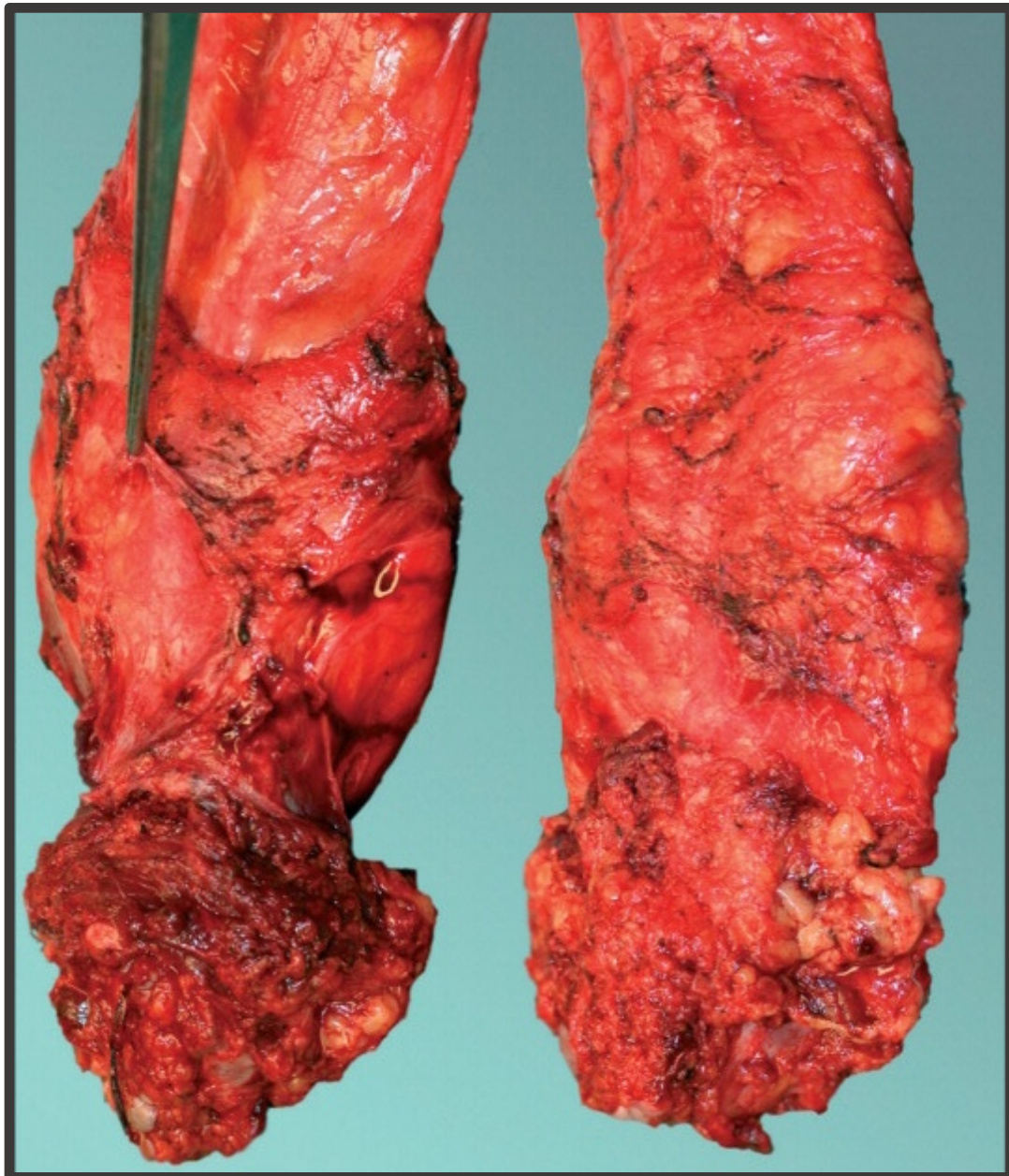


# RECTAL CANCER PATHOLOGY GUIDE









## Background

The quality of the surgical technique is a key factor in the success of surgical treatment for rectal cancer, both in the prevention of local recurrence and in long-term survival. Numerous studies have demonstrated that total mesorectal excision (TME) improves local recurrence rates and the corresponding survival by as much as 20%.

**Total mesorectal excision** requires precise dissection within the areolar plane outside the mesorectal fascia when removing the rectum. This plane encases all mesenteric nodes associated with the rectum.

