MDCT evaluation of colonic diverticular disease and the role of rectally administered contrast

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Learning objectives

1. To assess the feasibility and usefulness of multi-detector CT of the abdomen and pelvis with intravenous, oral and rectal contrast in the demonstration of colonic diverticular disease.
2. To demonstrate associated pericolic complications.
3. To demonstrate the role of using rectal contrast for these patients.
4. To understand the role of modern MDCT imaging in the management of these patients.

Background

Diverticuli are outpouchings of the colonic mucosa and submucosa through weaknesses of muscle layers in the colon wall. Diverticulitis is the second most common cause for acute abdominal pain. Life expectancy has increased over the years and with it the chances of getting diverticulitis have increased as one lives longer. Acquired diverticular disease affects 5-10% of people over the age of 45 years, increasing to affect almost 80% by the age of 80 years. Between 10-25% of individuals with colonic diverticular disease will develop diverticulitis at some point, with a recurrence risk of 7-35%. Diverticula can occur anywhere throughout the colon but are most common in the sigmoid colon, seen in around 90% of cases. The right hemicolon is only involved in about 15% of cases.

The exact pathogenesis of diverticulosis is unknown. Predisposing factors include age, low fiber diet and high fat diet, an increase in intraluminal pressure, chronic constipation, genetic factors and lack of exercise. There is no dependence on gender.

The outpouchings occur mainly where the vessels pierce the muscularis, between the mesenteric and antimesenteric teniae. This relationship of the diverticula to the penetrating blood vessels explains the propensity of diverticula to bleed.

Raised intra-colonic pressure occurs as an adaptative mechanism to a low-fibre diet, which is associated with an increased transit time. This is associated with increased desiccation and viscosity of the faecal content, promoting the development of diverticula. During its passage through the intestine, feces are then intermittently pressed into the opening of the diverticulum. This can cause obstruction of the diverticular neck, invasion of intestinal bacteria and ulceration of the mucous membrane.
Most patients are asymptomatic when they have only colonic diverticulosis.

When diverticulitis is present, the patient presents with lower abdominal mainly left iliac fossa pain, constipation and/or diarrhea, nausea and/or vomiting, fever, leucocytosis. In a setting of colonic diverticulitis and presence of a colovesical fistula, patient may present with specific symptoms of passing air or fecal matter in urine.

Barium enema has long been the gold standard in demonstrating diverticular disease. The primary difficulty with the use of contrast enema examination in the evaluation of diverticulitis is that the inflammatory process is extramucosal. Contrast enema is often unsuccessful in delineating the complications of acute diverticulitis and may underestimate the extent of pericolonic disease process.

The current sensitivity of CT is 94 % with a specificity of 99 % for diverticulitis. CT allows direct and simultaneous examination of colonic lumen, wall, pericolonic region, intraperitoneal and retroperitoneal spaces. Hence, it helps understand the extent of the disease process and identify any associated complications. Moreover, therapeutic percutaneous drainage can be performed under CT guidance, avoiding operation and allowing a single stage procedure.

Multi detector Row CT allows imaging of larger areas with thinner sections and more rapidly than ever before.

New MDCT scanners, with isotropic image acquisition in a single breath-hold, allow high-resolution multiphasic assessment of the bowel in multiple planes. They provide better temporal resolution.

It has the ability to yield multiplanar reformatted images which helps understand the disease process better and aids in subsequent treatment planning. Multiplanar reformattting can be used to improve the presentation and documentation of the findings in the form of images.

**Images for this section:**
Fig. 19: Diverticulitis in ascending colon.

Axial CT image of the abdomen shows colonic wall thickening and pericolonic inflammation in a patient of diverticulitis of the ascending colon (arrow).
Imaging findings OR Procedure details

The present study was conducted in the department of Radiodiagnosis, Breach Candy Hospital, Mumbai, India. In this prospective study conducted between June 2010 to June 2012, a total of 60 consecutive patients who came to the physician or the surgeon with complaints of abdominal pain mainly in lower quadrants, tenderness, fever, nausea, constipation and/or diarrhoea in whom colonic diverticular disease was suspected were studied in the age group of 35 to 80 years.

CT scan was performed with a triple contrast technique using oral, rectal and intravenous non-ionic contrast media.

Mannitol in a concentration of 2% was utilised as oral contrast agent.

