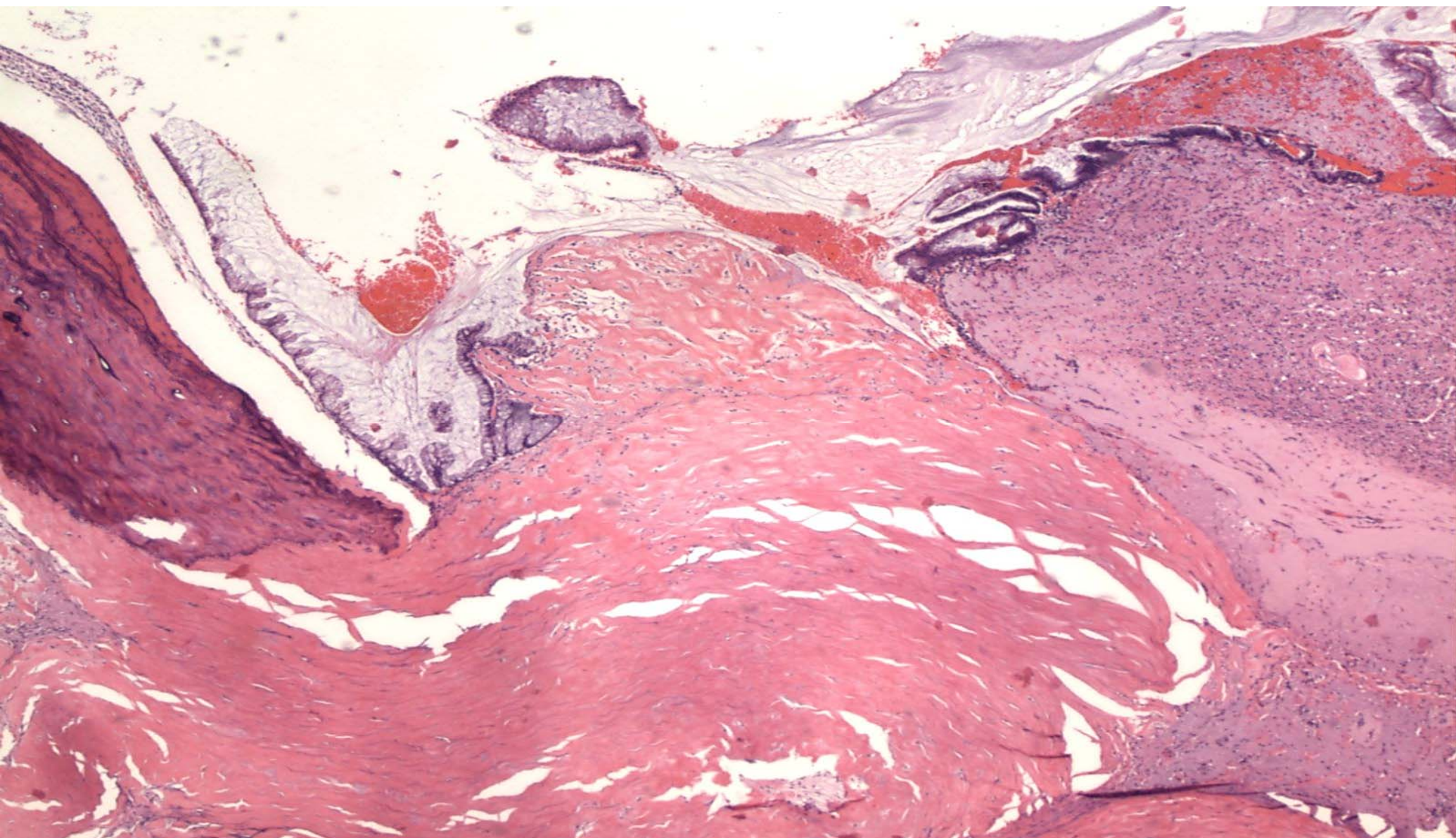


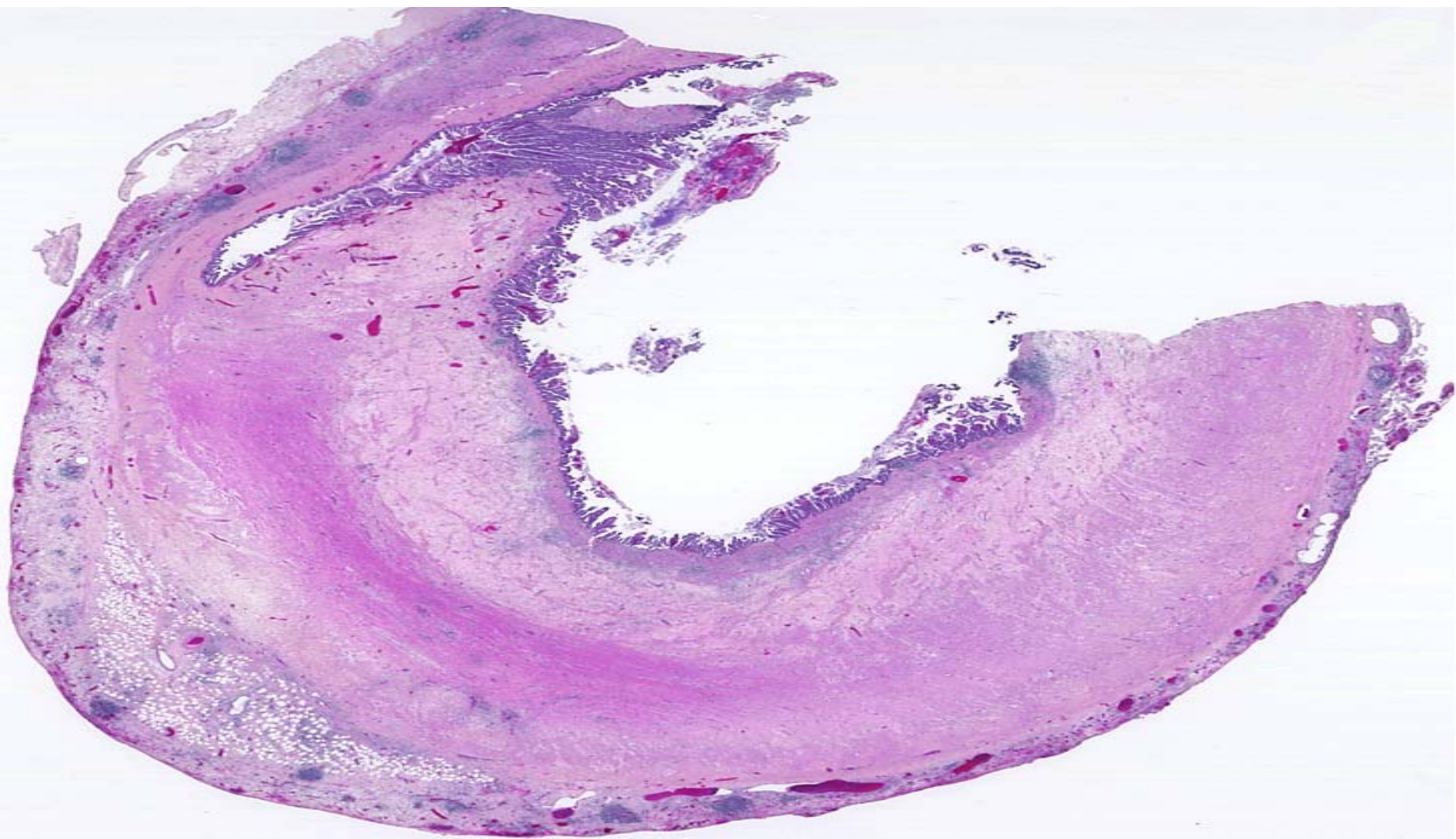
Joseph Misdraji