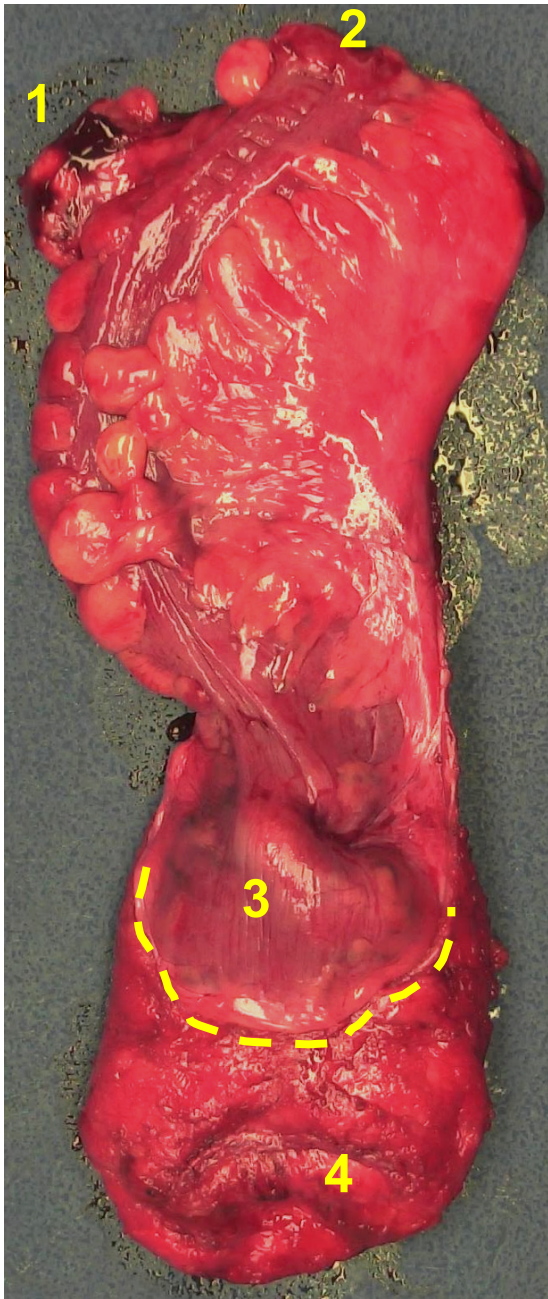
**Pathologic evaluation** of the resection specimen is a superior measure of surgical quality compared to mortality, complications, local recurrence, or 5-year survival.

- **Macroscopic pathologic assessment** of the completeness of the mesorectum (**TME grading**) accurately predicts both local recurrence and distant metastasis.
- **Microscopic parameters** (e.g., status of the circumferential resection margin) are powerful predictors of local recurrence but is inconsistently evaluated and under-reported.

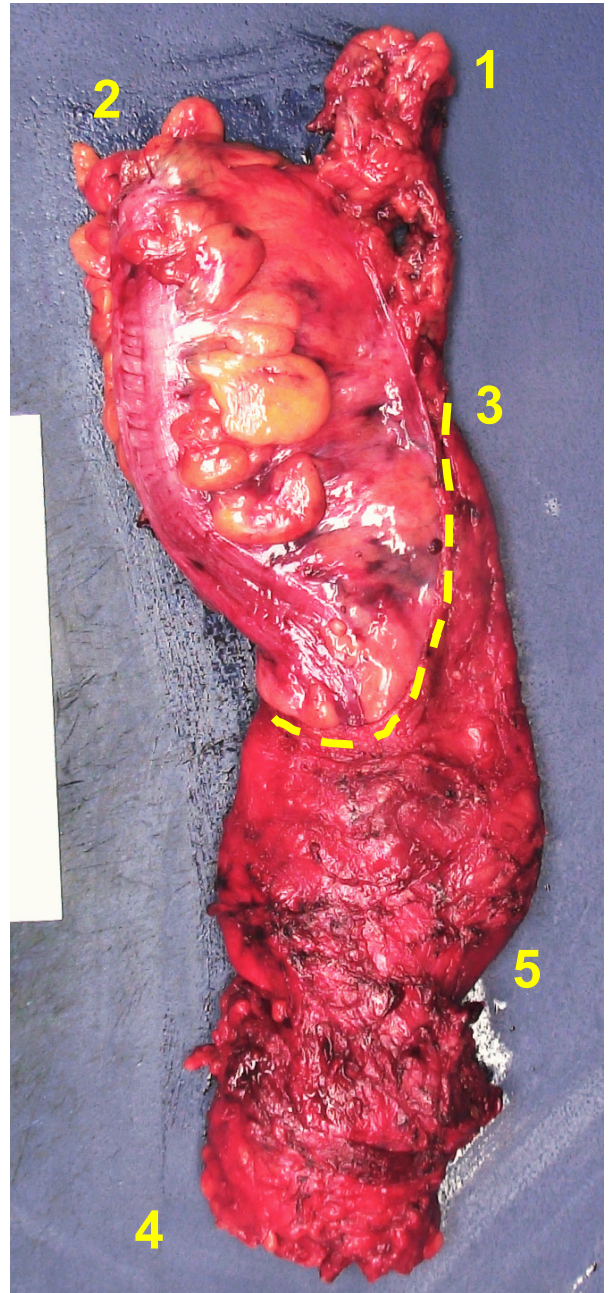




LAR Specimen



APR Specimen



1. Vascular pedicle (inferior mesenteric artery)
2. Staple line (proximal margin)
3. Peritoneal reflection
4. Staple line (distal margin; will have skin in an APR)
5. Levator muscle/sphincter complex