One and a half litre of 2% mannitol was administered over 30 - 45 minutes following which 250 ml of 2% mannitol was given on table.

25cc of Diatrizoate Sodium Solution (Gastrovideo) was diluted in a litre of water to prepare positive rectal contrast.

Approximately 600 to 800 cc of 2% mannitol as rectal contrast or positive contrast as rectal enema was given if required.

Following this a multiphase CT study of the abdomen and pelvis was performed with a DUAL SOURCE CT SCANNER (Somatom Definition; Siemens Medical Solutions, Germany) in all patients.

On CT diverticulae appear as outpouchings of the colonic wall, filled with air, fecal matter or colonic contrast enema.

Wall of the large bowel is considered thickened when its width exceeds 4mm and may reach 20mm in diverticulitis. The more severe the disease, the longer the affected colon is.

Intramural air may be demonstrated.

After intravenous administration of contrast media, the inflamed wall enhances homogenously.

**Signs in Diverticulitis:**
Diverticulum,
an outpouching from the bowel wall;

Inflamed diverticulum,
a diverticulum located in the center of fat stranding.
The diverticular wall may be thickened. After intravenous administration of contrast media, the inflamed wall enhances homogenously.

Bowel wall thickening- the large-bowel wall greater than 4 mm;

Fat stranding- a linear or inhomogeneous soft-tissue density interspersed in the fat.

In some cases there may be fluid seen at the root of the mesocolon.

Muscular wall hypertrophy, which appears as a sawtooth-like thickening of colonic haustrations.

Fascial thickening- peritoneal lining or septa in the fat thicker than usual;

Intramural air- air present in the bowel wall;

Intramural sinus tract- a linear streak of contrast material found in the bowel wall;

Arrowhead sign- an arrowhead-shaped configuration of contrast material found at the orifice of a diverticulum;
Phlegmon- an ill-defined mass of soft-tissue density without air;

Abscess- a collection of fluid or soft-tissue density that may or may not contain free air;

Free air- air found in the peritoneal cavity outside bowel.

Portal Pyaemia: Rarely thrombosis of portal/mesenteric veins with hepatic abscesses, due to extension of inflammatory process into portal system.

These were the various signs noted in the presence of diverticulitis, in the patients studied.

The two most common CT findings in uncomplicated diverticulitis were colonic wall thickening and pericolic fat stranding with the presence of diverticuli.

ROLE OF COLONIC CONTRAST ENEMA IN DIVERTICULITIS:

Optimal results on CT for suspected diverticulitis require the use of rectal contrast material.

Oral contrast material may not allow evaluation of colonic wall thickness when the colon is partially collapsed. It may provide inconsistent colonic opacification and distention. In addition, it takes up to 2 hr for oral contrast material to opacify the large bowel. This extended time delays scanning and may not be feasible in an emergency setting.

Colonic contrast material administered through the rectum offers the advantage of evaluation of
colonic wall thickness, intraluminal versus extraluminal
air, and the "arrowhead" sign.

Colonic contrast material allows adequate colonic opacification and distention. This helps in distinguishing true wall thickening from apparent wall thickening that can occur with incomplete luminal distention.

It also helps to identify and distinguish focal inflammatory wall thickening in acute diverticulitis from underlying muscular wall hypertrophy. Although colonic wall thickening noted on CT is not pathognomonic for diverticulitis, focal wall thickening superimposed on muscular wall hypertrophy may prove to be relatively specific for diverticulitis.

In cases of diverticulitis with fistulas, frequently communicating with an abscess or hollow viscus; fistula tracts can often be directly visualized if rectal contrast is administered.

**DIVERTICULITIS: COMPLICATIONS**

- Abscess
- Phlegmon
- Fistula
- Perforation
- Hemorrhage
- Peritonitis
- Stricture
- Obstruction

**COMPLICATIONS WITH DIVERTICULITIS:**

Complications are present in up to 30% of cases of diverticulitis and usually necessitate radiological or surgical intervention. The most common is a peridiverticular abscess.

**ABSCESS:**

An abscess can be seen in up to 30% of cases and
appears as a fluid collection next to the colon or intramural.

The center of the collection may contain air or air-fluid levels or demonstrate debris of various soft-tissue attenuation, which represents necrotic debris. Inflammatory stranding of the pericolonic fat always surrounds this fluid collection.