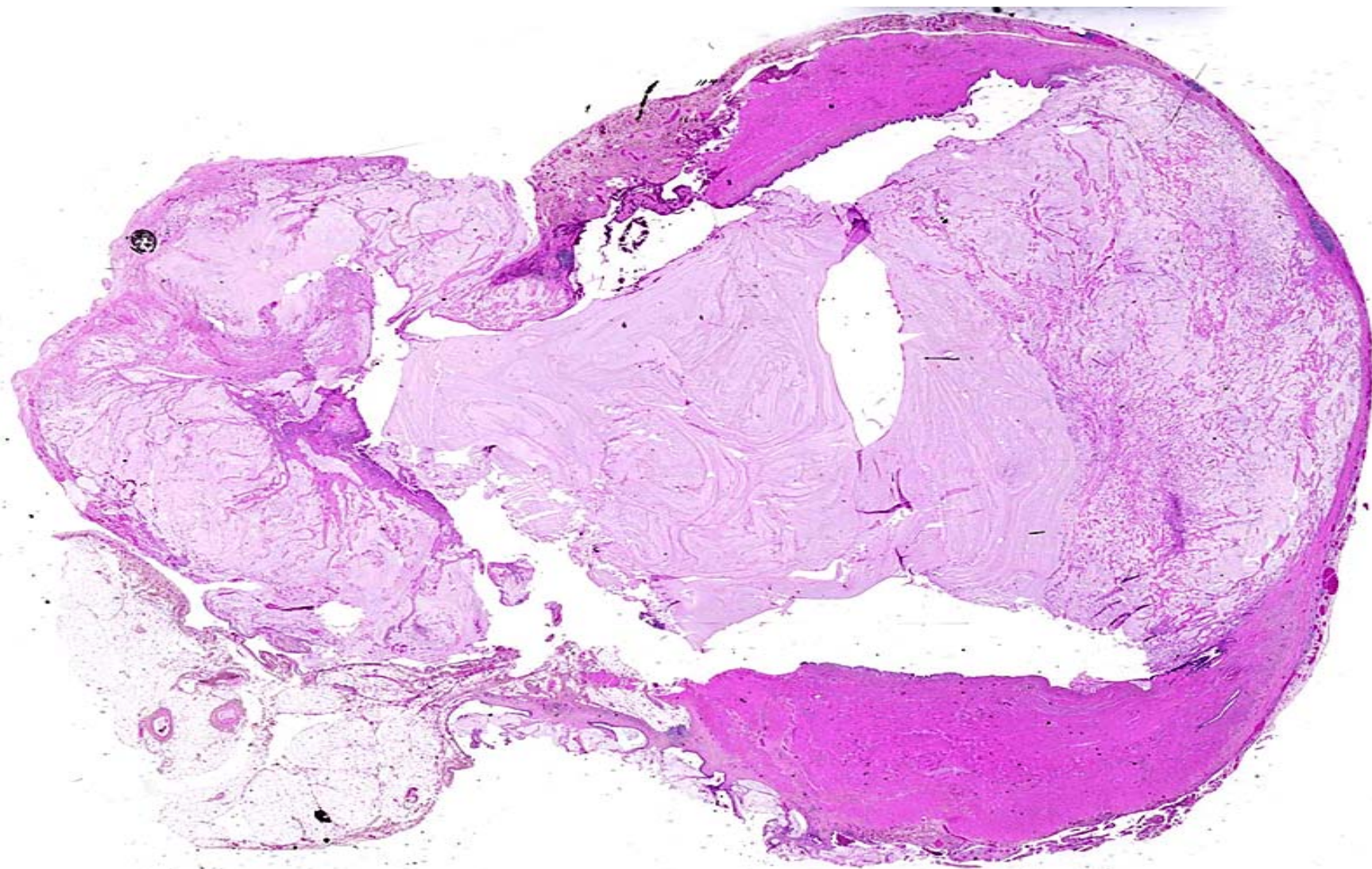
Staging LAMN: Is there a critical need to do so?
Is there a sound basis for it?

