CASE REPORT

Histo-morphometric Analysis of an Idiopathic 'Kink' in the Transverse Colon

Naveen Kumar[1], Anitha Guru[1], Ashwini Aithal P[1], Arijit Bishnu[2]*

[1]Department of Anatomy, [2]Department of Pathology, Melaka Manipal Medical College, Manipal Academy of Higher Education, Manipal- 576104(Karnataka) India

Abstract:

Presence of kinked transverse colon is not a very common phenomenon. Its presence may not cause physiological disturbance. However, at times when it requires endoscopy, the abrupt looped course of the transverse colon might set a risk of entrapment of the device, which in turn might lead to severe complications and undue discomfort to the patient. An idiopathic kink in the transverse colon of an adult male cadaver was noted and its morphometric and histopathological analysis was performed. The exact location and gross morphometric measurements of the kinks in the transverse colon was recorded. Small pieces of the colon at the regions of kinks were removed, processed, and stained with Haemetoxylin and Eosin, Alcian Blue- Periodic Acid Schiff (PAS) stain and Masson Trichrome stain for histopathological examination. Transverse colon presented with an abrupt loop towards its splenic end by the presence of proximal and distal kinks. Histopathological features of the mucosa at the areas of kink showed foci of surface erosions composed of parallelly placed tubular glands lined by columnar cells, interspersed by goblet cells. Submucosa was oedematous with few congested vessels. Presence of such unusual kink and the loop together may be the cause for forceful forward push of the device introduced into it during colonoscopy and might result in the damage of its mucosa.

Keywords: Transverse Colon, Kink, Looped Colon, Endoscopy

Introduction:

Variations associated with the human colon are increasingly important in surgical practice. More practically, the difficulty and duration of clinical procedures, including laparoscopic resections and colonic endoscopy, are often affected by the length and mobility of colonic segments [1]. Loops in the colon may dispose a patient to volvulus. Thus, it becomes important for the surgeons and radiologists to be aware of any anatomical variations associated with the colon.

Transverse colon is the longest and mobile part of the large intestine, which extends from right colic flexure to left colic flexure. In its course, it presents a downward convexity from the right hypochondriac region into left hypochondriac region. Its course also depicts an arch, the concavity of which is directed backward and a little upward. Towards its splenic end there is often a 'U' shaped curve which may descend lower than the main curve [2]. Transverse colon is covered by a peritoneal fold known as transverse mesocolon.

Congenital anatomic variations as well as spatial and/or pressure alterations within the abdominal cavity may cause variations in the location of the colon [3, 4]. We report in here an unusual presence of kinked transverse colon. Although very important, in our literature review we found that there are no cadaveric reports on such kinked appearance of the colon. Also, to the best of our knowledge, there is no data regarding its histopathological features. Considering the rarity of the case and the absence of comparable reports,

we attempted a detailed histo-morphometric study of the same and the aim of the study was to know the gross and histopathological features of an idiopathic kink in the transverse colon.

Case Report:

The present study was conducted in the department of Anatomy, Melaka Manipal Medical College, Manipal. This study was done on an idiopathic transverse colon. The left 1/3rd of the transverse colon was found to be kinked twice. The presence of proximal and distal kink close to its left colic flexure made the appearance of the transverse colon abruptly looped. The mesentery of the transverse colon was intact and attached through its length. An additional splenico-colic ligament seemed to be attached to lateral end of the spleen (Fig. 1). There was no record of history regarding any previous surgery or any endoscopic surgery done at this region.

The following gross morphometric features of the transverse colon were noted:

Total length of the transverse colon (from hepatic flexure to splenic flexure): 33.5 cm.

Length of the colon from hepatic flexure to proximal kink: 13 cm.

Length from proximal to distal kink: 8.5 cm.

Length from distal kink to splenic flexure: 12 cm.