## Rectal Cancer Surgical Pathology: Key Steps

1) **TME grading** (referred to in CAP template as: assessing the Macroscopic Intactness of Mesorectum)

**Examine** the whole, unopened fresh specimen, preferably (can be performed on the fixed specimen if necessary)

**Grade** as Incomplete (Grade 1), Near Complete (Grade 2), Complete (Grade 3), N/A, or Cannot Be Determined

2) **Lymph Node Exam:** an adequate lymph node yield is 12+ nodes

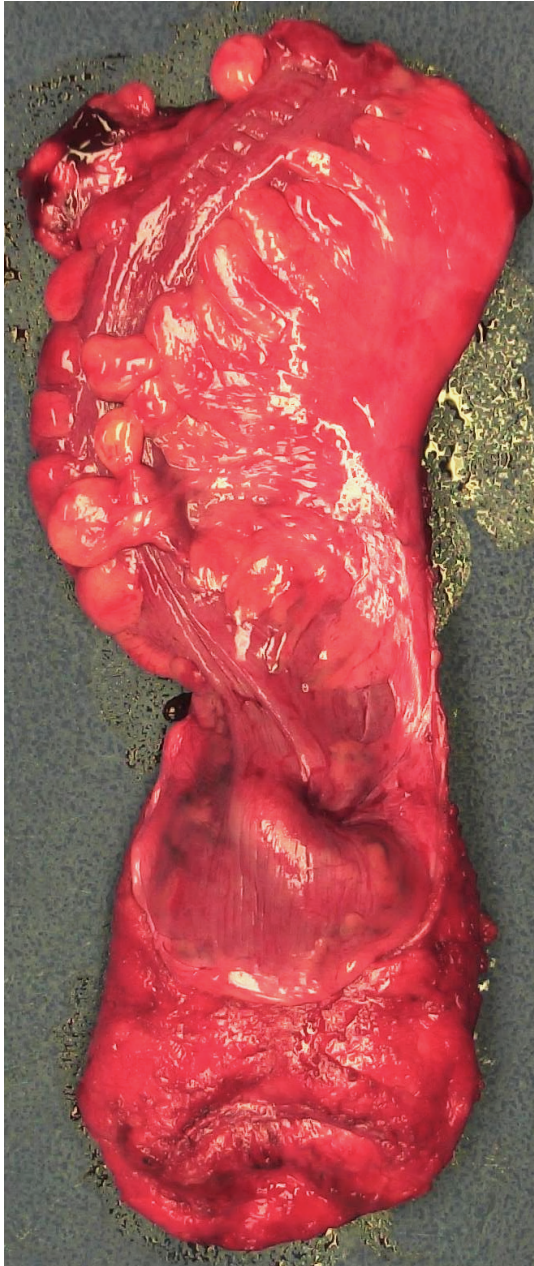
An adequate LN exam increases the likelihood of finding any metastatic nodes, which can change the patient's management.

3) **Margin Assessment:** local recurrence occurs mainly from incomplete surgical resection: the margin matters! (Both circumferential and proximal/distal)

