CT in the assessment of bowel wall thickening: keys for differential diagnosis

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Learning objectives

To review the more useful radiological findings on CT on the differential diagnosis of the intestinal wall thickening causes, using a systematic approach. We will review the main diseases causing intestinal wall thickening and semiology by submitting problem cases selected from patients treated at our hospital.

Background

The wall thickness of the normal intestine, both the small intestine and the colon, varies significantly with the degree of strain; can appear virtually imperceptible when the wall are well distended; a maximum thickness of 3mm as upper normal limit is generally accepted. Comparison between different loops with similar degree of relaxation is useful.

The increased thickness of the intestinal wall as isolated sign may reflect a number of varied etiologies, however the specific characteristics showing increased intestinal wall thickness in each case, and certain accompanying signs, allow narrow the differential diagnosis, leading on many occasions to accurate diagnosis. So useful systematic analysis of this kind, here are categorized according to the following criteria.

Imaging findings OR Procedure details

Attenuation increased intestinal wall thickness:

In studies without intravenous contrast administration (CIV) intestinal wall usually shows homogeneous density, two notable exceptions to be found would be the case of pneumatosis intestinalis or fatty deposition in the intestinal wall as no pathological finding, being particularly significant the latter case it may lead to diagnostic errors by its similarity to certain pathological signs.

Following administration of CIV there are two basic patterns of enhancement, homogeneous and heterogeneous.

Attenuation homogeneous:
- Submucosal hemorrhage: For submucosal bleeding after administration of VIC is usually observed a marked enhancement in a homogenous thickened intestinal segment circumferentially and symmetrically.
- Myocardial ischemia: In some cases of intestinal ischemia may observe segmental circumferential wall thickenings, which are comparatively hypodense handles the rest due to hypoperfusion.
- Crohn's Disease chronic active and chronic post-radiation changes: In these cases the transmural fibrosis development allows us to observe thickened bowel segments with homogeneous attenuation.
- Neoplasms: Multiple intestinal neoplasia may present as thickening of the intestinal wall of uniform density with or without enhancement, especially in small tumors in these cases the morphology and thickened segment length is especially important to make a correct diagnosis. The small bowel lymphoma also usually presented as a segment marked attenuation mural thickening with homogeneous symmetric.

Heterogeneous attenuation:

- Pattern stratified.

The stratified heterogeneous enhancement of the wall after administration of CIV, especially during the early arterial phase or portal, is a sign that translates hyperemia thickened segment, in axial sections of the bowel loops this enhancement pattern set the call sign " target "or" double halo "in alternating layers with different enhancement in the intestinal wall edema induced in those layers shown hypodense.

The attenuation causes stratified inflammatory bowel wall are varied, including stages of intestinal ischemia, Crohn's disease, autoimmune diseases, infectious enteritis and colitis and post-radiation. Normally the display of these signs for excluding malignant causes of differential diagnosis, but it is important to note that the scirrhouus gastric carcinoma or colon may also show these findings.

- Pattern unstratified:

The display on the thickness of the thickened bowel wall heterogeneous attenuation with areas which enhance CIV after administration of density areas along with an irregular distribution, should lead to malignant causes diagnosis, as adenocarcinoma or gastrointestinal stromal tumors. For large tumors are frequently observed core areas of hypodensity secondary to necrosis. Hypodensity similar areas, but in this case secondary to mucin deposition can be observed in the case of mucinous adenocarcinomas.

Degree of mural thickening

Moderate thickening

The moderate thickening of the bowel wall, up to 1 or 2 cm, usually due to causes malignant intestinal infections that affect the small intestine, in most cases, cause a slight increase in wall thickness or even nil. On the other hand, increasing the wall thickness of observable in intestinal inflammatory disease is usually mild in nature also, more marked
in the case of the E. Crohn's disease compared with ulcerative colitis by transmural involvement.

Severe thickening

Causes both inflammatory and neoplastic causes marked (2-3cm thick or greater) thickened bowel wall, this case of infectious colitis and pseudomembranous colitis, where the marked fold thickening in long segments of the colon results in the call sign of the accordion. Other causes infectious colitis can also cause this sign. In the case of intestinal tumors were also observed very marked wall thickenings, which usually will be focal in nature or in short segments of the intestine. The small bowel lymphoma usually presents as a very strong segment mural thickening without obstruction light.

