Colonic pseudolipomatosis is a rare and benign condition. It is not well known by gastroenterologists and its pathogenesis is still unclear.

Methods — All cases of colonic pseudolipomatosis seen between February 2002 and June 2004 at the Amiens University Hospital were identified and analyzed.

Results — During this period, 2099 colonoscopies were performed and 9 cases of colonic pseudolipomatosis were diagnosed (0.4%). Patients were all males aged from 41 to 67 (median age 52 years). They consulted for rectal bleeding (two patients), diarrhea (two patients) or abdominal pain (two patients). In three patients, colonic pseudolipomatosis was a fortuitous discovery during colonoscopy for polyp surveillance. The lesions presented as whitish and yellowish slightly elevated plaques ranging in size from a few millimeters to 4 cm. They extended over a two to 20 cm-long area, located in the right (two patients), transverse (four patients) or left colon (three patients). Microscopic examination showed empty spaces in the lamina propria measuring from 50 to 600 μm. They were negative for anti-CD31, CD34 and PS100 antibodies at immunohistochemistry and negative for Sudan black in three cases. The ultrastructural study showed in two cases round spaces containing small fibrillary protein-like deposits that might be lymph.

Conclusion — Colonic pseudolipomatosis is rare. Its pathogenesis is not well-known but could be due to gas invasion or extravasation of lymph into lamina propria, maybe induced by mucosal lesions related to barotrauma or certain colonoscope cleaning solutions.

SUMMARY

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(Biogenex, San Ramon, USA, 1/400) (adipocyte marker). For three cases, the biopsies were frozen and 10 µm slices were performed with a cryostat then stained with Sudan-black and examined under optical microscopy. For two cases, colonic biopsies were fixed in glutaraldehyde and osmium tetroxide then embedded in Epon resin. Semi-thin then ultra-thin slices were obtained with an ultra-microtome then examined under electron microscopy (Zeiss).

**Results**

**Patients**

During the study period, 2099 colonoscopic procedures were performed in the digestive endoscopy unit of the Amiens University Hospital. Prevalence of colonic pseudolipomatosis in this study was 0.4%. One diagnosis of colonic pseudolipomatosis was established in November 2002, two in February 2002, two in May and June 2003, and four between September and November 2003 by five different operators.

All patients were males ranging in age from 43 to 67 years (mean age 52 years) (table I). Two patients consulted for rectal bleeding, two for diarrhea, and two for non-specific abdominal pain. Pseudolipomatosis was a fortuitous discovery in three asymptomatic patients who underwent colonoscopic surveillance for polyps (moderately dysplastic tubulous adenomas). The earlier colonoscopy was performed three months, four years and seven years earlier in these three patients and had not disclosed pseudolipomatous lesions at that time. Fecal matter was cultured in the two patients with diarrhea and did not demonstrate presence of any pathogenic agent.

**Colonoscopic aspect**

In all nine patients, the pseudolipomatous lesions presented as slightly elevated whitish-yellowish plaques measuring from a few millimeters to 2 cm for the longest dimension. Some plaques were confluent, creating a pseudomembranous aspect (figures 1 and 2). The plaques extended over 2 to 5 cm in three patients and 18 to 23 cm in six. The lesions were localized in the right colon in two patients, the transverse colon in four, the left colon in two, and the sigmoid in one (table I). Lesions were discovered when ascending the endoscope in eight patients and when withdrawing it in one. There was no impression of rupturing air pouches when taking the biopsy. In one patient, the colonoscopy demonstrated the presence of a low-grade dysplastic tubulous adenoma and in another sigmoid diverticulosis. None of the patients underwent a control colonoscopy later.

**Pathology results**

All biopsy specimens presented the same histological aspect. Optically empty, sometimes coalescent, vacuole were observed in a background of chorionic tissue (figure 4). Occa-