Low Grade Appendiceal Mucinous Neoplasm

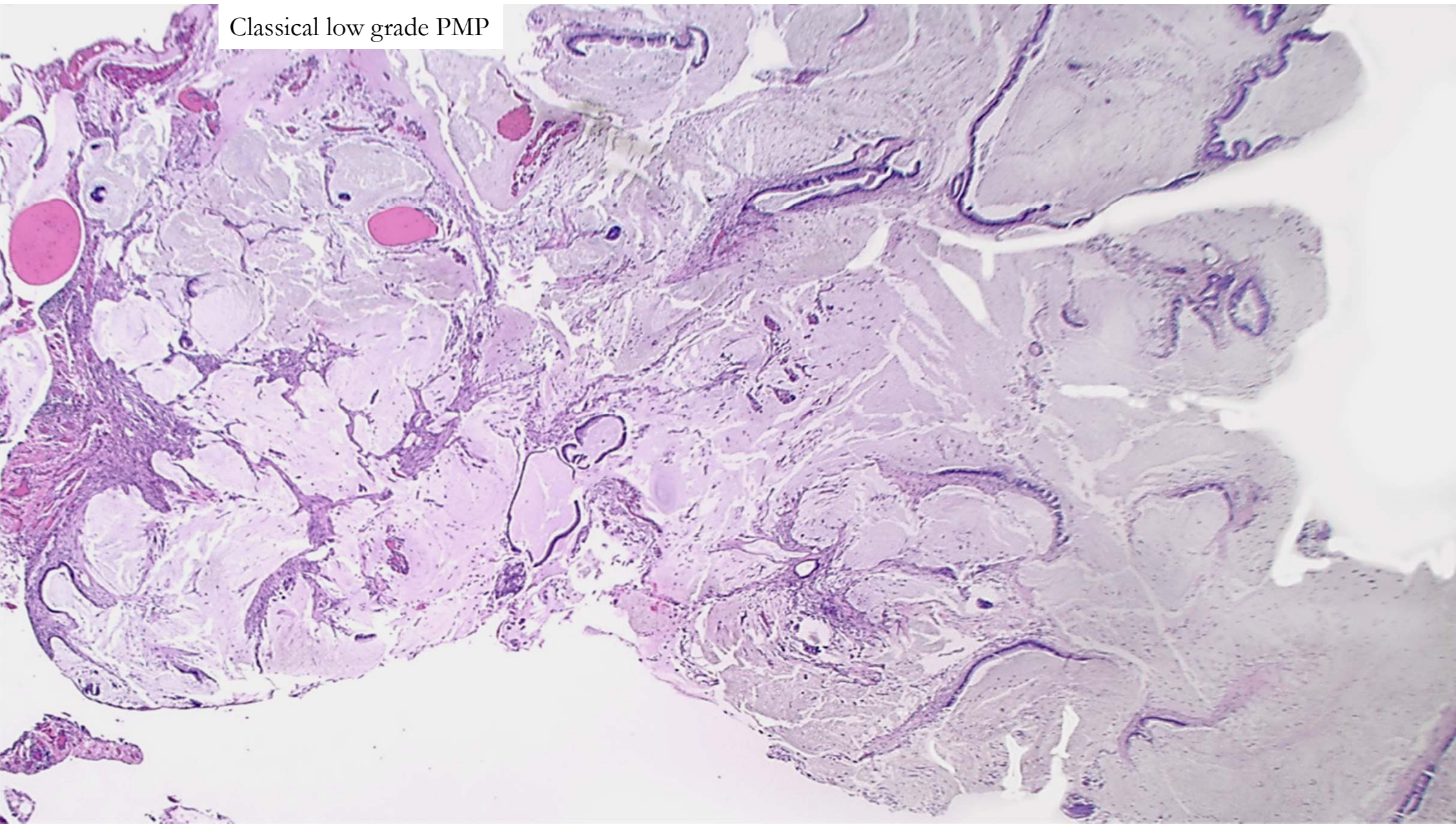
- ▶ A low grade mucinous tumor characterized by villiform, undulating, or flat growth pattern, and composed of tall mucinous epithelial cells.
- ▶ “Pushing” invasion. Destruction of muscularis mucosae with fibrosis, diverticula, herniations, dissections, etc. with possible rupture.
- ▶ Dissemination into the peritoneal cavity results in pseudomyxoma peritonei and, not infrequently, ovarian involvement.





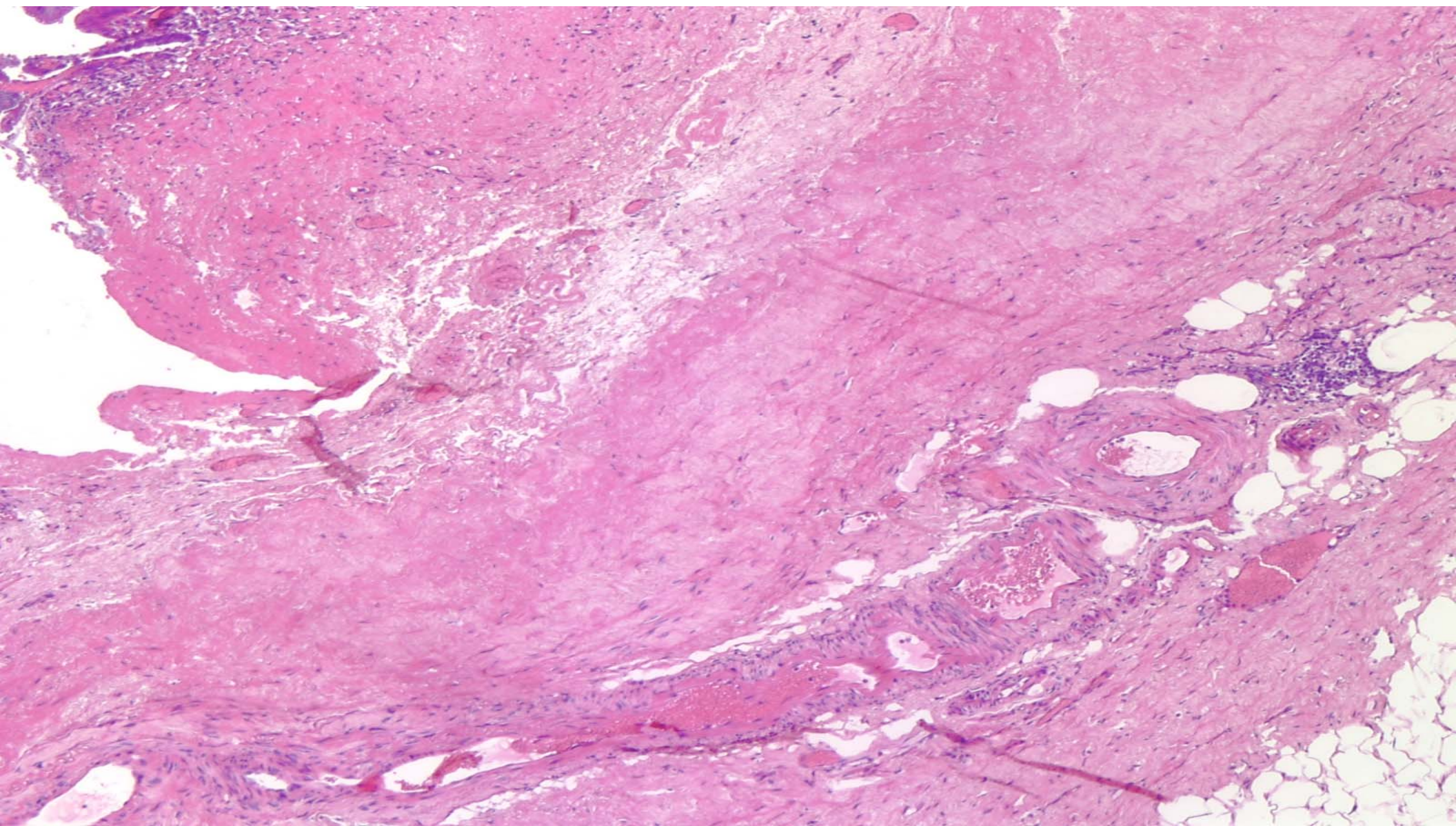


Classical low grade PMP



Mucin and mucinous tumors in the abdominal cavity

- ▶ Numerous studies have shown that acellular mucin in the peritoneal cavity has a better prognosis than cellular mucin.
 - Carr et al. *Cancer* 1995;75:757–83. Mucin outside the RLQ portended worse prognosis.
- ▶ The grade of the peritoneal tumor carries important prognostic information. 3-tier system (Davison et al. *Mod Pathol* 2014;27:1521–1539)