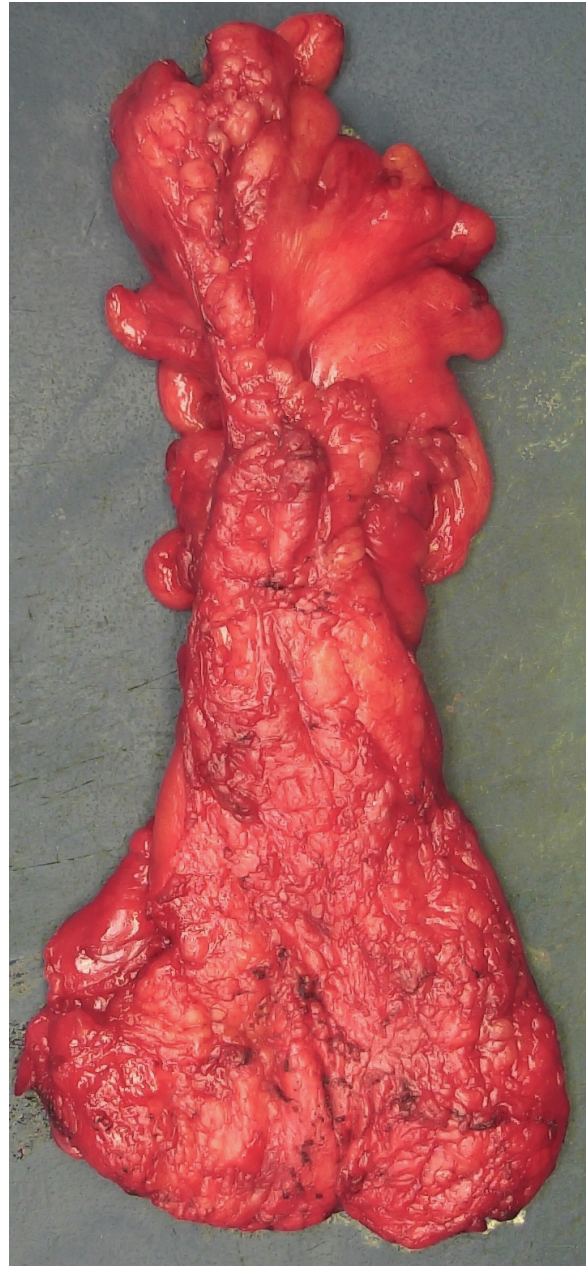
**Take 4 photos:**

Anterior, posterior, left lateral, and right lateral

Anterior



Posterior



Defects are more commonly found anteriorly, where the mesorectum is thinner.

Right



Left



## TME Grading

Examine the nonperitonealized surface of the fresh, uncut specimen circumferentially. Look for defects/tears in the mesorectal envelope.

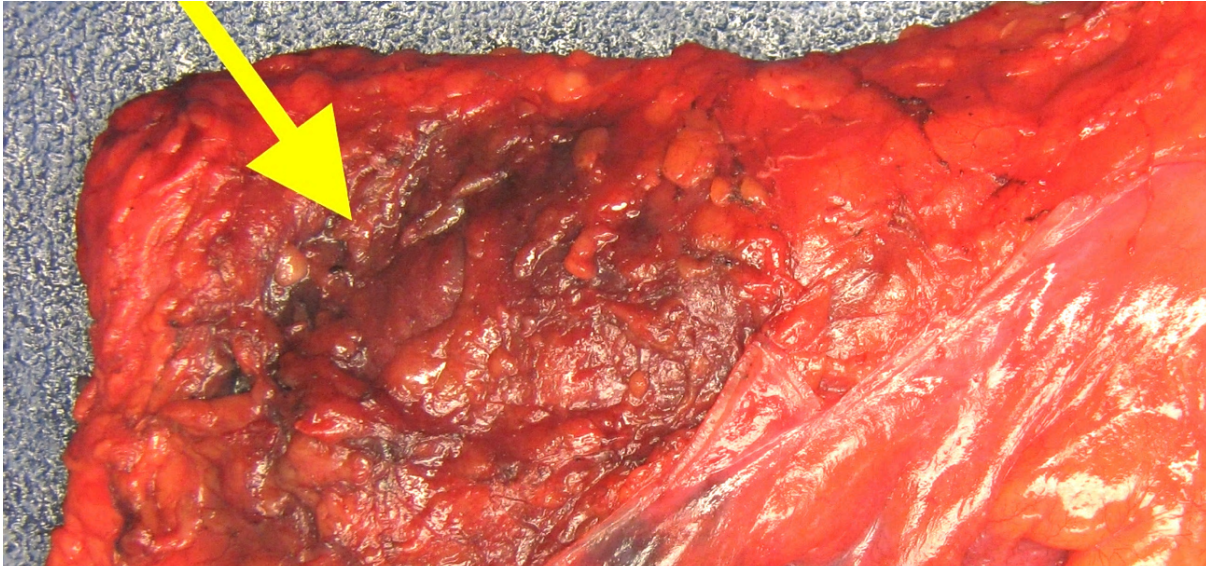
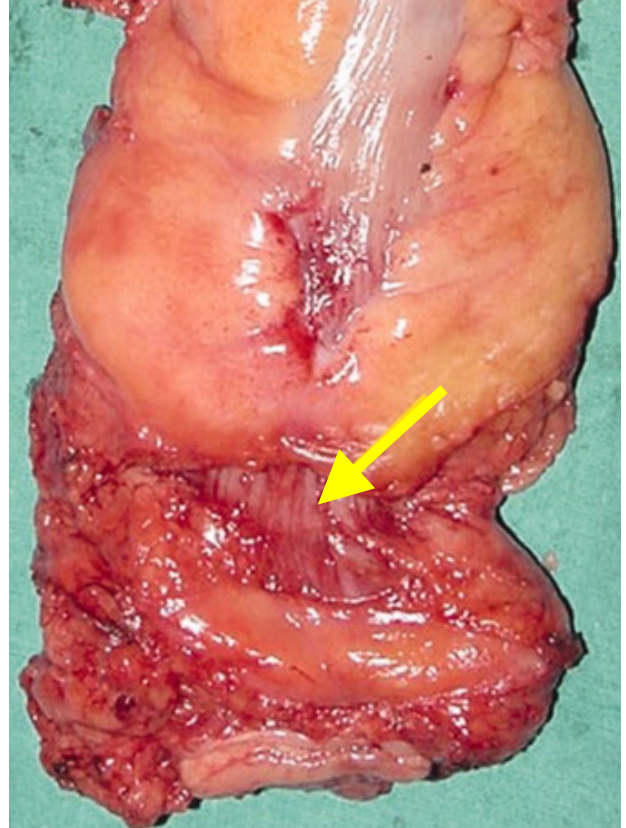
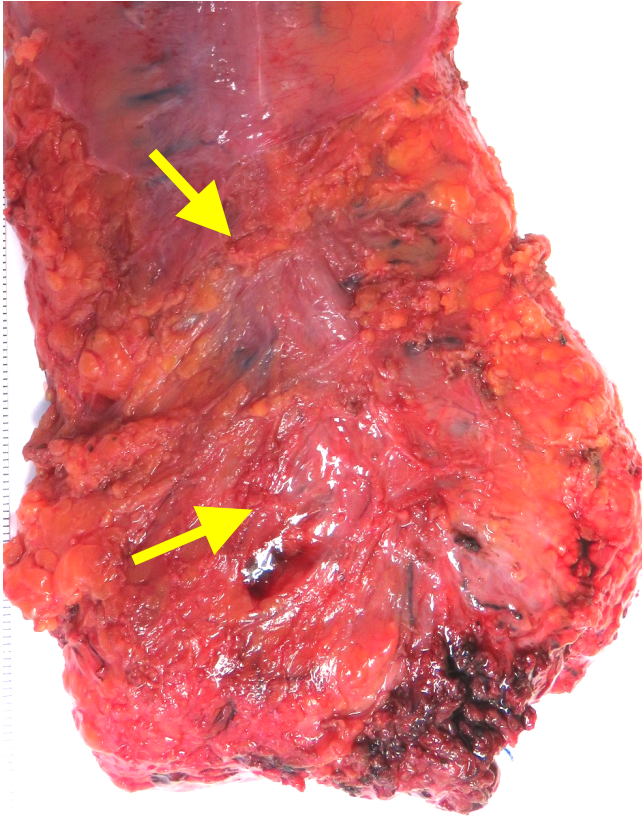
If necessary, TME grading can be performed on fixed specimens as well.

