Submucosal lesions of the colon is an mass like protusion into the lumen that is covered by normal colonic mucosa. It can be comprised from the various layers of the intestinal wall (intraluminal origin) or extrinsic compression (extramural origin). Optical colonoscopy can distinguish mucosal lesions from submucosal organ mass, but is hard to differentiate various submucosal tumors.

Imaging modalities such as CT or MRI effectively evaluate the full thickness of the colonic wall and surrounding tissue and are useful in the evaluation of suspected submucosal abnormalities. The correct diagnosis of these submucosal lesions with imaging study is sometimes difficult, but some submucosal mass has characteristic imaging features that can help to correct diagnosis and proper management.

**Learning objectives**

1. To illustrate the endoscopic and radiologic image findings of various submucosal lesions of the colon
2. To describe the imaging findings which can help to distinguish submucosal masses from mucosal lesions on radiologic images

### Imaging Findings/Procedure Details

**List of Submucosal Tumors of the Colon**

<table>
<thead>
<tr>
<th>Tumor Type</th>
<th>Pathology Description</th>
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<tbody>
<tr>
<td>Lipoma</td>
<td>Common nonencapsulated, benign, fat containing tumor that can be detected throughout the GI tract. The incidence of lipoma is 0.2% - 0.4% and more predominant in women. About 90% of colon lipoma is located in submucosa, and 70% of colonic lipoma is located in right hemicolon. Giant lipoma (&gt; 4cm) is the most common tumor in the colon that cause intussusception. On colonoscopy, lipoma typically has a pale yellow appearance with soft on probing, called &quot;pillow&quot; sign. Sometimes, colonic lipoma shows superficial ulceration, or bleeding. On CT, lipoma shows well defined smooth based lesion with marked low density that representing fat component.</td>
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<tr>
<td>Cavernous hemangioma</td>
<td>Hemangioma of the colon is very rare. It has many dilated, thin-walled and irregular blood filled space, is mainly located within the mucosa and submucosa. About 50% of patients have recurrent, painless rectal bleeding and anemia. At colonoscopy, elevated purple or red nodular lesions or dilated vessels are characteristic findings of the colonic cavernous hemangioma. The CT imaging findings are a transmural thickening of the involving segment, vascular engorgement within the mesentry. The presence of phleboliths is highly suggestive or phlegmonic findings of cavernous hemangioma.</td>
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<tr>
<td>Leiomyoma</td>
<td>The incidence of GI tract schwannoma is 6.1% and the most common origin is the stomach. It is usually asymptomatic, but sometimes it can cause bleeding, constipation, and anal pain. Malignant transformation is extremely rare. On endoscopy, Schwannoma shows polyoid intraluminal lesions with ulceration. On CT, well defined, round, mural mass with homogeneous attenuation and there is no evidence of cystic change, necrosis, hemorrhage and calcification. This tumor shows low attenuation on unenhanced CT, and delayed enhancement during the equilibrium phase on enhanced CT images.</td>
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<tr>
<td>Schwannoma</td>
<td>Colonic leiomyomas represent only 3% of all GI leiomyomas. They usually originating from muscularis propria or muscularis mucosa. The sigmoid and transverse is the most frequent site in the colon. Colonic leiomyoma usually shows asymptomatic, but can possibly have abdominal pain, bowel obstruction, or rectal bleeding. CT findings of leiomyoma are homogeneous, low-attenuation with various enhancement pattern. Tumors larger than 2 cm can have central ulceration. The differential diagnosis of leiomyomas includes GISTs and schwannomas.</td>
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</table>

**Gastrointestinal stromal tumor (GIST)**

GIST arises from the intestinal cells of Cajal or its precursor and it is the most common mesenchymal tumors of the GI tract. It is defined by CD117 (+)/KIT+; a tyrosine kinase growth factor receptor. On endoscopy, it shows rounded soft tissue mass, protruding to the lumen of the colon. On CT, it shows enhancing masses and often heterogeneous attenuation because of necrosis, hemorrhage, or cystic degeneration. On MRI, it shows hypointensity on T1-WI, hyperintensity on T2-WI with diffusion restriction.

**Carcinoid tumor**

Carcinoid tumors of the colon are relatively uncommon and most frequently observed in the rectum. Peak incidence of carcinoid tumor is 50th decade, and male:female ratio is 2:1. Typically, this tumor is small benign incidental lesion with a yellowish on optical colonoscopy. Colonic carcinoid tumor tend to be larger (>2cm) and more frequently involve the cecum and ascending colon. Carcinoid tumor usually present circumferential thickening or polypoid mass with lymphadenopathy, so it is difficult to distinguish from adenocarcinoma. Rectal carcinoid tumor appears as small solitary submucosal nodule or polypoid mass. Similar to colonic carcinoid, biopsy are required to confirm the diagnosis.

**Lymphoma**

Primary lymphoma of the colon is relatively rare, compared with that of the stomach and the small bowel. Nearly all primary lymphoma of the colon is non-Hodgkin B-cell lymphoma. The cecum is the most frequent location for primary colorectal lymphoma. At colonoscopy, colonic lymphoma is large, polyoid mass but mucosal ulceration can be found. At CT, Lymphoma shows infiltrative spread rising from the submucosa, resulting in uniform thickening of the intestinal wall, usually without associated desmoplastic reaction and also shows enlarged lymphnodes in the abdomen.

**Leiomyosarcoma**

Peak incidence of leiomyosarcoma is 5th and 6th decades, and it is more common in female. It has large areas of necrosis and cystic degeneration, but calcification is uncommon. On endoscopy, leiomyosarcoma shows an ulcerative mass with luminal protrusion. Small tumors may shows homogenous solid and large tumors show heterogeneous attenuation on CT. On MRI, it shows hypointensity on T1-WI, hyperintensity on T2-WI depending on the amount of necrosis and hemorrhage. The presence of retroperitoneal mass with ne cancerous and contiguous involvement of a vessel, is highly suggestive of leiomyosarcoma.

**Leiomyoma**

Colonic leiomyomas at descend colon of 56-year-old male patient with incidental findings were noted (arrows). On axial CT images of the abdomen, diffuse wall thickening was detected (arrow). On T2 weighted MR images, there is a round, well-marginated mass covered by normal mucosa and soft proving. Another lesion (C) was found. At CT, Lymphoma shows infiltrative spread rising from the submucosa, resulting in uniform thickening of the intestinal wall, usually without associated desmoplastic reaction and also shows enlarged lymphnodes in the abdomen.

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**Leiomyosarcoma**

Secondary involvement by an extracolonic tumor may be difficult to distinguish from a normal extrinsic compression or a primary intramural lesion at colonoscopy. For external compression, cross-sectional imaging can be useful for evaluating the extent of diseases.

**Conclusion**

- There are various neoplasms of submucosal origin in the colon.  
- The combined use of colonoscopy and a cross-sectional imaging technique allows a more precise evaluation of most submucosal lesions.  
- Knowing the imaging findings of submucosal lesions their mimickers (such as adenocarcinoma) will help avoid potential diagnostic pitfalls masquerading as submucosal lesions.