Patients with abscesses smaller than 3 cm in size can be treated with antibiotics alone and, in some cases, as outpatients, and may not uniformly require surgery. Patients with abscesses larger than or equal to 4 cm can be managed with CT-guided abscess drainage followed by referral for surgical treatment.

CT can thus be used for guidance of percutaneous drainage of an abscess large enough to be amenable to such a procedure and can help prevent emergency surgery.

**PERFORATION:**

Diverticulitis may result in a localized or generalized perforation of the colon.

The diverticulum perforates when the neck of the diverticulum becomes obstructed and the perfusion of the mucosa is compromised inducing hypoxia and tissue death. Focal contained or localised perforation of an inflamed diverticulum appears as small extraluminal pockets of air or extravasation of oral/rectal contrast material.

Occasionally, air may track from a localized diverticular perforation into the mesenteric venous system and portal vein.

Pneumoperitoneum is not a common complication in diverticulitis. The demonstration of free air under the diaphragm represents a more significant perforation.

It is important to identify the complications of diverticulitis in addition to diagnosing the condition.

A study has reported that the presence of an intraabdominal abscess and pockets of extraintestinal gas 5 mm or larger in diameter are the only CT parameters to be statistically predictive of failure of nonoperative treatment in patients admitted for a first episode of diverticulitis.

**DIVERTICULAR BLEED:**

Diverticular disease is a common cause of lower gastrointestinal bleeding. (20-55%).
Such patients may present with per rectal bleeding in addition to abdominal pain. Haemorrhage may be massive and life-threatening requiring blood transfusions but bleeding will cease spontaneously in 75% of cases of diverticular bleeding.

CT angiography can help accurately diagnose diverticular bleeding.

An unenhanced CT scan is obtained immediately prior to CT angiography to identify any preexisting hyperattenuating areas within the bowel lumen that could be confused with hemorrhage at CT angiography. CT findings will largely depend on whether there is active haemorrhage present at the time of imaging.

The CT angiographic diagnosis of active gastrointestinal bleeding is made when hyperattenuating extravasated contrast material is seen within the bowel lumen. The extravasated contrast material may demonstrate linear, jetlike, swirled, ellipsoid, or pooled configurations or may fill the entire bowel lumen, resulting in a hyperattenuating loop. In other cases, signs of haemorrhage may be sparse as bleeding in typically intra-luminal, where it is subsequently passed per rectum.

MDCT is a rapid, sensitive, non-invasive tool for detecting diverticular bleed and helps in localizing site and treatment planning.

**Fistula:**

Fistula formation is one of the complications of diverticulitis, accounting for up to 20 percent of surgically treated cases of diverticular disease. The major types of fistulas are colovesical fistulas (65 percent) and colovaginal fistulas (25 percent), followed by coloenteric and colouterine fistulas.

A colovesical fistula is the presence of a communication between the lumen of the colon and that of the bladder, either directly or via an intervening abscess cavity.

Diverticular disease represents their major cause (two-thirds of cases), followed by colorectal carcinoma.
Colovesical fistulas illustrate the features of most diverticular fistulas attributable likely due to close proximity of the bladder and sigmoid colon.

Affected patients often give a history of passage of stool and gas via the involved organ. Thus, common symptoms with a colovesical fistula include pneumaturia, dysuria, or irritative symptoms, and fecaluria. Other symptoms occurring in fewer than 50 percent of patients are crampy abdominal pain, diarrhea, hematuria, and passage of urine per rectum.

Fistulization is indirectly suggested by bowel-to-bladder adherence, focal bladder mural thickening and/or intraluminal air.

CT indirectly suggests presence of fistula to urinary bladder or vagina by showing air in these structures along with adjacent inflammatory changes in the form of focal thickening of urinary bladder wall and abscess interposed between bowel and bladder. In most cases the fistula occurs through the dome of the bladder (~ 60%), the posterior wall (~ 30%) and trigone (~ 10%) are less involved.

The beehive on the bladder sign has been coined to describe the vesical end of the fistula as seen on cystogram. It elevates the bladder outline in a rounded triangular fashion, reminiscent of a beehive. On CT, the fistula will be heralded less frequently by direct demonstration of the tract itself.

Other important conditions which can lead to fistula formation are Crohn's disease and colonic carcinoma. Imaging plays an important role in diagnosing the underlying cause of fistula.