**Be stringent:** score the entire specimen according to the worst area!

Any defects in the mesorectum, even if far from the tumor, should downgrade the specimen.

	Incomplete (Grade 1)	Near Complete (Grade 2)	Complete (Grade 3)
Mesorectum	Little bulk, irregular	Moderate bulk, irregular	Bulky, intact, smooth
Defects	Down to muscularis propria	No visible muscularis propria	Not deeper than 5mm
Coning	Moderate-marked	Moderate	None

## Grade 1 - Incomplete



The mesorectal envelope is torn and the muscularis is visible. In the third photo, the mesorectum has little bulk over the posterior aspect (yellow arrow).

## Grade 3 – Complete



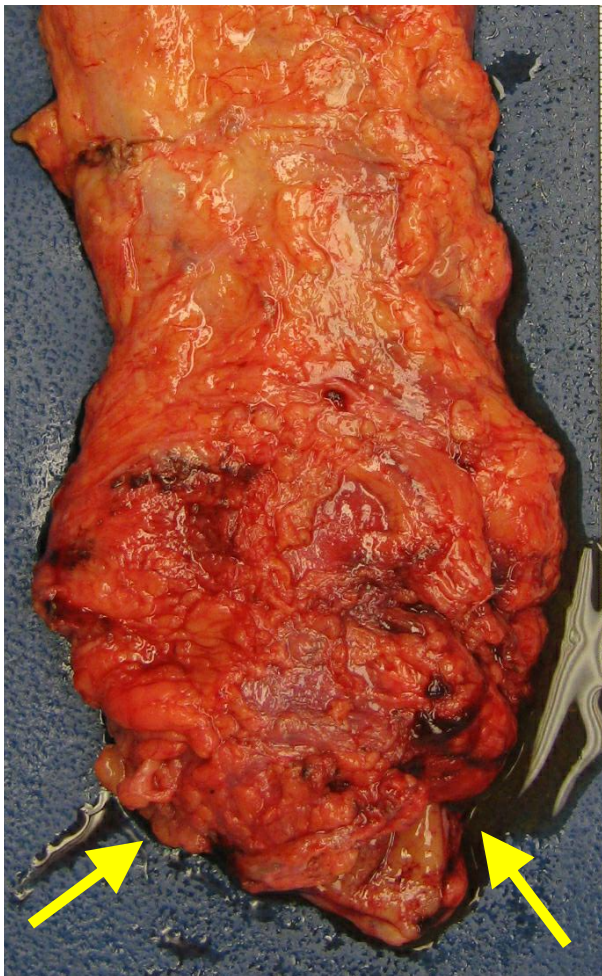
No defects (or less than 5mm deep), smooth mesorectal envelope.