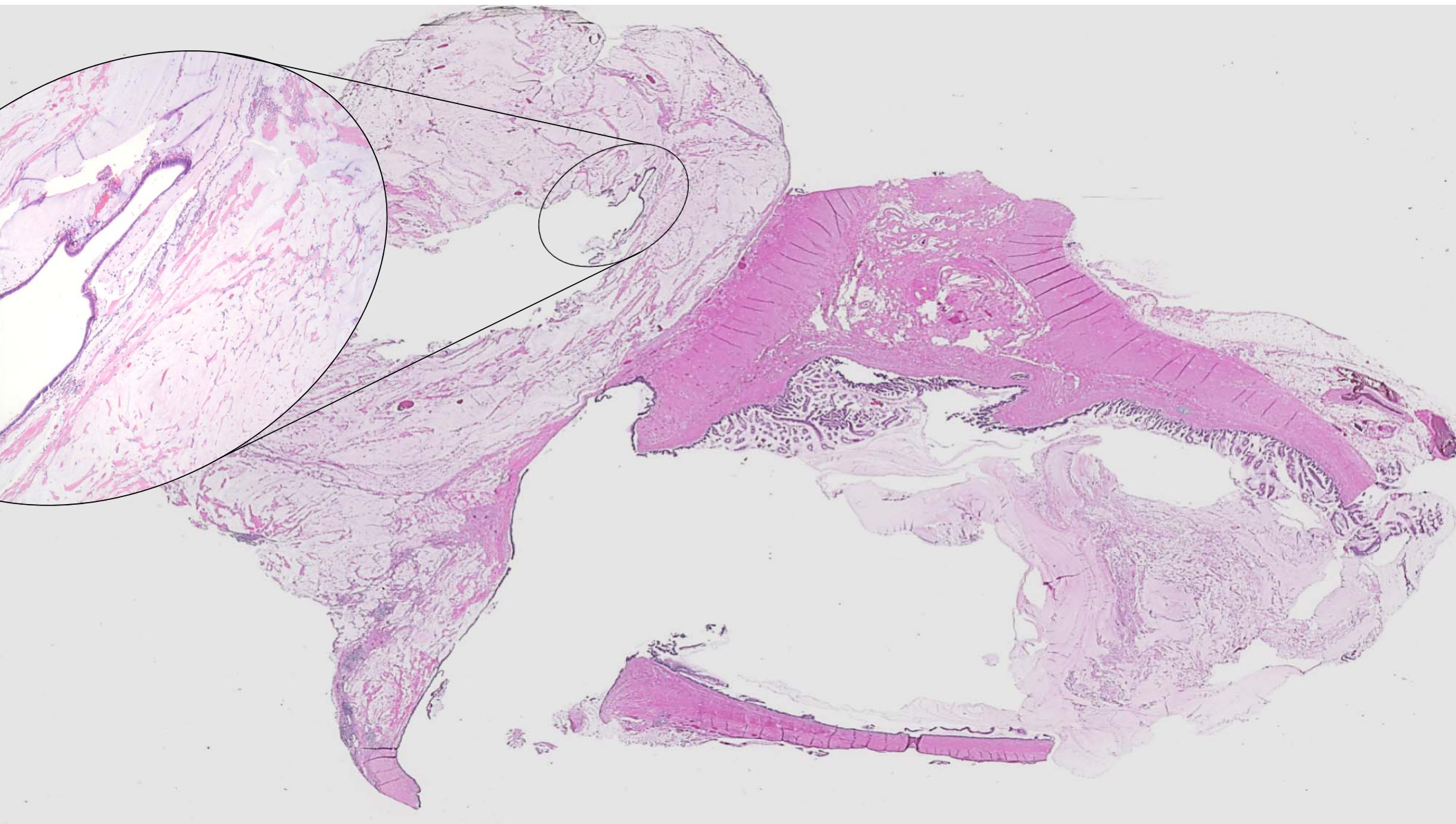
Localized pseudomyxoma peritonei



Prognostic Significance of Localized Extra-Appendiceal Mucin Deposition in Appendiceal Mucinous Neoplasms

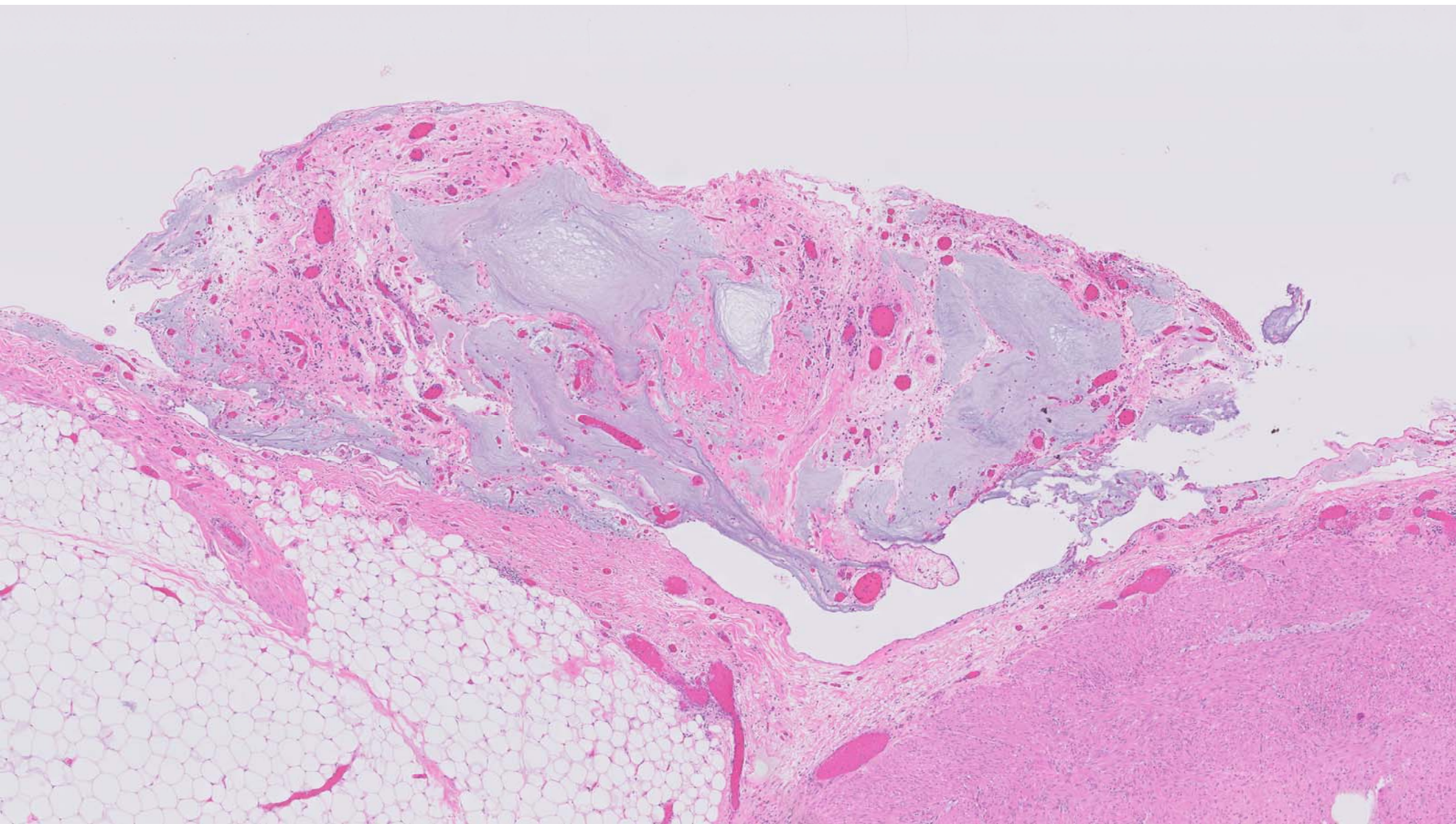
Yantiss RK, Shia J, Klimstra DA, Hahn HP, Odze RD, Misdraji J
Am J Surg Pathol 2009;33:248-255

