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# Small Bowel Mechanical Occlusion and Computed Tomography Severity Indicators: What to Look for

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# Small Bowel Mechanical Occlusion and Computed Tomography Severity Indicators: What to Look for

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## Abstract

Computed Tomography (CT) allows detecting different aspects of small bowel pathology in course of mechanical obstruction, principally correlated to circulatory disturbances, giving useful indications for a surgical treatment.

## Introduction

The small bowel mechanical obstruction is a complex clinical situation, with different clinical aspects, often correlated to the grading of ileal loops pathology. Patients with intestinal occlusion, still constitute a difficult and vexing problem for the surgeon, in order to arrive to a precise diagnosis, and to an appropriate therapeutic decision. The value of CT in the diagnosis of intestinal occlusion is universally admitted, often permitting to determine the site and cause of the obstruction (1-8). Our aim was to extend the CT study to detect morphological aspects of the ileal loops correlated to this pathology, and to severity of the obstruction.

## Methods

We retrospectively reviewed 25 cases, 14 men and 11 women, aged between 23 and 74 years, observed in the years 2009-2011, with small bowel mechanical occlusion, secondary to a fibrous band or matted adhesions, excluding patients with pre-existing gastroenterologic diseases or peritoneal carcinomatosis. In all a contrast enhanced CT was performed. We considered the following pre-defined morphological criteria, correlated with physio-pathological conditions, in order to value the intrinsic severity of the obstruction, distinguishing 4 classes:

1. contrast-enhanced hyper-density of the ileal loops, corresponding to an early vasodilatation, necessary for their hyper-peristalsis (Illustration 1);
2. evident dilatation of ileal loops, 3 times or more than normal, corresponding to a muscular wall de-compensation, and persisting endoluminal

hypertension (Illustration 2);

3. mural thickening of more than 3 mm, with preserved contrast hyper-enhancement of the mucosa, corresponding to increased capillary permeability and secondary mucosa oedema (Illustration 3);

4. attenuated contrast enhancement of the ileal loops and mesenteric oedema, corresponding to an impending circulatory insufficiency (Illustration 4).

Coronal reformatted images were helpful and complementary to axials to improve reader confidence (9-10).

All the patients had a subsequent surgical procedure, whose results were considered the standard of reference.

## Results

It is evident the gradual worsening, through the aforementioned four classes of the CT signs of ileal obstruction, towards a condition of insufficient vascular supply. The following percentages were calculated considering, for a single case, the most advanced symptoms:

Class 1 = 9 cases (36%);

Class 2 = 10 cases (40%);

Class 3 = 4 cases (16%);

Class 4 = 2 cases (8%).

The feeble numeric percentage of cases found in class 3 and 4 corresponded to the necessity of a previous emergency treatment, imposed by critical clinical conditions. These results were compared with those of a control group of combined large and small bowel obstruction, where no important signs of ileal loops pathology could be seen, except their dilatation.

## Discussion

In case of small bowel mechanical occlusion, the association of different morpho-pathological signs in a single case is common; usually the more advanced sign is the result of the progressive passage through the previous stages, indicating the worsening of the disease. The morphological criteria distinguishing the aforementioned Class 4 can further aggravate towards a condition of absent contrast enhancement in

the ileal loops, secondary to their parietal overdistension and to compression of the capillary network. Impending severe ischemia and danger of perforation follows, with the subsequent diagnosis of acute secondary peritonitis. Our proposed correlations between morphological and physio-pathological indicators of the severity of intestinal obstruction were performed with the guide of CT. Similar studies, always based on signs of secondary vascular pathology, demonstrated the CT value in particular conditions, as intestinal volvulus, or whirl of one or two ileal loops (11-16). We extended this "vascular interpretation" to different other CT signs, interesting the small bowels loops proximally to the site of a mechanical obstruction. The subsequent clinical implications are clear: fluid sequestration in the abdominal compartment, possible evolution towards a condition of severe ischemia with impending danger of parietal pneumatosis, bacterial translocation, aeroportitis, and also small bowel perforation. The venous mesenteric congestion in course of ileal mechanical obstruction was just the subject of our recent report (17). Here we recall attention to the different CT grades and aspects of intrinsic intestinal wall pathology, chiefly based on secondary vascular alterations, and usefully addressing to a prompt diagnosis. Nevertheless, in case of small bowel occlusion, we must always admit that the final diagnosis and surgical indication must consider all the clinical, laboratory and radiological signs. The condition of combined large and small gut occlusion does not induce so important and early pathological changes in the small bowels, probably because of its less acute onset and slower increasing distension.

## Conclusion(s)

Contrast enhanced CT permits to demonstrate the different, often progressive, graded stages of ileal bowel pathology in course of mechanical occlusion, giving important elements for an accurate diagnosis. The present study confirms the great value of CT in detecting important aspects of small bowel pathology, correctly examining their circulatory secondary lesions.

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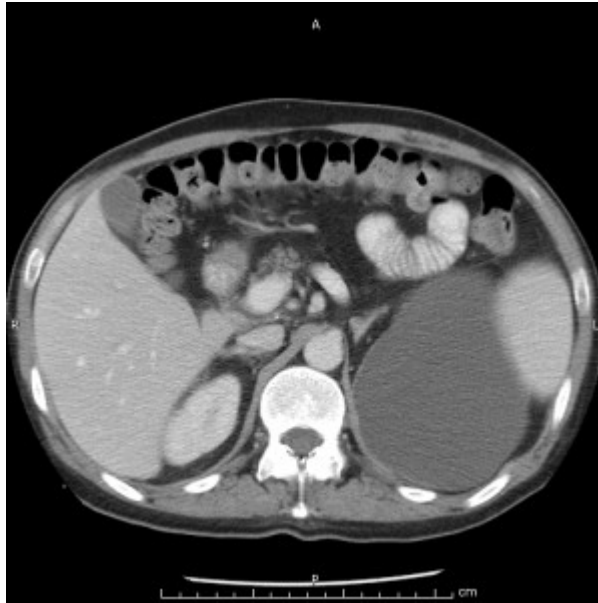
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## Illustrations

### Illustration 1

Marked contrast hyper-enhancement of a jejunal loop, proximal to an occluding fibrous band. Enormous cyst of the left kidney upper pole.



### Illustration 2

Ileal loops well dilated, with evident parietal contrast enhancement.



### Illustration 3

Parietal thickening of small bowels with still preserved vascular network.



### Illustration 4

Oedema of the mucosa of the ileal loops, with a reduced vascular network.



## Reviews

### Review 1

#### **Review Title: Small Bowel Mechanical Occlusion and Computed Tomography Severity Indicators**

Posted by Dr. Faycal Kharfi on 11 Nov 2012 06:22:10 PM GMT

#### **What are the main claims of the paper and how important are they?:**

Small Bowel Mechanical Occlusion and Computed Tomography Severity Indicators.

No the claims are not novel:

1. Mourad Boudiaf et al., CT Evaluation of Small Bowel Obstruction, *RadioGraphics*, May 2001, 21, 613-624.
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Yes

Yes relatively.

#### **If a protocol is provided, for example for a randomized controlled trial, are there any important deviations from it? If so, have the authors explained adequately why the deviations occurred?**

The protocol (method) is a simple and standard one.

Yes relatively

Giving more details on the investigation protocol and followed method.

Giving more details on the investigation protocol and followed method.

**Rating:** 5

#### **Comment:**

No comments

**Competing interests:** No

**Invited by the author to make a review on this article? :** No

**Have you previously published on this or a similar topic?:** No

#### **References:**

#### **Experience and credentials in the specific area of science:**

Radiology

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