A small piece of the colon was cut at three places (at proximal kink, distal kink, splenic flexure) to study its histological features. The sections were processed for haematoxylin and eosin stain, Alcian Blue - Periodic acid Schiff (PAS) stain and Masson Trichrome stain using standard staining procedures. The microscopic features of the sections were studied carefully, and the features were noted down. Photomicrographs were obtained at different magnifications. The stained sections showed all four layers of alimentary tract namely mucosa, submucosa, muscularis externa and serosa. The lining epithelium was made up of columnar cells with many goblet cells. Sections from the region of proximal and distal kink showed mucosa with foci of surface erosions composed of parallelly placed tubular glands lined by columnar cell interspersed by goblet cells. Submucosa was oedematous with mild lymphoplasmacytic infiltrates and few congested vessels (Fig. 2, 3, 4).

The following histo-morphometric features of the kinks were noted:

No significant or appreciable changes were noted in the region of the proximal kink as its thickness was same as the rest of the transverse colon. However, few changes in the region of distal kink was noted.

Thickness of mucosa at the distal kink: 1 mm

Thickness of mucosa proximal to distal kink: 10 mm

Thickness of mucosa distal to distal kink: 10 mm.

Thickness of the mucosa at distal kink was 1mm, which is very less compared to other areas because the mucosa at the kink showed surface ulcerations.

Thickness of lamina propria at the distal kink: 2 mm

Thickness of lamina propria proximal to distal kink: 6 mm

Thickness of lamina propria distal to distal kink: 6 mm.

Increased thickness of lamina propria at the region proximal and distal to the kink was due to the formation of the oedema which might be due to the presence of kink.

Thickness of muscularis externa: There was no change in the thickness of the muscularis externa layer at the region of kink or at the region proximal or distal to the kink.

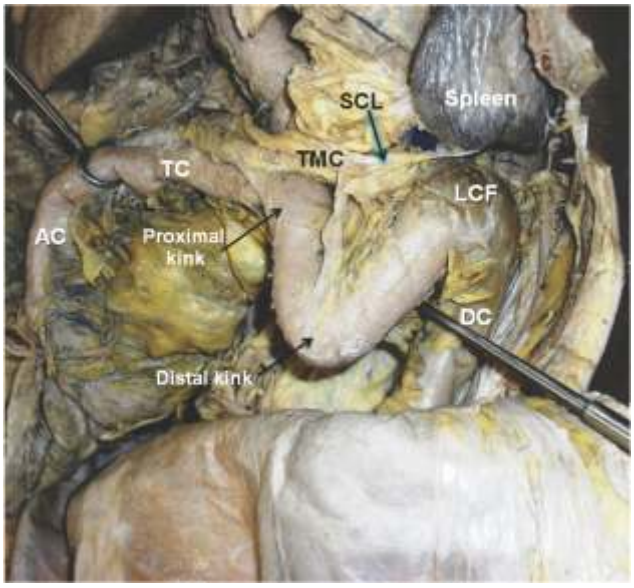

Fig. 1: Showing the Abrupt Looped Transverse Colon by the Presence of Double Kink. AC: Ascending Colon, TC: Transverse Colon, DC: Descending Colon, TMC: Transverse Mesocolon, LCF: Left Colic Flexure, SCL: Splenico-colic Ligament