Ileo vesical fistulas due to Crohn’s disease are usually along the right anterior surface of the urinary bladder as compared to fistulas in sigmoid diverticulitis, along left posterior surface of the urinary bladder.

If an enterovesical fistula is suspected, it is often helpful to perform CT with oral or rectal contrast material but no intravenous contrast material. If positive contrast material is detected in the bladder, it must have originated from the intestine, thus confirming the presence of an enterovesical fistula. If intravenous contrast material is administered, positive contrast material can reach the bladder via the ureters or intestine.

Colovaginal fistulas demonstrate luminal contrast in the vagina, these are well demonstrated on sagittal images.
A direct extension of diverticulitis into the adnexa is rare despite the proximity of the left ovary to the sigmoid colon.

In a patient with colosalpingeal fistula, the physical signs and symptoms can be explained by diverticulitis alone.

On CT in patients with diverticulitis, a collection of gas, either alone or in combination with fluid, within the adnexum is a sensitive and specific predictor of the presence of a fistula between the colon and an adnexum. Enlargement of the adnexum adjacent to the inflamed colon is also seen.

**Bowel obstruction:**

Diverticulitis is the cause of 10% of bowel obstructions. The bowel can become obstructed in two ways: inflammation and oedema of the affected segment of bowel, or, a pericolic abscess can narrow the lumen or chronic inflammation can result in fibrous bands across the bowel lumen causing obstruction.

A stricture resulting from diverticulitis can be difficult to differentiate from an obstructing neoplasm. Imaging alone may not distinguish the benign from the malignant causes of luminal narrowing and colonoscopy is required where diagnostic uncertainty remains.

**Severity of diverticulitis:**

<table>
<thead>
<tr>
<th>Stage</th>
<th>Modified Hinchey Classification</th>
<th>CT Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Mild clinical diverticulitis</td>
<td>Diverticuli ±colonic wall thickening</td>
</tr>
<tr>
<td>Ia</td>
<td>Confined pericolic inflammation/ phlegmon</td>
<td>Colonic wall thickening with pericolic soft tissue changes</td>
</tr>
<tr>
<td>Stage</td>
<td>Description</td>
<td></td>
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<tr>
<td>-------</td>
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<td></td>
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<tr>
<td>Ib</td>
<td>Pericolic/mesocolic abscess + pericolic/mesocolic abscess</td>
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<tr>
<td>II</td>
<td>Pelvic, distant intraabdominal or retroperitoneal abscess + distant abscess (generally deep in the pelvis or in interloop regions)</td>
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<tr>
<td>III</td>
<td>Generalized purulent peritonitis</td>
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<tr>
<td>IV</td>
<td>Generalized fecal peritonitis</td>
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Complicated Diverticulitis: Staging by CT

Staging system used to classify severity of complicated diverticulitis

Stage II- CT-guided percutaneous drainage of abscesses larger than 4 cm in diameter.

Stage III or IV- Emergency operative treatment.


The disease stage in patients with diverticulitis is often determined by using the modified Hinchey classification system, in which imaging and/or surgical findings are incorporated.
Most patients with uncomplicated diverticulitis can follow a conservative treatment regimen of antibiotics and diet modification. In mildly ill patients with a presentation clearly suggestive of uncomplicated diverticulitis (Hinchey stage 0 or 1a), the treatment decision is not based on the imaging results only but rather also on the patient's clinical status. In patients who have Hinchey stage 1b diverticulitis with a small (≤2 cm) abscess, treatment can be conservative as well.

Patients with larger abscesses are treated with percutaneous drainage.

CT acts as an excellent guide for aspiration and drainage of abscesses. Abscess which are approachable percutaneously are aspirated or drained with the help of indwelling drainage tubes like intercostal drainage tubes.

The majority of these collections, approximately 36%-59%, are mesocolic abscesses. The diverticulitis recurrence rate is the highest (40%) in this group.

If patients do not respond to or deteriorate while undergoing treatment, they will undergo surgery. This has helped tremendously to convert the therapy of diverticulitis from a three stage surgical procedure to a single stage surgical procedure. Historically a colostomy was done, then resection of sigmoid after the inflammation had settled and finally a third surgery to close the colostomy.

CT plays a role in confirming the diagnosis and staging suspected complicated disease. CT assists in therapeutic decisions and in the detection of alternative diseases, according to guidelines of the American Society of Colorectal Surgeons.