Symmetry of increased wall thickness

The symmetric thickening of the bowel wall, ie one in which the entire bowel wall thickness increases circumferentially similar degree compared to asymmetrical thickening, wherein an axial thickness of the small sample variable, with areas of increased thickness eccentric, is an important feature to be evaluated in the differential diagnosis of pathologies causing thickening of the bowel wall.

The symmetric thickening of the intestinal wall causes commonly associated with inflammation, infection, ischemia or hemorrhage submucosa. Scirrhous carcinoma and lymphoma may also present this pattern of thickening.

The asymmetric thickening in turn is associated with neoplastic disease most often is the case of adenocarcinoma, GIST, carcinoid tumor, metastases and occasionally lymphoma. E. longstanding Crohn's is a notable exception in this case because it can show areas of thickening eccentric mural.

Extension of increased wall thickness

It is important to distinguish between diffuse intestinal involvement, ie that affects most of the small intestine or colon, segmental, a length of intestine implicated of between 10-30cm or focal where bowel inches show increased thickness. In general, the impairment of long intestinal segments oriented towards benign causes.

Focal involvement:

Most neoplasms arise as intestinal areas of focal thickening of the bowel wall, it being possible also find very short segments of increased wall thickness as inflammatory bowel disease or appendicitis diverticulitis.

Segmental involvement:
The segmental bowel involvement is seen more frequently in benign, commonly inflammatory in nature (IBD, infectious ileitis, postradiation enteritis, ischemia, etc). However, it should be noted that the intestinal lymphoma usually also have a segmental involvement.

Diffuse involvement:

The causes of diffuse thickening of the intestinal wall are usually benign, including infections, ulcerative colitis, edema or hypoproteinemia portal hypertension and low cardiac intestinal ischemia. Certain vasculitis, such as systemic lupus erythematosus, can also cause thickening of the wall of the small intestine of diffuse or segmental.

Findings associated

Valuing accompanying extraintestinal findings in cases of bowel wall thickening are, in many cases, the key to narrow the differential diagnosis definitely made based on the above criteria. Thus, the presence of lymph nodes and the characteristics of these, locoregional increased density of mesenteric fat, the presence of abscesses or fistulas, mesenteric fat proliferation and solid organs findings represent additional data more useful for assessment of bowel wall thickening.

Clinical data:

Clinical data that will offer us many times and similarly in the case of associated radiological findings, the final factor that tips the balance in favor of one or another possible etiology. Having all clinical information and analytic possible can mean the difference between a correct interpretation of the findings or diagnostic error, so it must be the framework on which our work is based diagnosis.

Problem Case Presentation:

Case 1:

Male, 58 years old unremarkable history presented to the emergency by moderate and continuous pain in left lower quadrant of 48h of evolution, by associating a food vomiting. Leukocytosis with left shift and marked increase in PCR without other laboratory findings.

Location and extent of wall thickening: segmental sigma (white arrow).
Wall Attenuation: Homogeneous without pathological enhancement.
Symmetry: symmetrical circumferential.
Thick Grade: Moderate.
Associated findings: Diverticulosis (purple arrow), ectopic gas bubbles (red arrow) and increased density in the adjacent fat (yellow arrow).
Diagnosis: Acute Diverticulitis.
Case 2:

85-year old male presented to the emergency by epigastric pain ten hour history of sudden onset, which has gradually increased in intensity. It is accompanied by nausea and loose stools with blood remnants. Analytically is afebrile and has no interest findings except slight increase of PCR.

Location and extent of wall thickening: Diffuse small bowel loops (white arrows).
Wall Attenuation: Homogeneous diminished.
Symmetry: symmetrical circumferential.
Thick Grade: mild-moderate.
Associated findings: contrast filling defect in superior mesenteric artery. (Red arrow)
Diagnosis: Intestinal ischemia.

Case 3:

83 years old male who presents with diffuse abdominal pain of several days duration accompanied by vomiting and no bowel.

Location and extent of wall thickening: Focal in sigmoid colon (white arrows).
Wall Attenuation: Heterogeneous unstratified with irregular enhancement.
Symmetry: Circumferential, asymmetric and irregular.
Thick Grade: Moderate - severe.
Associated findings: None of interest.
Diagnosis: Adenocarcinoma of colon.