## Coning

“Coning” refers to an incomplete mesorectal removal just above the levator muscles. As the surgeon reaches the end of the rectum toward the sphincter, it can be possible to “cone in” toward the rectal wall and leave mesorectal tissue behind.

Coning can occur during LARs or APRs. You will see tapering at the distal end of the specimen where the dissection is inadequate.

**Any coning should downgrade the specimen!**

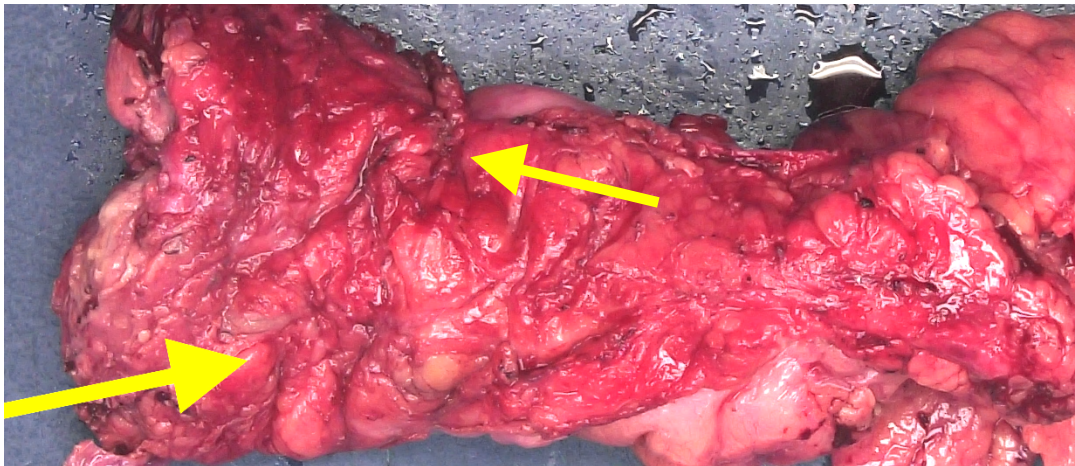
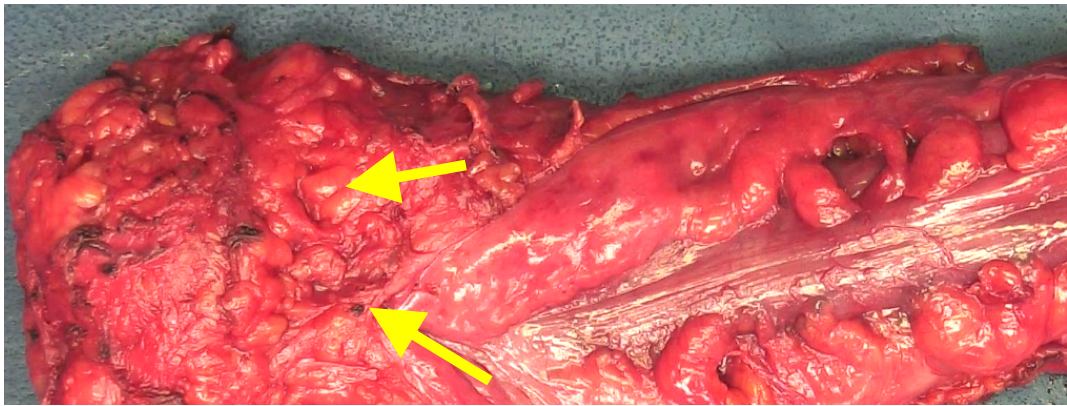
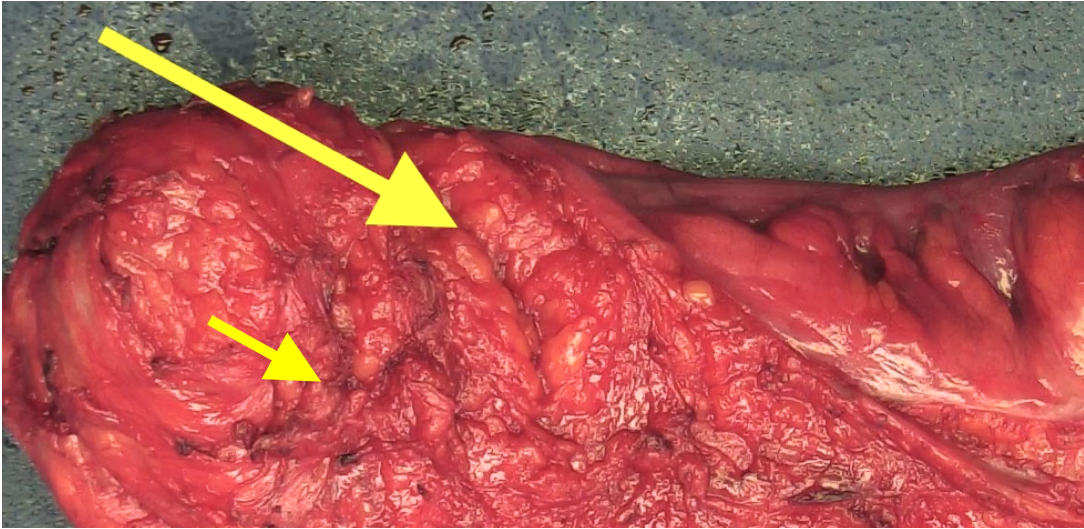


