



## “Balloons-on-strings” sign

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“Balloons-on-strings” sign has been used for diagnosis of closed-loop small bowel obstruction and describes the dilated small bowel segments (“balloons”) within the closed loop tethered by stretched mesenteric vessels (“strings”) [1]. Closed-loop obstruction occurs when a bowel loop of variable length is occluded at two adjacent points along its course [2]. Most commonly, the closed loop is caused by a single adhesive band, an external or internal hernia, or metastatic and primary tumors of the small bowel [1]. Congenital or iatrogenic defects of the mesentery may also trap a segment of the small bowel, rarely resulting in a closed-loop obstruction [3]. Small bowel within the closed loop continues to secrete fluid and become markedly distended, which can impair venous drainage and cause the ischemia [3].

The CT appearance of a small bowel closed-loop obstruction partly depends on the orientation of the closed loop relative to the plane of image reconstruction but typically reveals characteristic fixed radial distribution of several markedly fluid-distended small bowel segments tethered by their stretched mesenteric vessels forming a “balloons-on-string” appearance (Figures 1 and 2a–c). Recognition of this sign enables accurate and timely identification of the closed-loop small bowel obstruction, which otherwise can quickly progress to strangulation, ischemia, necrosis, and perforation of the small bowel [4].



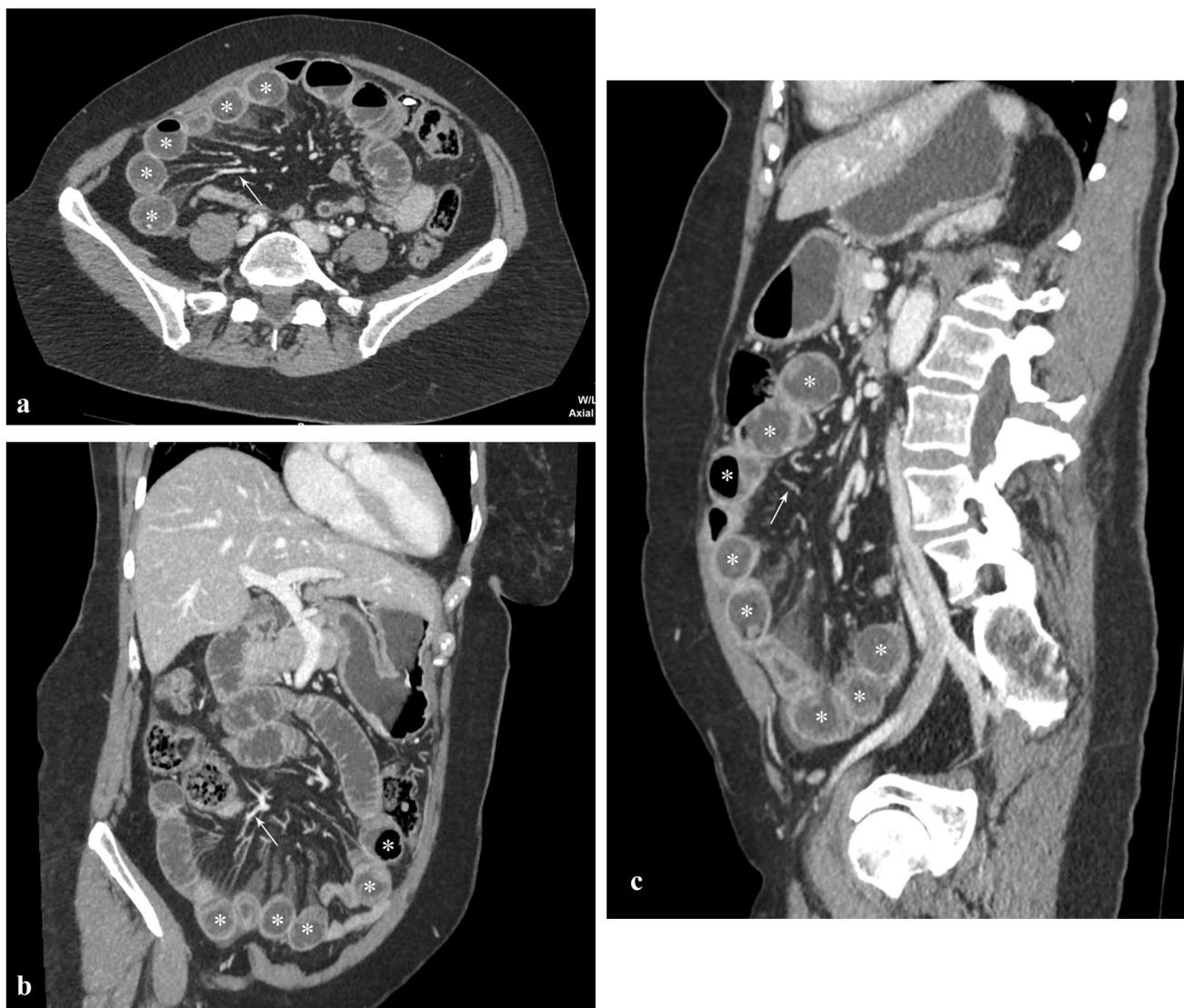
Fig. 1 Balloons on strings

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**Fig. 2** a–c Axial (a), coronal oblique (b), and sagittal CT section (c) show classic “balloons-on-strings” appearance with the strings being the stretched mesenteric vessels (arrows) and balloons the fluid-

distended small bowel segments within the closed loop (stars) in a 60-year-old female patient with the small bowel obstruction due to adhesion

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### Compliance with ethical standards

**Conflict of Interest** The authors of this manuscript declare that they have no conflict of interests.

**Ethical approval** This manuscript does not contain any studies with animals. All procedures performed in study involving human participants were in accordance with the ethical standards of the institutional and national research committee and within the 1964 Helsinki Declaration and its later amendments.

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