- ▶ 50 cases without cells in periappendiceal mucin
 - 2 (4%) recurred as pseudomyxoma peritonei
 - Neither was submitted entirely, raising the possibility that epithelial cells were unsampled
- ▶ 15 cases with cells in the periappendiceal mucin
 - 5 (33%) recurred ($p=0.03$); 1 died of disease



Beware of mucin carry-over from specimen handling (no tissue reaction).





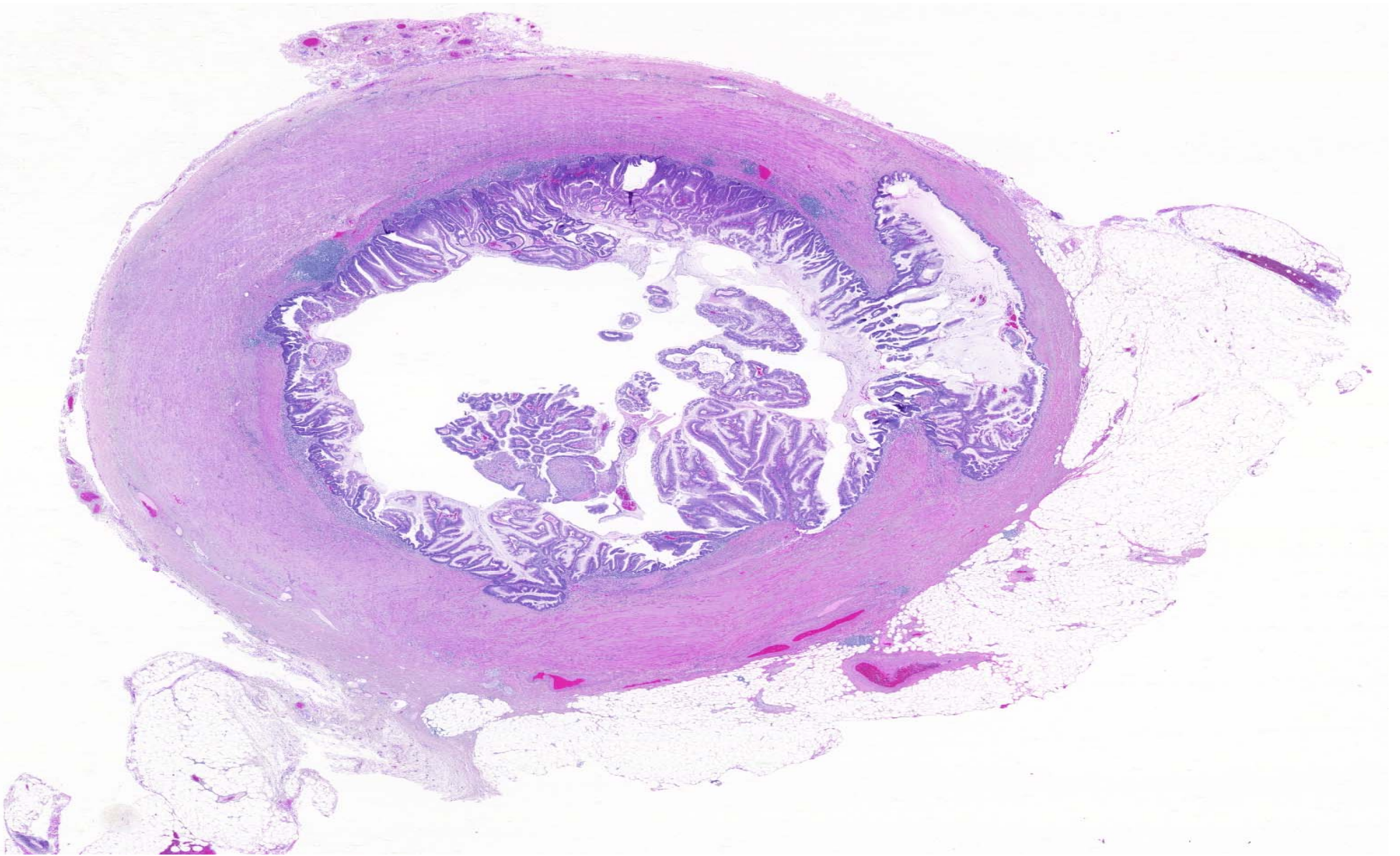