Coning with incomplete dissection at the distal margin



LAR specimen with no coning at distal resection margin

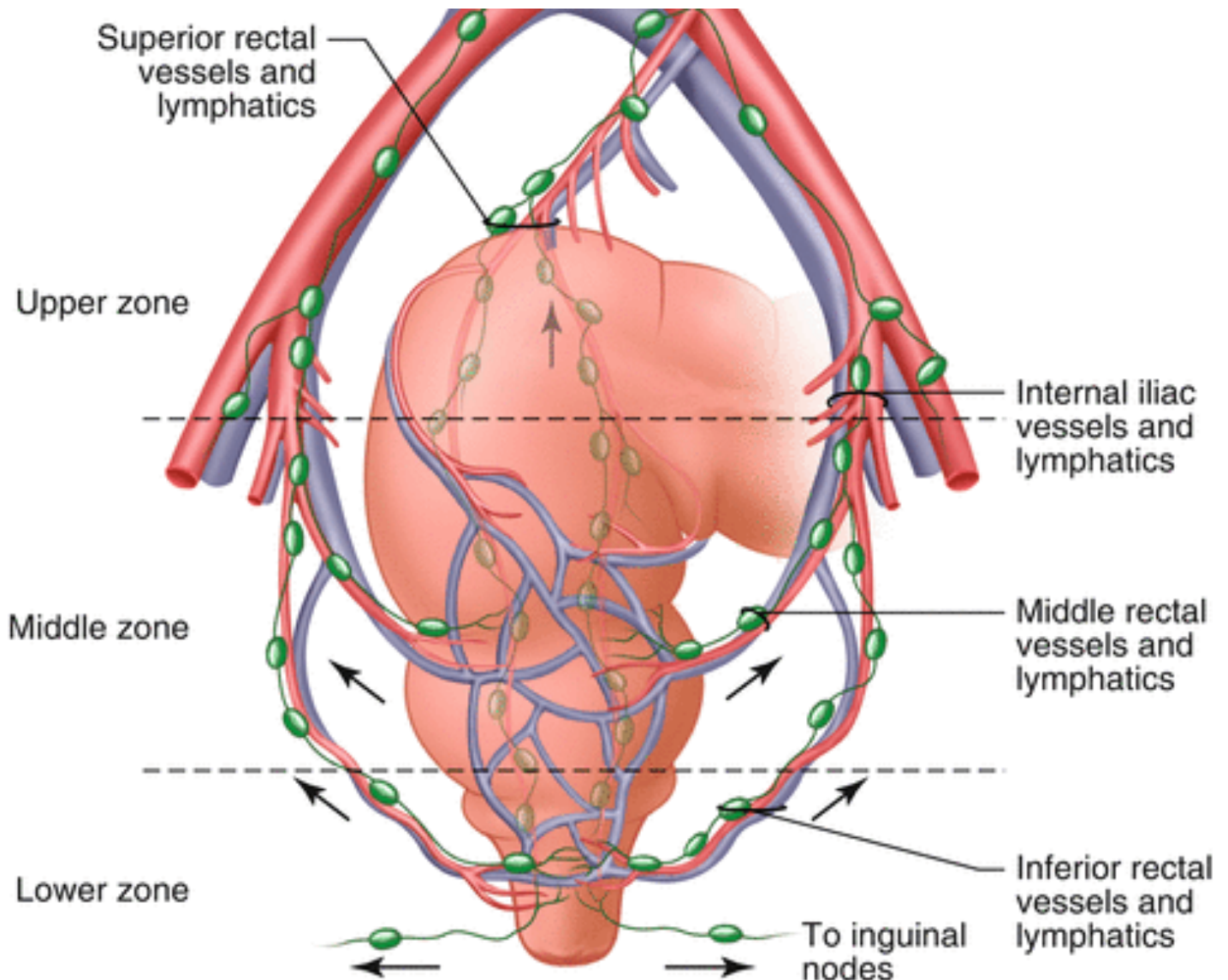
## Grade 2 – Near Complete



The mesorectal envelope is irregular and torn open (yellow arrows), but the muscularis is not visible.



# Lymph Node Assessment



Most lymph nodes are found around the branches of the superior rectal artery. Only a few are found around the middle rectal artery.

