

Characterization of Discordant Radiology-Pathology Results in Abdominopelvic Imaging

Authors

Molly S. Gunther, MD ¹; Cristina Hajdu, MD ²; Ankur Doshi, MD ¹

¹ Department of Radiology
NYU Langone Medical Center
New York, NY

² Department of Pathology
NYU Langone Medical Center
New York, NY

Disclosures

- No financial disclosures.

Introduction

- Peer-review performance assessment is an expected component of quality improvement in radiology.
 - RADPEER is a widely used peer review system that involves assessment of prior imaging studies.¹
 - Limited by: subjectivity, hindsight bias, and personal bias.³
- Self-review of prior interpretations offers a valuable opportunity for continued learning.
- Assessment for radiology-pathology concordance is standard practice in breast imaging, but is not systematically performed in other radiology subspecialties.⁴
- Conduction of radiology-pathology review may be limited by: ³
 - Effort required to follow-up cases
 - Lack of a comprehensive system for efficient follow-up of pathology results

Background

- Our department developed an automated tool that provides radiologists with pathology results relevant to their previous imaging interpretations using secure email and an integrated PACS module.⁵

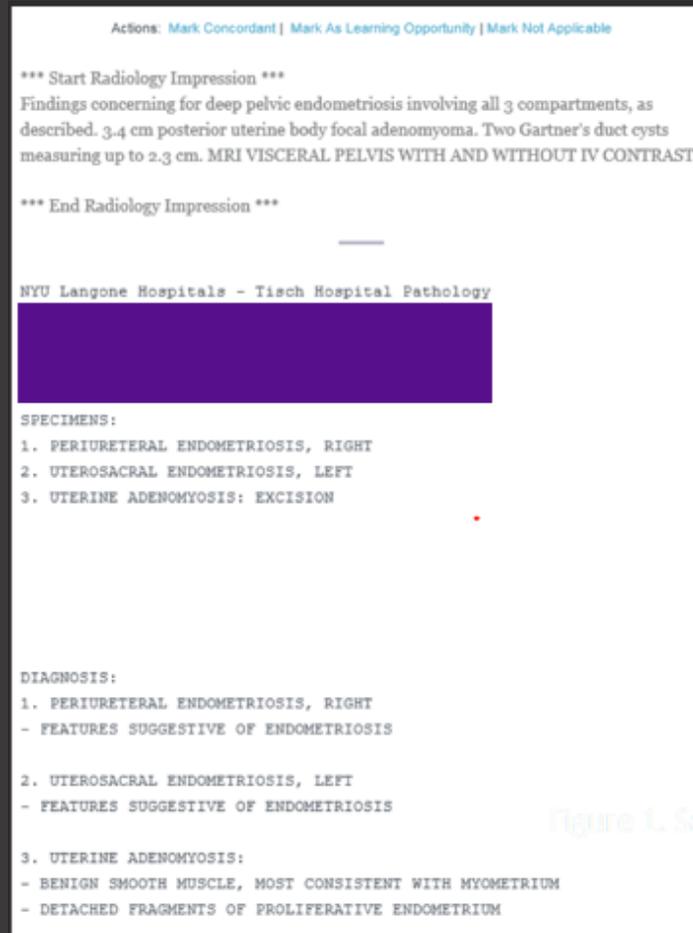


Figure 1. Sample radiology-pathology automated email

Goals and Purpose

- Radiologists are asked to mark the concordance of each radiology-pathology result upon receipt as:
 - Concordant
 - Learning Opportunity (i.e. discordant)
 - Not Applicable (i.e. pathology result unrelated to the imaging exam)
- The goal of this study was to determine:
 - ***Distribution*** of discordance in abdominopelvic CT and MRI by *organ system*
 - ***Reason*** for discordance
 - ***Potential clinical impact*** of discordance

Materials and Methods

- The radiology-pathology module was retrospectively searched for discordant radiology-pathology correlations related to abdominopelvic CT and MRI interpretations performed between January and June 2018.
- Discordant cases were classified by organ system.
- In a consensus approach, an abdominal radiologist and fellow determined:
 - If the correlation was appropriately marked as discordant by the interpreting radiologist
 - Reason for radiology-pathology discordance
 - Any potential clinical impact of the discordant results