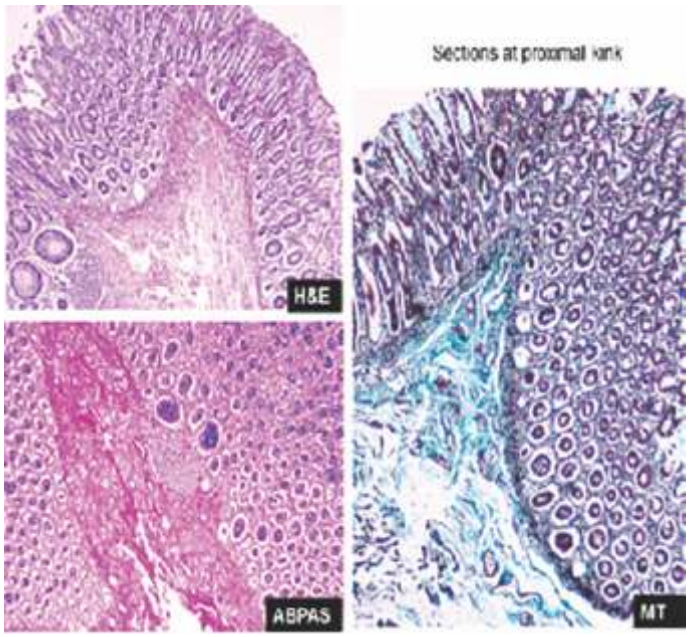

Fig. 2: Histopathological Features of Kinked Colon at its Proximal Kink (H&E- Haematoxylin and Eosin, MT- Massion Trichrome, ABPAS- Alcian Blue with Periodic Acid Schiff Stain). Magnification: 40x

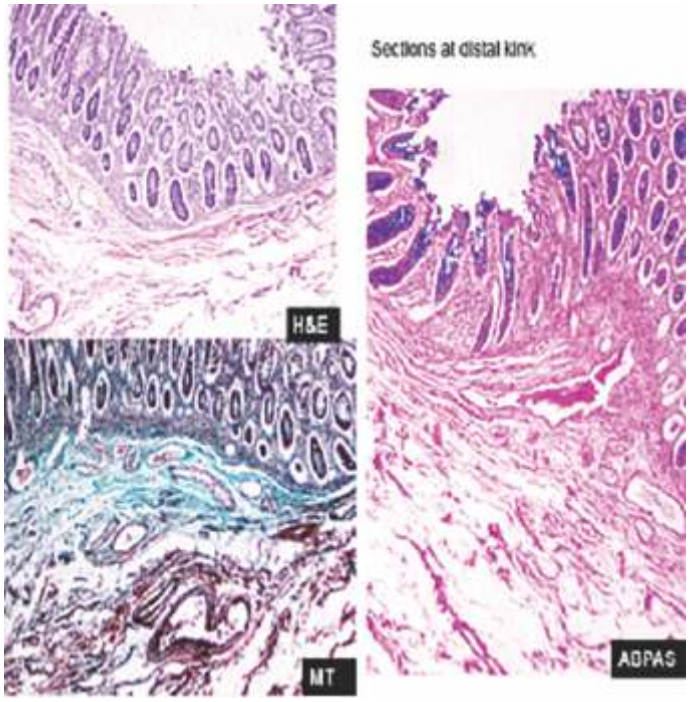

Fig. 3: Histopathological Features of Kinked Colon at its Distal Kink (H&E- Haematoxylin and Eosin, MT- Massion Trichrome, ABPAS- Alcian Blue with Periodic Acid Schiff stain). Magnification 40x