<table>
<thead>
<tr>
<th>Patient</th>
<th>Sex/Age</th>
<th>Reason for colonoscopy</th>
<th>Localization</th>
<th>Size</th>
<th>Extension</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>M/52</td>
<td>Diarrhea</td>
<td>Left colon</td>
<td>0.5 - 2 cm</td>
<td>15 cm</td>
</tr>
<tr>
<td>2</td>
<td>M/46</td>
<td>Diarrhea</td>
<td>Right colon</td>
<td>0.2 - 0.3 cm</td>
<td>5 cm</td>
</tr>
<tr>
<td>3</td>
<td>M/67</td>
<td>Surveillance of polyps</td>
<td>Transvers colon</td>
<td>0.5 - 1 cm</td>
<td>20 cm</td>
</tr>
<tr>
<td>4</td>
<td>M/48</td>
<td>Abdominal pain</td>
<td>Right colon</td>
<td>0.4 cm</td>
<td>3 cm</td>
</tr>
<tr>
<td>5</td>
<td>M/41</td>
<td>Abdominal pain</td>
<td>Sigmoid</td>
<td>0.5 - 1 cm</td>
<td>2 cm</td>
</tr>
<tr>
<td>6</td>
<td>M/53</td>
<td>Rectal bleeding</td>
<td>Left colon</td>
<td>2 cm</td>
<td>23 cm</td>
</tr>
<tr>
<td>7</td>
<td>M/50</td>
<td>Rectal bleeding</td>
<td>Transvers colon</td>
<td>2 - 4 cm</td>
<td>20 cm</td>
</tr>
<tr>
<td>8</td>
<td>M/50</td>
<td>Surveillance of polyps</td>
<td>Transvers colon</td>
<td>1 - 2 cm</td>
<td>15 cm</td>
</tr>
<tr>
<td>9</td>
<td>M/67</td>
<td>Surveillance of polyps</td>
<td>Transvers colon</td>
<td>3 - 4 cm</td>
<td>20 cm</td>
</tr>
</tbody>
</table>

**Table I** – Clinical and endoscopical features for each patient.

*Caractéristiques cliniques et endoscopiques de chaque malade.*

**Fig. 1** – Endoscopic appearance of colonic pseudolipomatosis, showing adherent, irregular whitish plaques on the surface of the right colon (patient 5).

*Aspect endoscopique de la pseudolipomatose colique, caractérisée par des plaques blanchâtres, irrégulières, adhérentes à la surface du côlon droit (malade 5).*

**Fig. 2** – White surelevated and confluent plaques in the transverse colon (patient 4).

*Plaques blanches surelevées parfois confluentes au niveau du côlon transverse (malade 4).*
Colonic pseudolipomatosis

Sionally, the vacuoles were coalescent limited by thin partitions. The vacuoles measured 50 to 600 µm in their longest dimension and were surrounded by a mononucleated inflammatory infiltrate. The colonic epithelial surface showed abrasion in some specimens or presence of dystrophic cells in others. Sudan-black stain did not demonstrate presence of lipid deposits in the vacuoles of the three specimens tested. Immunohistochemistry was negative for anti-CD31, anti-CD34 (figure 4) and anti-protein S100. The immunohistochemical aspect was not in favor of vascular dilatation or adipocyte vacuoles. The ultrastructure was examined in two specimens and demonstrated that the vacuoles displaced collagen fibers and cellular elements in the chorion. The extracellular vacuoles were not limited by a membrane and appeared to have a fluid content, containing fine protein-like fibrillary deposits, compatible with lymph (figures 5 and 6).

**Discussion**

Colonic pseudolipomatosis is a rare entity described by Snover in 1985 [1]. About sixty cases have been published in the literature [1-8]. Different endoscopy units have reported a frequency of 0.3 to 1.7% among all colonoscopies performed [1-3]. Prevalence of this entity is probably underestimated due to the lack of clinical expression [3]. It is predominantly found in men in the sixth decade (reported age range 27-85 years) [1, 4, 5].
Patients consult for various symptoms (diarrhea, constipation, abdominal pain) or for digestive bleeding (positive occult blood test, rectal bleeding) in about half of the published cases [1, 4-6]. Pseudolipomatous lesions can also be fortuitous discoveries in patients undergoing colonoscopy for polyp [1] or dolichosigmoid [4] surveillance.

The endoscopic aspect of colonic pseudolipomatosis is very characteristic. Lesions appear as slightly elevated whitish or yellowish adherent plaques, often multiple and sometimes confluent. The plaques extend over several millimeters to 4 cm and can be found equally in the right or left colon [1]. False membranes, lipoma, or malakoplakia are sometimes suggested endoscopically [1, 5].