Staging LAMN

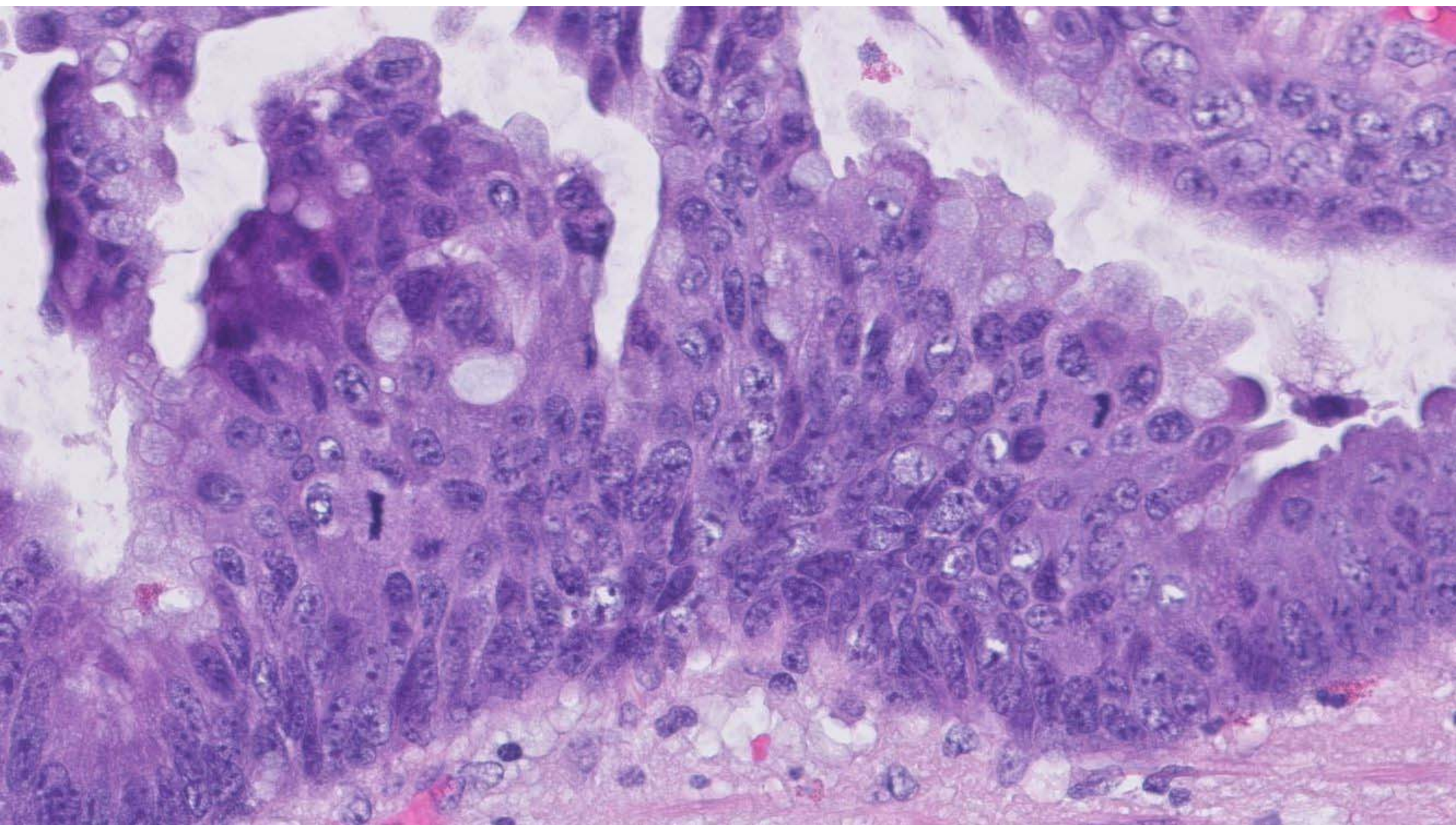
▶ T stage

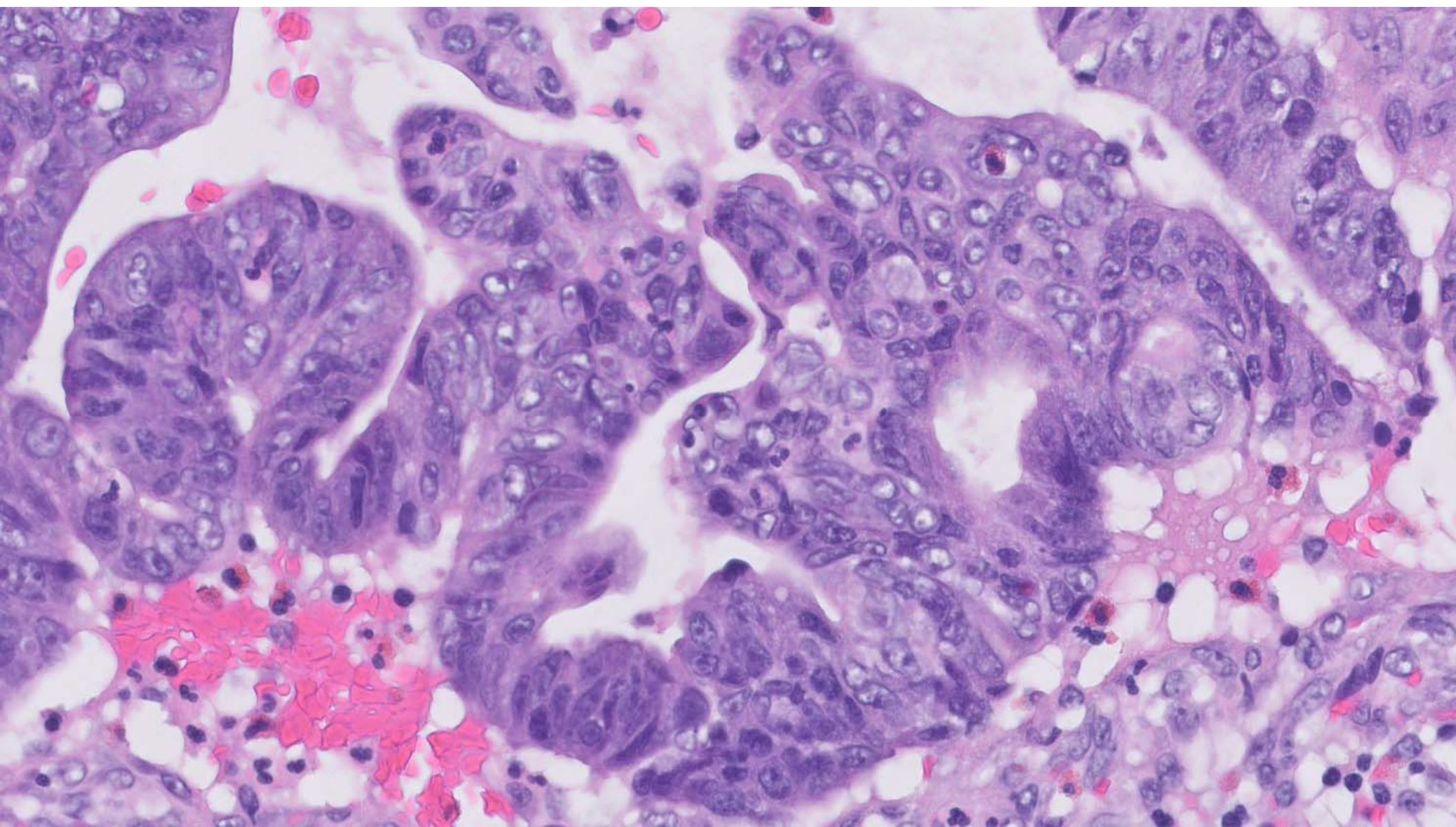
- Tis(LAMN) – LAMN confined by the muscularis propria. Acellular mucin or mucinous epithelium may invade into m. propria.
- T3 – Tumor extends to subserosa. *Includes acellular mucin.*
- T4a – Tumor invades visceral peritoneum, including acellular or cellular mucin on the serosa of the appendix or mesoappendix.