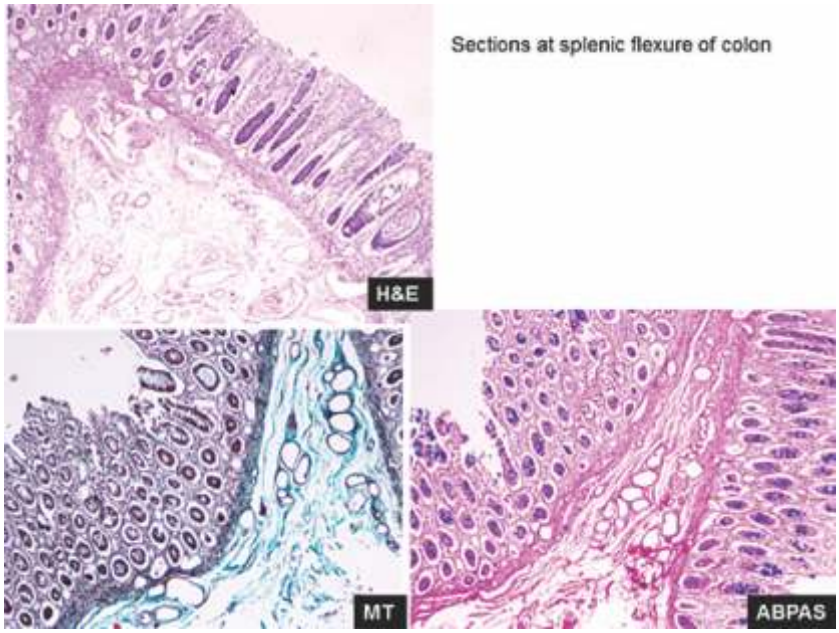

Fig. 4: Histopathological Features of Kinked Colon at its Splenic Flexure (H&E- Haematoxylin and Eosin, MT- Massion Trichrome, ABPAS- Alcian Blue with Periodic Acid Schiff stain). Magnification 40x

Discussion:

Anatomic variations of the colon probably result due to embryologic abnormalities of gut rotation and fixation or increased intraperitoneal pressure. These anatomic variations may include congenital malposition, pathological peritoneal attachments, a short transverse mesocolon, reduced as well as increased retroperitoneal fat tissue, or an innate increased laxity, elongation, or absence of the suspensory ligaments [5-8]. Embryologically, the human midgut (which includes the right colon and two-thirds of the proximal transverse colon) returns to the abdomen in the tenth week.

Thereafter, the dorsal mesenteries of the ascending and descending colon degenerate while the posterior body wall lengthens. Consequently, the ascending and descending colon become 'secondarily' retroperitoneal and the transverse and sigmoid colon remain suspended [9]. Hence, the kinking of colon as in the present case might be a developmental anomaly that occurs due to malrotation of the primitive gut during fetal life.

Clinically, no symptoms are attributable to kinking of transverse colon, but at times it may mimic various abdominal complications in the form of attacks of pain off and on at irregular intervals. Bailey reported a similar case long back of a patient with the complications of violent pain above the left of the umbilicus and had a differential diagnosis such as appendicular colic, colitis, duodenal ulcer, malignancy of colon and splenic trouble. However, physical examination of the subject did not reveal any tenderness instead, abdominal uneasiness could be palpated. The contrast x-ray eventually confirmed the kinking of the transverse colon resulting in an obstruction [10]. So, surgeons should be aware of the anomalous presence of such 'kinks' and loops in the transverse colon before exploration of patient for any acute abdominal emergency as unawareness might lead to wrong diagnosis. Histopathological study performed in this study confirmed that the thickness of the colon was reduced at the region of the kink due to ulceration. This point is very important to note. Similarly, we also noted that there was formation of oedema due to presence of the distal kink. All these findings are important during colonoscopy as the reduced thickness might lead to obstruction during this procedure. This might also lead to misinterpretation of the findings. The obstruction might also lead to the formation of volvulus within the transverse colon.

Finally, despite there being much clinical importance of the kinking of colon, little has been said in the literature about its incidence and structure. In fact, there are no studies on the histopathological appearance of these kinks in the colon. Nevertheless, kinking of the colon is clinically very important. It may cause difficulties in colonoscopy procedure and in the interpretation of various radiological images of the abdominal organs.

Conclusion:

The kinking of transverse colon is a rare anatomic entity mostly seen as an incidental finding in an asymptomatic patient`s radiograph. However, this anatomic abnormality might be responsible for unclear gastrointestinal symptoms. Hence, these findings have important applications in colonic surgery and endoscopy.

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***Author for Correspondence:** Ashwini Aithal P, Department of Anatomy, Melaka Manipal Medical College (Manipal campus), Manipal Academy of Higher Education, Manipal- 576104 Karnataka. Email: ashwini.anat@gmail.com Cell : 8095132879*