The histological aspect is typical, characterized by the presence of optically empty vacuoles measuring a few micrometers and displacing adjacent chorion but not crypts and glands [1, 4]. These optically empty cavities in the chorion are morphologically similar to adipocytes but histochemistry and ultrastructure confirm the absence of lipid content, leading to the term ‘pseudo’lipomatosis proposed by Snover et al. [1]. In our series, the absence of protein-S100 uptake at the immunohistochemistry study confirmed that these vacuoles were not adipocytes and the absence of CD31 and CD34 uptake that they were not distended lymphatic vacuoles. For most authors, the optically empty cavities correspond to sequestered gas in vacuoles in the colonic mucosa as was demonstrated by two ultrastructure studies [1, 6]. Electron microscopy, performed in two specimens in this series, appeared to suggest the presence of lymph in the cavities but the mechanism of this lymphatic extravasation into the lamina propria is not clear.

The pathogenesis of colonic pseudolipomatosis remains unclear but appears to be more a complication of endoscopy than a real pathological entity. Gas invasion or lymphatic extravasation into the chorion could be favored by the presence of colonic mucosal lesions resulting from barotraumas subsequent to insufflation during the colonoscopic procedure [3, 5]. Certain authors have also suggested that insufficient rinsing of endoscopes would implicate an effect of disinfection products, particularly hydrogen peroxide, in the pathogenesis of these lesions [6]. Colonic pseudolipomatous lesions have been reproduced experimentally in the rat by instillation of hydrogen peroxide into the colon [9, 10]. Certain authors have also suggested that glutaraldehyde could be implicated in the pathogenesis of pseudolipomatosis [11], but experimental attempts to reproduce the lesions with this agent have been unsuccessful [9, 10]. At the Amiens University Hospital, 3% hydrogen peroxide has been used to disinfect endoscopes for several years. The disinfection protocol was not changed during the study period. The endoscopes are rinsed manually so it would be difficult to formally rule out an error of manipulation. Cases of pseudolipomatosis were observed over a short period of time. In the literature, pseudolipomatous lesions have been observed both when ascending and withdrawing the endoscope [1, 6]. In our series, most were observed when ascending the endoscope (8/9 cases), suggesting that endoscope rinsing might not be the origin of these lesions.

For Snover and Cox, the presence of colonic pseudolipomatosis might be “endoscopist-dependent”, related to particular colonoscopic techniques [1, 7]. This was not found in our study where five different endoscopists observed nine lesions.

An infectious cause of colonic pseudolipomatosis has been proposed but not confirmed [5, 6]. Jonas et al. [6] reported a series where stool cultures were used to search for *Clostridium difficile* in all patients with pseudolipomatous lesions. All cultures were negative. In our study, stool cultures were negative in the two patients who presented diarrhea.

Pseudolipomatous lesions can be found in localizations other than the colon, a few cases have been reported in the stomach [12, 13] or duodenum [14]. In these localizations, pseudolipomatosis is diagnosed uniquely histologically, going undiagnosed during the endoscopy. The biopsies present optically empty cavities within the gastric or duodenal mucosal chorion [12-14].

For the differential diagnosis, colonic pseudolipomatosis can be distinguished from intestinal cystic pneumatosis by the endoscopic aspect. In cystic pneumatosis, the colonic mucosa presents a more rippled, swollen aspect with the impression that air bubbles are ruptured with retraction of the mucosa. Histologically, cystic pneumatosis is characterized by the presence of optically empty vacuoles in the colonic submucosa but not mucosa, bordered by macrophages and multinucleated giant cells [15]. Colonic lymphangioma is characterized by the presence of distended lymphatic vascular cavities in the colonic wall bordered by CD31+ and CD34+ endothelial cells [16]. Lipomatous hyperplasia of the Bauhin valve or colonic lipoma are characterized histologically by the presence of adipocytes in the ileal submucosa. Colonic malakoplakia appears as a cluster of spumous histiocytes enclosed in Michaelis-Gutmann bodies [17].

Colonic pseudolipomatosis is a benign lesion. Colonoscopic control has been performed in only a few reports but in all cases endoscopic lesions have regressed spontaneously in 3 to 20 months [3, 4, 6].

In conclusion, colonic pseudolipomatosis is a benign condition which is often asymptomatic. The endoscopic aspect is characteristic and the lesions regress spontaneously. Colonic pseudolipomatosis would be related to gas invasion or lymph extravasation into the chorion of the colonic mucosa. The pathogenic mechanism remains poorly elucidated but barotrauma by insufflation during colonoscopy or the action of endoscopic disinfection products could be implicated in the pathogenesis of these lesions.

**REFERENCES**