▶ M stage

- M1a: Intraperitoneal acellular mucin
- M1b: Intraperitoneal mucinous deposits containing tumor cells.
- M1c: Metastasis to sites other than peritoneum.







High-grade appendiceal mucinous neoplasm

- ▶ Pushing invasion, like LAMN, but *unequivocal* high-grade cytology. May have complex architecture (micropapillary or cribriform).
- ▶ HAMNs are rare. Most tumors with high-grade cytology are invasive cancers; evaluate the entire tumor before concluding it is a HAMN.

Staging HAMN – the same as invasive cancer*

▶ T stage

- T1 – Tumor invades submucosa
- T2 – Tumor invades muscularis propria
- T3 – Tumor invades subserosa or mesoappendix.
- T4a – Tumor invades visceral peritoneum, including acellular or cellular mucin on the serosa of the appendix or mesoappendix.

▶ M stage

- M1a: Intraperitoneal acellular mucin
- M1b: Intraperitoneal mucinous deposits with tumor cells.
- M1c: Metastasis to sites other than peritoneum.

*Based on the principle that high-grade tumors are more likely to recur. The data to support this is lacking. It may be the case that the outcome is dependent on stage, as it is with LAMN.

Why do we use TNM Classification?

- ▶ The UICC TNM staging system is the common language in which oncology health professionals can communicate on the cancer extent for individual patients as a basis for decision making on treatment management and individual prognosis.
- ▶ The objectives of the TNM classification are the following:
 - Aid treatment planning,
 - Provide an indication of prognosis,
 - Assist in the evaluation of treatment results,
 - Facilitate the exchange of information between treatment centers,
 - Contribute to continuing investigations of human malignancies,
 - Support cancer control activities, including through cancer registries.
- ▶ (Because we have to, if your lab is CAP accredited.)

LAMN: Prognosis is stage dependent

(but T stage doesn't stratify patients into distinct prognostic groups)

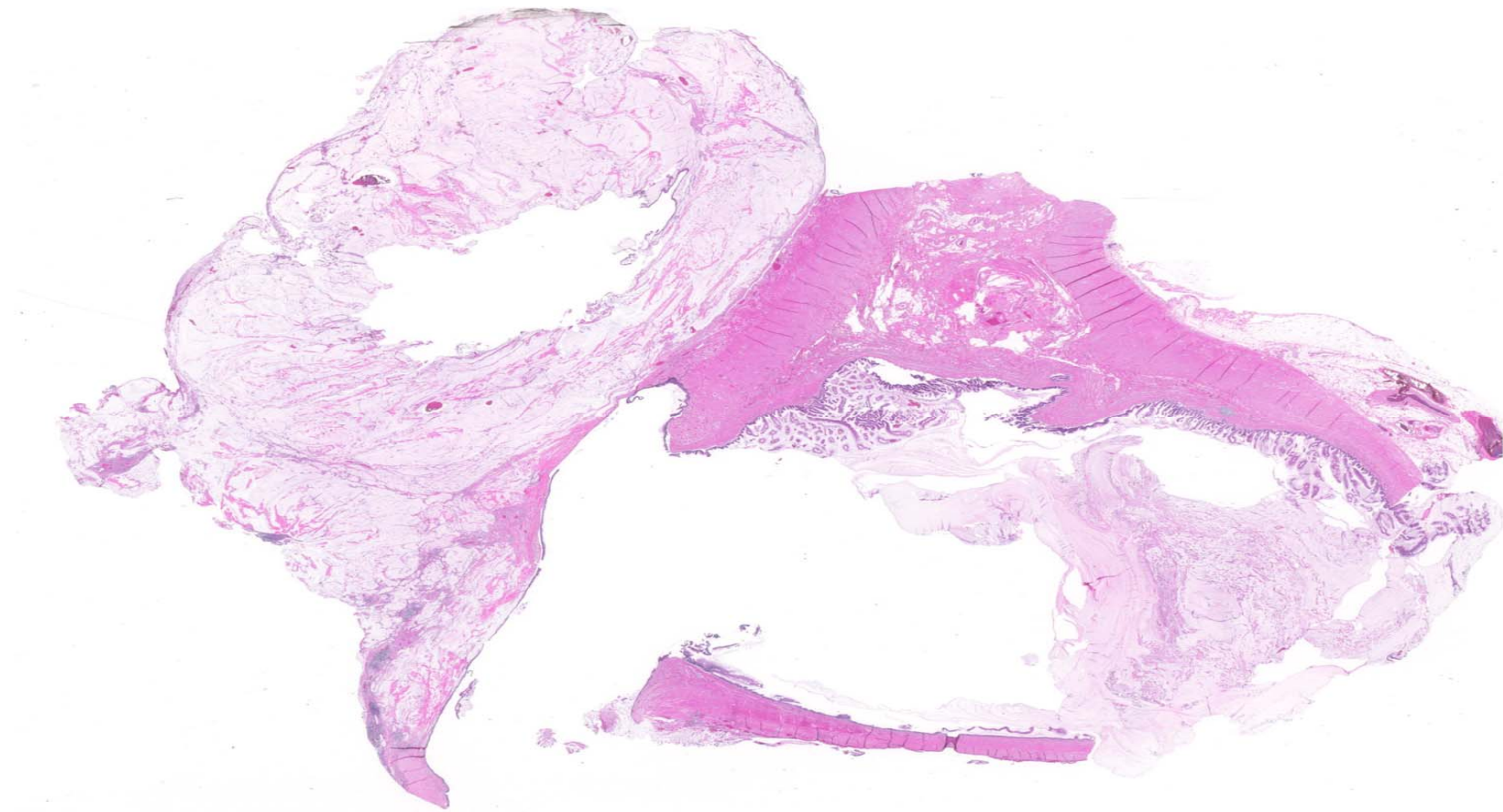
Extent of tumor spread in appendectomy	Prognosis	TNM stages
Tumor is confined to the appendix: serosa intact, no mucin or tumor outside appendix	Almost certainly cured by appendectomy	Tis(LAMN) or T3
Tumor perforates serosa with acellular mucin on the serosa (or with acellular mucin elsewhere)	Low-risk of recurrence as pseudomyxoma	T4a (and maybe M1a)
Tumor perforates serosa with cellular mucin on the serosa	High-risk of recurrence as pseudomyxoma	T4a