RIGHT SIDED DIVERTICULITIS:

Right sided diverticulitis - rare, constitutes 5 %, seen more in asians.

Imaging features on ct-focal colonic wall thickening, hazy peri-colonic fat, diverticuli.

Clinically, right-sided colonic diverticulitis has been one of the greatest mimics of acute appendicitis; however, with current thin-section helical CT, most healthy appendixes can be revealed.
Important to detect as differential - appendicitis is managed essentially by surgery as compared to diverticulitis - managed conservatively.

The two CT findings of right-sided colonic diverticulitis that most distinguish it from colonic carcinoma are inflamed diverticula and the preservation of an enhancement pattern of the involved colonic wall.

**Chronic diverticulitis** - chronic diverticulitis is a variant of diverticulitis in which symptoms can persist for 6 months to 1 year or longer. A small subgroup of patients - may develop luminal narrowing of sigmoid colon due to fibrosis/chronic inflammation.

It is characterized by the frequent development of chronic obstructive symptoms and abdominal pain rather than the classic clinical findings of acute sigmoid diverticulitis. The circumferential luminal narrowing in chronic diverticulitis is presumably caused by chronic inflammation or fibrosis of the colonic wall and surrounding pericolonic fat. Patients with chronic diverticulitis are more likely to require surgical resection of the diseased sigmoid colon than those with the acute form of this disease as they are likely to undergo varying degrees of colonic obstruction.

The most important differential consideration in the diagnosis is the distinction between diverticulitis and colon cancer.

Features that indicate diverticulitis are long-segment involvement (10 cm), pericolonic stranding, engorged mesenteric vessels, and fluid in the mesentery. Features that indicate colon cancer are a focal concentric mass with overhanging shoulders and pericolonic nodes. However, because the distinction between a benign and a malignant process cannot always be made on CT images, it is important to recommend colonoscopy as a follow-up examination in all such patients to prevent missing a colon cancer with microperforation. Endoscopy and biopsy can be done to differentiate after the clinical symptoms have resolved - often after 6 weeks.
Images for this section:

Axial CT images of pelvis in two different patients show multiple small outpouchings in the sigmoid colon filled with air and colonic contrast (arrow).

**Fig. 1:** Colonic Diverticulosis.
Unenhanced CT of the pelvis shows extensive pericolonic inflammation in the form of fat stranding (linear or inhomogeneous soft-tissue density interspersed in the fat – arrow) in a patient having sigmoid diverticulitis.

Coronal unenhanced CT image in a patient of sigmoid diverticulitis – note peridiverticular inflammatory changes.

Coronal CT image in a patient of sigmoid diverticulitis shows colonic wall thickening (arrow).
Fig. 4: Colonic Diverticulitis.

A 55 year old man presented with acute onset left iliac fossa pain. Post contrast axial CT images of the pelvis show presence of sigmoid diverticuli along with the two pathognomic findings of diverticulitis— inflammatory changes in the form of fat stranding (red arrow) and colonic wall thickening in the involved segment (yellow arrow).

Fig. 2: Signs in colonic diverticulitis.
Fig. 3: Signs in colonic diverticulitis.

Fig. 6: Diverticular wall thickening.
A curved mpr CT image here shows presence of multiple sigmoid diverticuli, colonic wall thickening in the region of diverticuli and pericolonic fascial thickening (arrow) in a patient of sigmoid diverticulitis. Post processing mpr images delineate the length of involved colonic segment which helps guide the surgeon when resection is planned. Note positive rectal contrast was administered.

**Fig. 5:** Sigmoid Diverticulitis

Plain axial and post contrast coronal CT images in a patient with left sided abdominal pain show presence of a diverticulum in the descending colon. Note the thickened diverticular wall (arrow) in addition to peridiverticular fat stranding (arrow) indicating diverticulitis in descending colon. Patient responded to conservative management.

**Fig. 7:** Diverticulitis in descending colon.
Sigmoid diverticulitis with pericolonic abscess formation (arrow) - similar findings as above seen in a 60 year old male patient presenting with left iliac fossa pain, fever and leucocytosis.

A peridiverticular collection of soft tissue density with or without air suggests abscess formation (arrow) as seen in this curved mpr CT image in a case of sigmoid diverticulitis.

**Fig. 9:** Peridiverticular Abscess.
Axial and curved mpr CT images show peridiverticular abscess cavity with air and colonic contrast (arrow) within it in a case of sigmoid diverticulitis.