Results

- 151 discordant radiology-pathology correlations identified by 18 radiologists were included.
- Reasons for discordance included:
 - Misinterpretation (42.4%; 64/151)
 - Pathology could not be seen or characterized on imaging (41.1%; 62/151)
 - Example: Gastric cancer or bladder cancer that could not be seen on CT
 - Under reading (9.9%; 15/151)
 - Example: Area of deep pelvic endometriosis not reported on a pelvic MRI
 - Possible biopsy sampling error (6.6% 10/151)
- Organ systems with the most frequent discordant results included:
 - Gynecologic (27.2%; 41/151)
 - Bowel (22.5%; 34/151)
 - Liver (17.9%; 27/151)

Distribution of Radiology-Pathology Discordance by Organ System and Reason for Discordance

	Organ System									
Reason for Discordance	Adrenal	Biliary	Bowel	GU	GYN	Liver	Lymph node	Pancreas	Peritoneum/ Abdominal Wall	Total
Under Reading	0.0%	0.7%	1.3%	0.0%	5.3%	1.3%	0.0%	0.7%	0.7%	9.9%
Misinterpretation	0.7%	3.3%	9.3%	9.3%	9.3%	6.6%	2.0%	1.3%	0.7%	42.4%
Pathology can't be seen or characterized on imaging	0.0%	4.6%	10.6%	3.3%	11.3%	6.6%	2.6%	1.3%	0.7%	41.1%
Possible biopsy sampling error	0.0%	0.0%	1.3%	0.0%	1.3%	3.3%	0.0%	0.7%	0.0%	6.6%
Total	0.7%	8.6%	22.5%	12.6%	27.2%	17.9%	4.6%	4.0%	2.0%	100.0%

Sample Gynecologic Misinterpretation Case

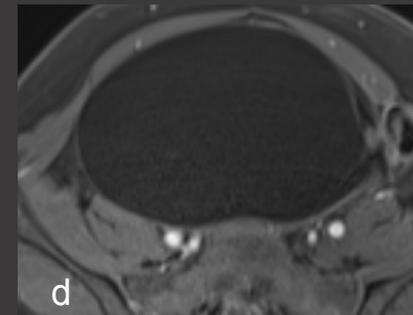
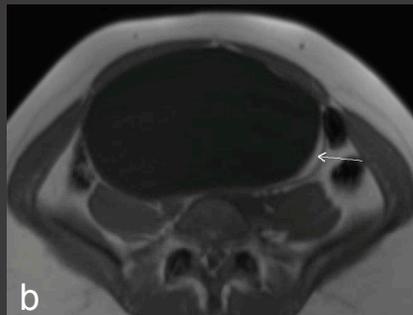
Indication: Female with a cystic pelvic mass requiring further characterization

MRI Interpretation:

Cystic pelvic mass with several slightly thickened internal septations and focal nodularity likely representing an epithelial ovarian neoplasm.

Pathology:

Mature cystic teratoma



Sagittal T2-HASTE image (a) shows a large T2 hyperintense cystic mass. Axial In-phase image (b) shows a thin crescent of T1 hyperintensity that is hypointense on the T1 fat-suppressed image (c), indicating fat. The post contrast (d) image shows an enhancing septation and nodule

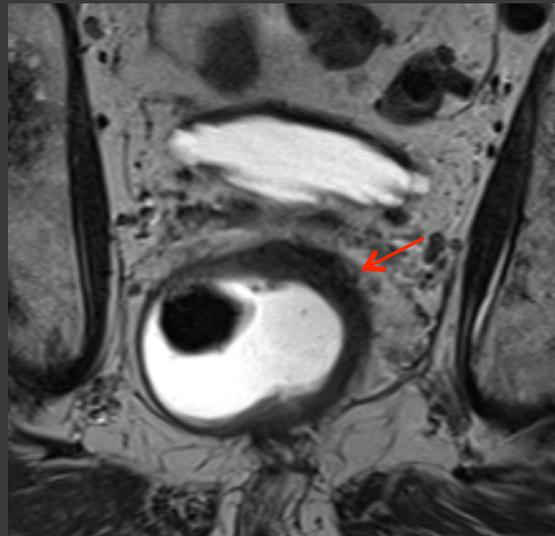
Sample Bowel Under Read Case

Indication: Rectal cancer status post chemotherapy and radiation. Restaging.

