.* 2009;10(2):143-54.
18. Szojda MM, Cuesta MA, Mulder CM, Felt-Bersma RJF. Review Article: management of diverticulitis. *Aliment Pharmacol Ther.* 2007;26 S2:61-76.
19. Pelaez N, Pera M, Courtier R, Sanchez J, et al. Applicability, safety and efficacy of an ambulatory treatment protocol in patients with uncomplicated acute diverticulitis. *Cir Esp.* 2006;80(6):369-72.
20. Ridgway PF, Latif A, Shabbir J, Ofriokuma F, et al. Randomized controlled trial of oral vs. intravenous therapy for the clinically diagnosed acute uncomplicated diverticulitis. *Colorectal Dis.* 2009;11(9):941-6.
21. Alonso S, Pera M, Peres D, Pascual M, et al. Outpatient treatment of patients with uncomplicated acute diverticulitis. *Colorectal Dis.* 2009;2:e278-282.
22. Stocchi L. Current indications and role of surgery in the management of sigmoid diverticulitis. *World J Gastroenterol.* 2010;16(7):804-817.
23. Beckham H, Whitlow CB. The Medical and Nonoperative Treatment of Diverticulitis. *Clin Colon Rectal Surg.* 2009;22:156-60.

24. Vermeulen J, Lange JF. Treatment of Perforated Diverticulitis with Generalized Peritonitis: Past , Present and Future. *World J Surg.* 2010;34(3):587-593.
25. Martin GJ, Serralta DeColsa D, Garcia MA, Vaquero Rodriguez A, et al. Safety and efficiency of ambulatory treatment of acute diverticulitis. *Gastroenterol Hepatol.* 2009;32(2):83-7.
26. Brandt D, Gervaz P, Durmishi Y, et al. Percutaneous CT scan guided drainage vs. antibiotherapy alone for Hinchey II diverticulitis: a case control study. *Dis Colon Rectum.* 2006;49(10):1533-8.
27. Dharmarajan S, Hunt SR, Birnbaum EH, Fleshman JW, et al. The efficacy of nonoperative management of acute complicated diverticulitis. *Dis Colon Rectum.* 2011;54(6):663-71.
28. Ibele A, Heise CP. Diverticular disease: update. *Curr Treat Options Gastroenterol.* 2007;10(3):248-56.
29. Smith-Bindman R, Miglioretti DL, Larson EB. Rising Use of Diagnostic Medical Imaging in a Large Integrated Health System. *Health Aff.* 2008;27(6):1491-1502.
30. DeStigter KK, Keating DP. Imaging Update: Acute Colonic Diverticulitis. *Clin Colon Rectal Surg.* 2009;22(3):147-155.
31. Hogan A, Winter D. Management of Acute Diverticulitis: Is Less More? *Dis Colon Rectum.* 2011;54:126-128.