- 80% smaller than 5mm
- Most in upper and middle zone, fewer in lower zone

## Lymph Node Harvest Techniques

Traditional manual node dissection: uses a combination of visualization and palpation techniques

Fat clearance method:

- Can help find nodes  $\leq 2\text{mm}$
- Fix the tumor and adjacent mesorectum in formalin as usual (to assess CRM)
- Remove and immerse the mesorectal fat in 100% alcohol solution for 24 hours--72 hours for Friday specimens
- The lymph nodes will turn white, aiding in visualization and harvest

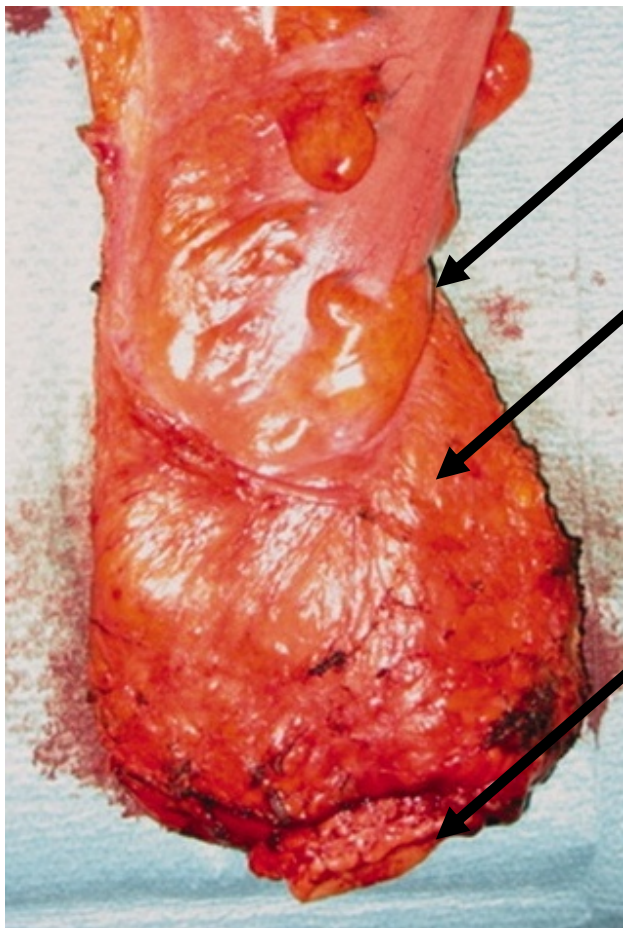
References:

Vogel C, Kirtil T, Oellig F, Stolte M. Lymph node preparation in resected colorectal carcinoma specimens employing the acetone clearing method. *Pathol Res Pract* 2008;204:11–15.

## Margin Assessment

A positive circumferential margin (CRM) is most predictive of local recurrence in rectal cancer. A positive CRM increases the risk of recurrence by 3.5-fold and doubles the risk of death from disease.

If the tumor is near a resection surface that is not peritonealized, assess the CRM. (The serosal surface/visceral peritoneum does not constitute a surgical margin, figure below).



Peritoneal reflection

Non-peritonealized mesorectal envelope (CRM)

Distal margin in LAR specimen

Report the distance in millimeters between the tumor and the circumferential margin. This assessment **includes tumor within a lymph node** as well.

## **The pathologist's role:**

Lymph node yield varies more by pathologists than by surgeon (Johnson 2002, Evans 2008).

A node yield of less than 12 is associated with worsened 5-year survival (Becerra 2016)

## **What can pathologists do to increase lymph node yield?**

- Be aware of the importance of adequate lymph node dissection
- Use ancillary techniques if necessary: enhanced visualization, fat clearance
- Alcohol processing of the specimen

## **References:**

- Johnson PM. Adequacy of nodal harvest in colorectal cancer: a consecutive cohort study. *J Gastrointest Surg* 2002;6:883-888
- Evans MD. The impact of surgeon and pathologist on lymphnode retrieval in colorectal cancer and its importance in survival in Dukes B disease. *Colorectal Dis* 2008;10:157-164
- Becerra et al. Variation in Hospital-Specific Rates of Suboptimal Lymphadenectomy and Survival in Colon Cancer: Evidence from the National Cancer Data Base. *Ann Surg Oncol* 2016;23:674-683



## Acknowledgments

This reference was created for the Michigan TME Project, headed by the University of Michigan in collaboration with the Michigan Surgical Quality Collaborative (MSQC) hospitals.

We thank Dr. Mariana Berho, a pathologist at the Cleveland Clinic – Florida. She currently serves on the Rectal Cancer Coordinating Committee to help create national accreditation programs in rectal cancer.

For more information about this resource or the TME study, please contact:

Dr. Samantha Hendren (Study PI)  
hendren@med.umich.edu

or

Ashley Duby (Study Coordinator)  
agay@med.umich.edu