Case 4

84 year old woman with a history of cervical carcinoma that was treated by hysterectomy and double adnexectomy plus radiotherapy. Turn by intense abdominal pain of several days duration that is accompanied by vomiting.

Location and extent of wall thickening: long segment of ileum (white arrows).
Wall Attenuation: Homogeneous.
Symmetry: Circumferential symmetrical.
Thick Grade: Moderate
Associated findings: slight increase in density pelvic fat.
Diagnosis: postradiation enteritis.

Case 5:

46 year old male admitted with acute pancreatitis treated with antibiotics that begins with box gastroenteritis with diarrhea.
Location and extent of wall thickening: Diffuse affecting entire frame colic.
Wall Attenuation: Homogeneous.
Symmetry: Circumferential symmetrical.
Degree of thickness: Severe, marked thickening of folds (accordion sign).
Associated findings: None of interest.
Diagnosis: pseudomembranous colitis.

Case 6:
50 year old male who presents with fever and vomiting box accompanied by diffuse abdominal pain.

Location and extent of wall thickening: Segmental multiple, discontinuous, in part colic and distal ileum (white arrows).
Wall Attenuation: Heterogeneous with fat density (purple arrows) and soft tissue (red arrow).
Symmetry: Asymmetrical Pattern unstratified
Thick Grade: Moderate.
Associated findings: ileocolic fistulas. Increased density pericecal fat (yellow arrow).
Diagnosis: Chronic changes E. Crohn’s with ileocolic acute inflammatory findings.

Case 7:
54 year old male who presents with bloody diarrhea of ten days’ duration, accompanied by pain in hypogastrium and left iliac fossa. Fever, leukocytosis and increased CRP discreet.

Location and extent of wall thickening: Segment long descending colon, sigmoid and rectum (white arrows).
Wall Attenuation: Laminated with mucosal enhancement.
Symmetry: Circumferential symmetrical.
Thick Grade: Moderate.
Associated findings: Discrete increased density in the adjacent fat (yellow arrow).
Diagnosis: Ulcerative colitis.

Case 8:
12 year old male presents with epigastric abdominal pain that is accompanied by fever, a week earlier. Entered on two previous occasions by pictures of gastroenteritis and is in tracking epigastralgia digestive query.

Location and extent of wall thickening: segmental terminal ileum to ileocecal valve (white arrows).
Wall Attenuation: Homogeneous.
Symmetry: Circumferential symmetrical.
Degree of thickness: Severo.
Associated findings: Irregularity of light thickened segment suggestive of mucosal ulcerations.
Diagnosis: acute outbreak of E. Crohn's.

Case 9:

Puerperal woman of 35 who attended the emergency room for lower abdominal pain and in both iliac fossae. Apenditectomizada. Analytically highlights a moderate increase in PCR without other findings.

Location and extent of wall thickening: long segment of ileum in pelvis (white arrows).
Wall Attenuation: Heterogeneous layered.
Symmetry: symmetrical circumferential.
Thick Grade: Mild - moderate.
Associated findings: Free fluid adjacent (yellow arrow).
Diagnosis: Enteritis Anisakis.

Case 10:

71 year old woman was referred to the ED by their PCP for a box of diarrhea with mucus accompanied month history of diffuse abdominal pain, predominantly in the left abdomen and fever syndrome. Analytically highlights a slightly elevated CRP without hemogram abnormalities.

Location and extent of wall thickening: Segmental affecting the left colon, sigmoid and rectum (white arrows).
Wall Attenuation: Homogeneous stratified.
Symmetry: Circumferential symmetrical.
Thick Grade: Slight
Associated findings: ascites and increased density of the adjacent fat (yellow arrows).
Diagnosis: Acute ischemic colitis.

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Fig. 10
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Conclusion

The thickening of the intestinal wall can be caused by intestinal neoplasms and various inflammatory conditions. Although none of the findings described in abdominal CT diagnosis alone, the association of several of them valued at the appropriate clinical context, leads in most cases to suggest an accurate diagnosis or narrow the differential diagnosis significantly. Therefore, the systematic assessment of the radiological findings by categorizing semiological signs observed is particularly useful, as it facilitates the work of differential diagnosis in the wide spectrum of pathologies causing thickening of the intestinal wall.

References

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Personal Information