MRI Interpretation:

Residual asymmetric left lateral wall thickening involving the lower rectum which may represent residual T1/T2 disease or fibrosis/scarring.

Pathology: yT3 rectal cancer



Axial T2-weighted image of the rectum shows T2 hypointensity extending beyond the muscularis propria

Results – Clinical Impact

- Of the 79 misinterpreted or under-read cases:
 - **84.8%** of the radiology interpretations would likely *not have resulted in any change in the subsequent diagnostic or therapeutic procedure performed*
 - **8.9%** might have *resulted in a different procedure being performed*
 - **3.8%** might have *resulted in an unnecessary procedure*
 - **2.5%** might have *resulted in delay or failure to perform the procedure*

Sample case of potential impact on clinical management

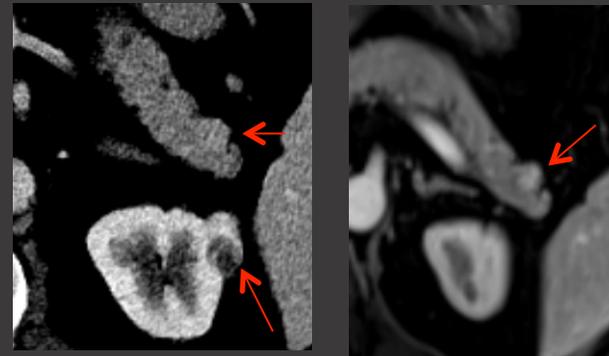
Indication: Hematuria.

CT Interpretation: Left renal lesion with enhancing septation and nodule suspicious for neoplasm. MRI recommended.

MRI Interpretation: Left Bosniak 3 renal cyst and 1.1 cm pancreatic tail mass, possible neuroendocrine tumor.

Pathology: Pancreatic neuroendocrine tumor (diagnosed through endoscopic ultrasound and FNA).

Both lesions are undergoing imaging surveillance.



Axial CT shows a left renal cystic lesion with septation and mural nodule. There is a subtle enhancing lesion in the pancreatic tail

Axial T1-weighted contrast enhanced MRI shows an enhancing lesion in the pancreatic tail

Sample case of no potential impact on clinical management

Indication: Groin mass.

CT Interpretation: Lymphadenopathy raising concern for malignancy.

Pathology: Necrotizing granulomatous lymphadenitis

Tissue diagnosis was necessary in this case given the nonspecific imaging findings.



Axial CT images showing right inguinal, right pelvic and retroperitoneal lymphadenopathy

Discussion and Conclusions

- An automated radiology-pathology notification system is an efficient tool for providing pathology feedback on previously interpreted radiology examinations.
- The system provides a mechanism for self-review, provides important learning opportunities for radiologists, helps identify cases with high teaching value, and highlights areas for section-wide education.
- The most frequent abdominopelvic organ systems with radiology-pathology discordance are gynecologic and bowel, which are mostly related to pathology not able to be seen or characterized on the imaging study, highlighting areas for research into more advanced imaging techniques.
- Misinterpretations were most common in bowel, genitourinary and gynecologic organs, highlighting areas for focused radiology-pathology correlation conferences to enhance peer learning and improve future interpretations.

References

1. Kaewlai R, Abujudeh H. Peer Review in Clinical Radiology Practice. *American Journal of Roentgenology*. 2012; 199: W 158-W162.
2. Golderverg-Stein S, et al. ACR RADPEER Committee White Paper with 2016 Updates: Revised Scoring System, New Classifications, Self-Review, and Subspecialized Reports. *Journal of the American College of Radiology*. 2017; 14: 1080-1086.
3. Kelahan LC, Kalaria AD, Filice RW. PathBot: A Radiology-Pathology Correlation Dashboard. *Journal of Digital Imaging*. 2017; 30(6): 681-686.
4. Food and Drug Administration. Quality Mammography Standards: Final Rule. *Federal Register*. 1997; 62(208): 55852-5994. http://frwebgate.access.gpo.gov/cgi-bin/getpage.cgi?position=all&page=55994&dbname=1997_register
5. Dane B, et al. Automated Radiology-Pathology Module Correlation Using a Novel Report Matching Algorithm by Organ System. *Academic Radiology*, 2018; 25 (5): 673-680.

Corresponding author information:

Molly S. Gunther, MD, MPA
Molly.Gunther@nyulangone.org

