

# EVMS EM JC CRITICAL REVIEW FORM: THERAPY ARTICLES

**Resident:** Kaitlynn Butler

**Date:** 5/23/22

**Citation:** Thorisson A, Nikberg M, Torkzad MR, Laurell H, Smedh K, Chabok A. Diagnostic accuracy of acute diverticulitis with unenhanced low-dose CT. *BJS Open*. 2020 Aug;4(4):659-665. doi: 10.1002/bjs5.50290. Epub 2020 May 20. PMID: 32431087; PMCID: PMC7397358.

## **Background:**

Diverticulitis is a fairly common reason for referral to the ED. Although the clinical finding of isolated LLQ pain has a high likelihood ratio ([LR+10.1](#)) the overall accuracy of the PE has been reported at 50% Standard dose CT with IV contrast enhancement is currently the method of choice in diagnosing acute diverticulitis. SDCT has been cited to have 94-95% sensitivity and 96-99% specificity for diverticulitis. There is currently a nationwide IV contrast shortage which has prompted us to assess available data regarding the impact of non-enhanced CT has on the diagnostic accuracy of acute diverticulitis and its potential complications.

## **Study Objectives:**

“Evaluate whether unenhanced low dose CT (LDCT) is as accurate as SDCT in detecting suspected acute colonic diverticulitis.”

## **Study Methodology:**

Prospective observational study conducted in two hospitals in Sweden

From January to October 2017, all consecutive patients 50 years or older admitted to the ED with clinically suspected diverticulitis asked to participate

- Defined clinically suspected diverticulitis as pain in LLQ on PE, CRP above 25 mg/l, WBC greater than  $10 \times 10^9/l$
- Exclusion criteria of pregnancy, CI to contrast, lack of informed consent
- Enrolled 149 patients of 272 screened for enrollment, 71.8% women

First underwent LDCT and then SDCT (64-slice)

CT scans reviewed by three independent radiologists, two abdominal radiology consultants with 5 and 15 years of experience and one fourth year radiology resident

- Examined for signs of diverticulitis, complications, and presence of other acute diagnoses
- First examined LDCT, then 4 weeks later examined SDCT
- Diagnosis based on consensus between specialists on SDCT examinations (considered as reference or “gold standard”)
  - o Diverticulitis defined as colonic wall thickening greater than 5 mm, visible diverticula and pericolic fat stranding
- In case of disagreement, CT scans were evaluated a second time together and a consensus was reached

Two sided p-value below 0.05 was considered significant

Calculated sensitivity and specificity

Intraobserver and interobserver agreements assessed using kappa value and respective

asymptotic standard error (ASE)

Categorized as poor (below 0.2), low (0.21-0.40), moderate (0.41-0.60), good (0.61-0.80), and excellent (above 0.80)

## Randomization and Blinding

Readers were blinded to patient outcomes, previous CT findings, and one another's findings.

## What were the results

Enrolled 149 patients

107 women (71.8%)

Mean BMI of 28.8, body temp of 37.4, CRP of 82,, WBC count of 11.8

Overall, 107/149 (71.8%) met criteria for diverticulitis by SDCT

- LDCT overall performed well for diagnosing acute diverticulitis – it showed sensitivity of 98.6% and specificity of 98% for the two consultants combined (so this did not include the resident)
  - for the resident 95.3%, 86% and  $k = 0$ .
- Intraobserver agreement was excellent for the consultants ( $k = 0.984$  and  $0.934$ ) and good for the resident ( $k = 0.816$ )
- Reasons for the presentation of abdominal symptoms other than diverticulitis were found in 26 patients on SDCT, 23 (88%) diagnosed correctly on LDCT protocol
- Cases missed using LDCT include splenic infarction and two cases of segmental colitis
- For complications, readers reached a consensus on 33 patients having signs of a complication on SDCT.
- LDCT performed poorly with regards to the Presence of complications of diverticulitis. Sensitivity of 61% and 73% for the consultants and 58% for the resident. (specificities of 100%, 95%, and 78% respectively). Kappa values of 0.680, 0.703, and 0.354 respectively. So, intraobserver agreements were not so great for presence of complications in LDCT.
- Specifically for presence of an abscess, sensitivities were 38%, 23% and 15% (kappa 0.487, 0.285, and 0.189).
- The authors do point out that of the 13 patients with an abscess (as agreed upon by consultants), only 6 had an abscess reported in the initial CT report (they don't make it extremely clear, but I'm assuming this is the clinical radiology report from the reading radiologists at the hospital, not from a part of the study?) 3 of them were reported to have small amounts of free air, and four were reported to have uncomplicated diverticulitis. One patient was readmitted after 2 weeks and found to have abscess requiring CT-guided drainage. No patients required emergency surgical intervention and there was no mortality.

For free air 61%, 86%, 39% respectively (kappa 0.672, 0.807, and 0.367)

Interobserver agreement was also analyzed and was excellent for the presence of diverticulitis for the consultants, good between the resident and the consultants. For extraluminal or free air it was good between the consultants regardless of imaging method, fair between consultants and

resident. **Interobserver agreement was low for the presence of abscesses between the two consultants on LDCT, but excellent on SDCT.** (Low or moderate between the two consultants and the resident)

### **Applicability to my patient care**

I found this study very applicable to my patient care specifically in the context of a current IV contrast shortage in the US at the time of this review. This was a non-US study so patient demographics are likely to be different. For example BMI's likely to be higher in our patient population which may affect sensitivity/specificity of CT

### **Strengths**

- Prospective study
- Blinded assessors
- Good sample size, adequately powered
- Reasonable "gold standard" as all patients got both studies.
- Overall good methods, feel they did an adequate job of blinding

### **Weaknesses**

The paper lists limitations to include risk of recall bias, use of SDCT as the standard (although this is the method of choice in current clinical practice).

72% of the included patients had diverticulitis (previous studies have shown accuracy of clinical suspicion to be around 50%), so they also note there may have been a selection bias, with included patients having a high suspicion of diverticulitis.

- Additionally, 71.8% of patients were women
- No report on follow-up or outcomes of patients with "missed" diagnoses on LDCT

### **My Clinical Bottom Line**

LDCT may be sensitive for the detection of diverticulitis, but is not sufficiently sensitive for the detection of complications. Therefore, if I had reasonable clinical suspicion for early diverticulitis and a low suspicion for complicated diverticulitis ordering an LDCT could be included in a patient-centered regarding deferring IV contrast in this patient population. In patients at higher risk for complications, I would still order an SDCT contrast enhanced study.