Ultimately, it is critical to describe the extent of spread of tumor and mucin, emphasizing whether there is acellular or cell mucin on the appendix serosa

What I do

- ▶ Staging LAMNs and HAMNs – particularly those that are not widely disseminated – is critical to assess whether a patient is at high risk of developing pseudomyxoma and for surgeons to manage that risk.
- ▶ I always describe the tumor and whether it is confined to the appendix (intact serosa) or whether there is mucin and/or epithelial cells beyond the serosa, and the grade of any peritoneal tumor.
- ▶ I do not consistently use TNM to communicate that information.

1. This appendiceal tumor shows attenuation of the wall, and on the left, mucin extruding onto the appendix serosa. There is a single strip of epithelium in that mucin (not easily visible from low-power). What key things need to be reported?



What key things need to be reported?

#	Answer	%	n
1	The stage using TNM (pT4a)	3.80%	3
2	A description of the extent of disease (mucin and epithelial cells on the serosa)	7.59%	6
3	Both of the above are necessary to communicate the critical clinical information	88.61%	70
Total		100%	79

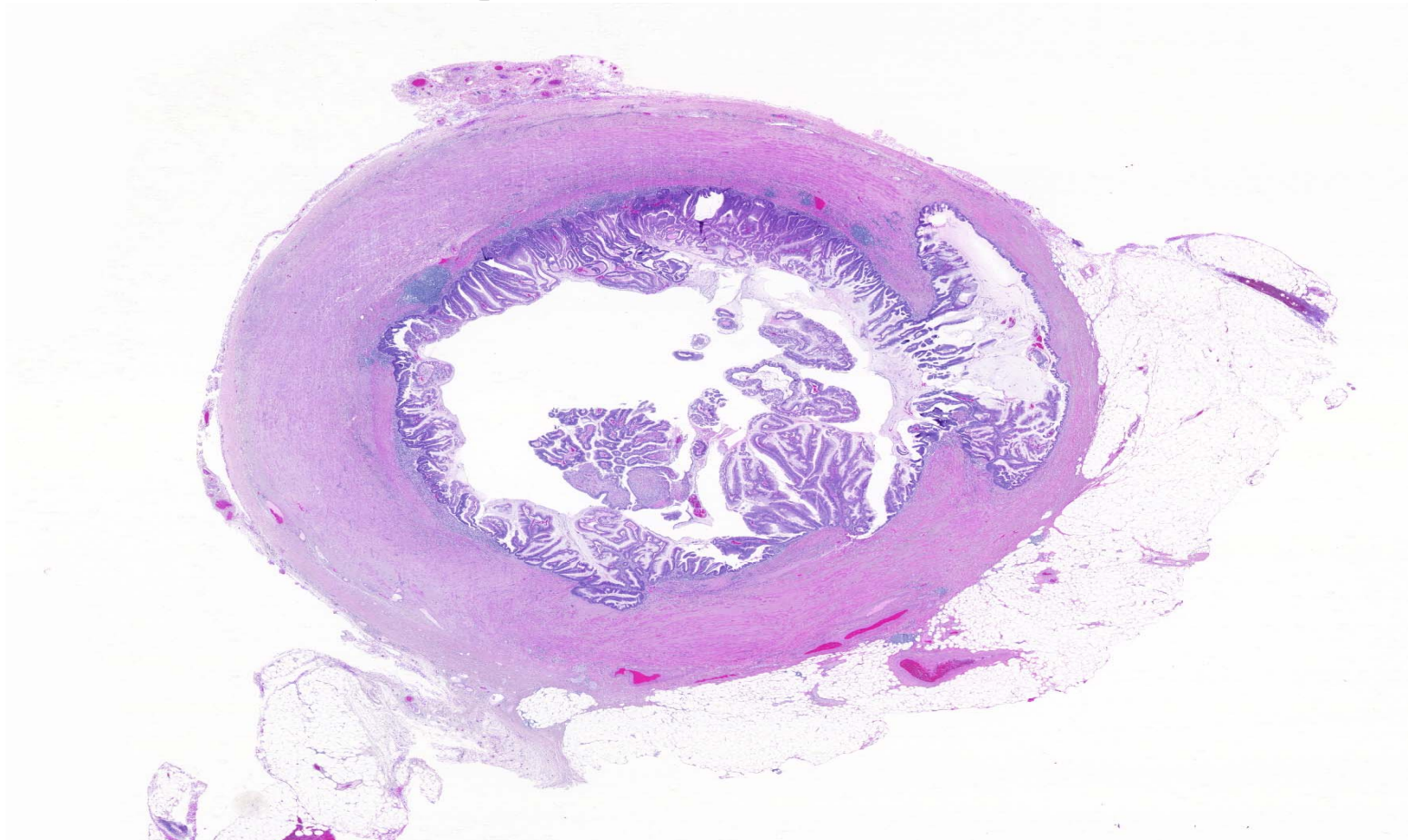
2. This tumor in the appendix was associated with widespread disease in the peritoneum and ovaries. What T stage would you use to describe this tumor?



2. This tumor in the appendix was associated with widespread disease in the peritoneum and ovaries. What T stage would you use to describe this tumor?

#	Answer	%	n
1	T4aM1b	50.00%	38
2	TxM1b	3.95%	3
3	Tis(LAMN)M1b	25.00%	19
4	Descriptive report	21.05%	16
Total		100%	76

3. This tumor shows pushing invasion into, but not through, the wall on the right side of the photo. There is no tumor on the surface of the appendix or beyond the appendix. There is an area of tumor that is unequivocally high grade (upper left of the lumen). How would you report this tumor?



3. Pushing but not through serosa; area of tumor that is unequivocally high grade (upper left of the lumen). How would you report this tumor?

#	Answer	%	n
1	Tis (HAMN)	38.46%	30
2	T2	7.69%	6
3	Report descriptively, emphasizing that the serosa is intact	12.82%	10
4	Both a description and the T stage are important to communicate effectively	41.03%	32
Total		100%	78