Fig. 10: Peridiverticular Abscess.
Post-contrast axial CT images of the pelvis show multiple pericolonic absesses (arrows) in a patient of sigmoid diverticulitis.

**Fig. 11:** Multiple pericolonic abscesses in a 67 year male patient of sigmoid diverticulitis having abdominal pain, fever and leucocytosis.
Axial and coronal post contrast CT images show leak (arrow) of orally administered contrast into a pericolonic collection in a patient of sigmoid diverticulitis suggesting diverticular perforation in the sigmoid colon.

**Fig. 12:** Diverticular perforation.

Perforation—Coronal mip CT image in a patient of sigmoid diverticulitis shows leak of rectally administered positive contrast and it communicating with a thick walled pericolonic collection.
Fig. 13: Perforation.

Fig. 14: A coronal mip image of unenhanced CT in a patient of sigmoid diverticulitis complaining of fecaluria. The positive rectal contrast is seen to leak into the bladder, suggesting presence of a colovesical fistula.
**Fig. 15:** Colovesical fistula

Unenhanced coronal CT image of the pelvis in a patient of sigmoid diverticulitis shows adherence of the sigmoid colonic wall to the bladder with leak of positive rectal contrast into the bladder (arrow) suggesting presence of a colovesical fistula.

**Fig. 16:** Sigmoid diverticulitis with colovesical fistula.

Unenhanced axial CT image of the pelvis in a known patient of sigmoid diverticulitis shows presence of positive rectal contrast and air in urinary bladder (arrow) suggesting a fistulous communication with sigmoid colon.

This fistulous communication is well seen in saggital CT image of the same patient as above (arrow) – Sigmoid diverticulitis with complication of colovesical fistula.
Small outpouching filled with air is seen in the caecum (arrow). Note no peri-caecal inflammation seen. This was a case of caecal diverticulosis.

**Fig. 17:** Caecal Diverticulosis.

Post contrast axial and coronal CT images in patient having right sided abdominal pain show thickened diverticulum with its wall enhancing (green arrow) and presence of peridiverticular fat stranding (yellow arrow) – acute right sided diverticulitis. Also note colonic wall thickening of the hepatic flexure of colon.

**Fig. 18:** Right sided colonic diverticulitis.
Post contrast axial CT image of the abdomen shows presence of diverticuli in the ascending colon with their walls mildly enhancing post contrast and peridiverticular fat stranding (arrow), findings suggesting acute diverticulitis in the ascending colon.

**Fig. 20:** Acute diverticulitis in the ascending colon with small pericolonic abscess.

Axial CT of the pelvis in a patient of sigmoid diverticulitis undergoing CT guided drainage of a diverticular abscess.

**Fig. 21:** CT guided drainage of a peri-diverticular abscess.
Fig. 23: Chronic Diverticulitis.
Conclusion

We concluded that CT is the first and the only investigation required to establish the diagnosis, to determine next line of therapy-medical, interventional radiological or surgical in colonic diverticular disease.

1) MDCT is rapid, sensitive and specific in diagnosis of colonic diverticulitis and is the imaging modality of choice in depicting pericolonic complications.

2) MDCT helps understand the extent and severity of the diverticular disease process better and thus aids in patient management.

3) In the absence of colonic diverticulitis, it can diagnose other pathological conditions.

4) Use of rectal contrast helps understand the disease process better and thus aids in diagnosis and look for any associated complications like perforation or fistulous communications.

5) CT guided drainage of diverticular abscesses permits a one-stage procedure, rather than a three-stage, surgical operation.

Images for this section:

![Images of CT scans showing colonic diverticulitis](image)

**Fig. 8:** Role of rectal contrast in colonic diverticulitis: Note better distention and opacification of the colon.
Post contrast axial CT shows marked wall thickening with consequent lumen narrowing in the region of sigmoid colon along with pericolonic fat stranding. Presence of diverticuli (arrow) in addition to other findings suggests sigmoid diverticulitis.

**Fig. 24:** Sigmoid diverticulitis-imaging on CT.

Axial unenhanced CT images in a patient of sigmoid diverticulitis with pericolonic abscess formation (arrow). Patient underwent CT guided aspiration of the abscess. Abscesses > 3 cm in size are amenable to CT guided drainage.

**Fig. 22:** CT guided drainage of a diverticular abscess.
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