

Diffusion-Weighted MRI for Diagnosis of Acute Cholecystitis: Comparison with Histopathology

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Acute cholecystitis (AC)

- Common surgical emergency
- Ultrasound (US) = first-line imaging
- ⚠ Variable sensitivity in clinical practice
41–67%¹²³ in histopathology-based studies
- ⚠ Technically challenging examinations
 - obesity
 - bowel gas
 - pain
 - operator dependency

Could Diffusion-Weighted Imaging (DWI) improve diagnosis?

Study Aim

1. Compare DWI findings with gallbladder (GB) histopathological findings
2. Compare DWI with US, evaluate GB wall thickness on MRI, and assess interobserver reproducibility

Study design

Retrospective multicentre study

2433 MRCP + DWI examinations
May 2022 – May 2024

270 included patients (surgical cohort)
Cholecystectomy ≤ 7 days from MRI

3 experienced abdominal radiologists
(independent blinded review)

Histopathology (reference standard)

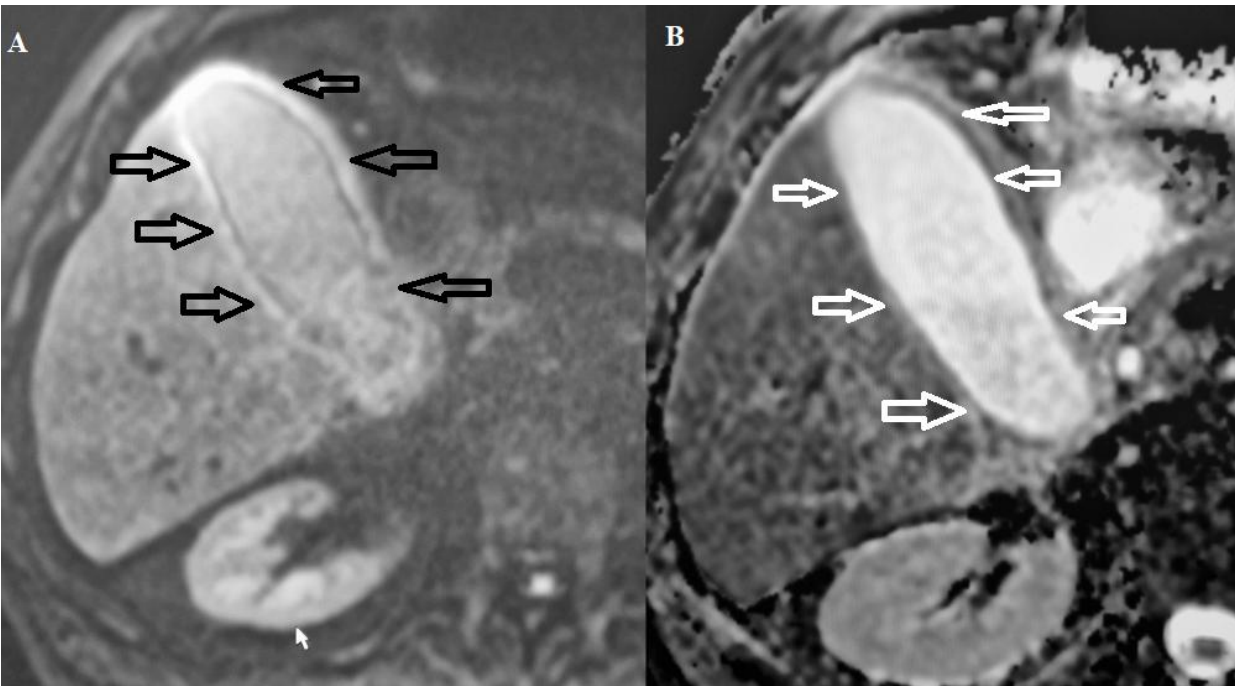
Restricted diffusion on DWI

Restricted diffusion in gallbladder wall:

high signal on b800 + corresponding low signal on ADC

b800

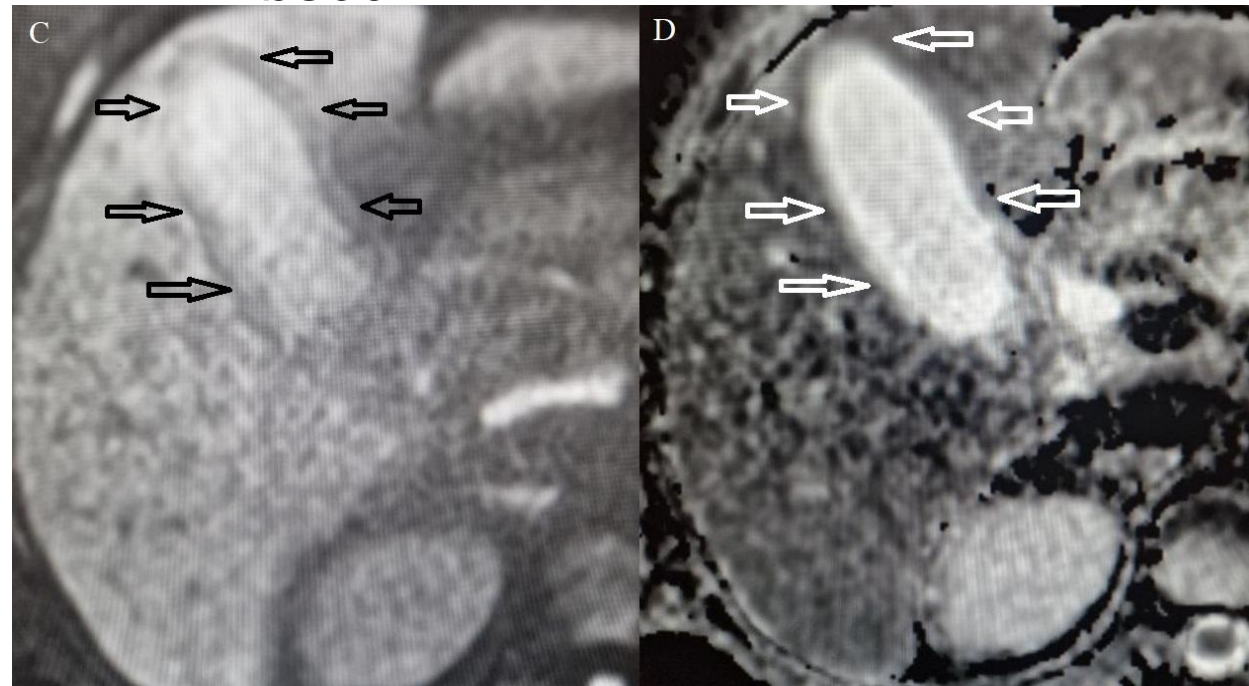
ADC



Histopathology-confirmed AC

b800

ADC



Histopathology-confirmed chronic cholecystitis

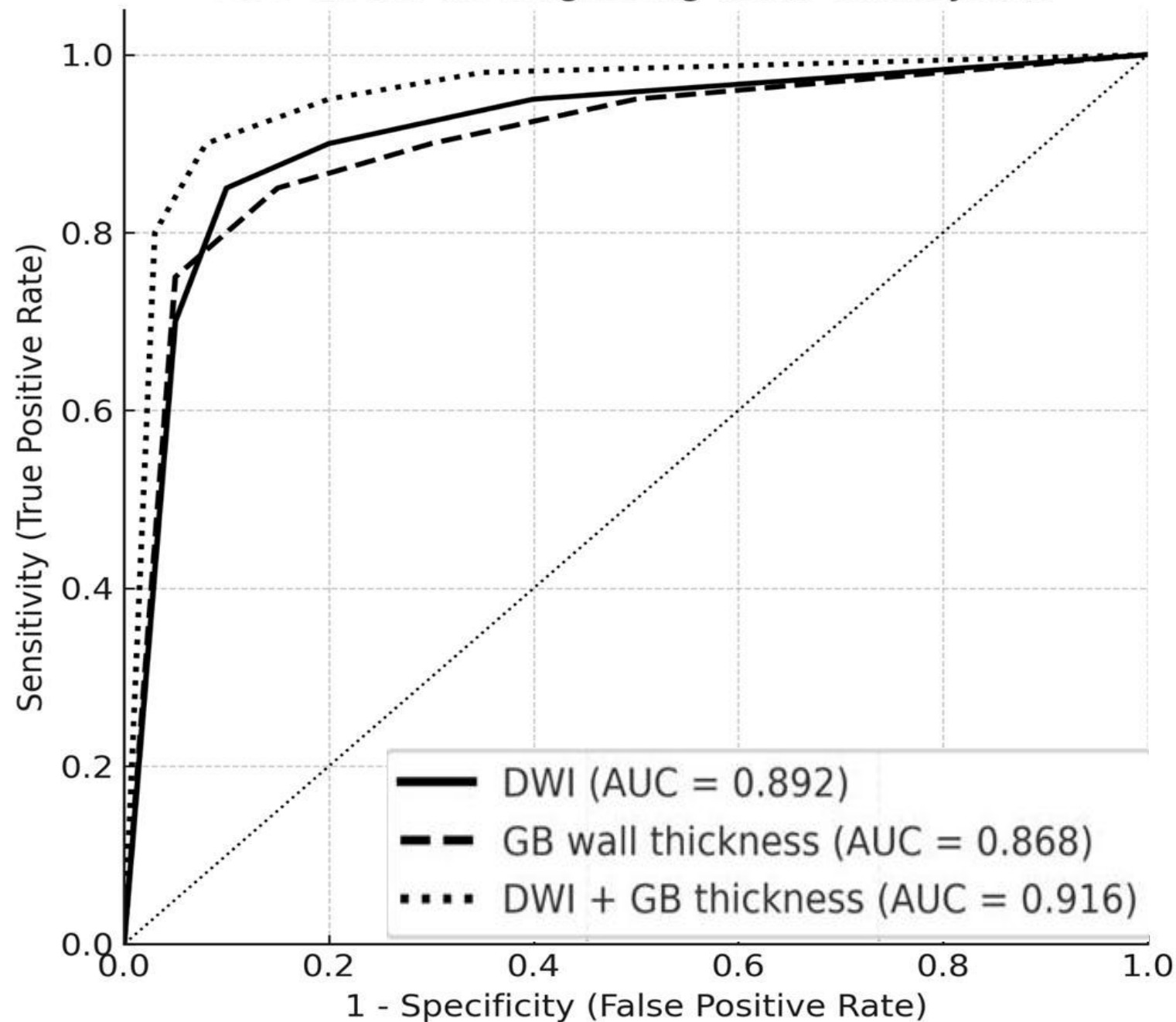
DWI diagnostic performance

	DWI	GB wall thickness (T2 seq.)	Ultrasound
Sensitivity	94%	84%	54%
Specificity	84%	72%	82%
NPV	96%	89%	71%
AUC	0.89	0.87	—

DWI sensitivity significantly exceeded US, 94% vs 54% ($p < 0.001$)

GB wall restricted diffusion represents a robust imaging marker for AC

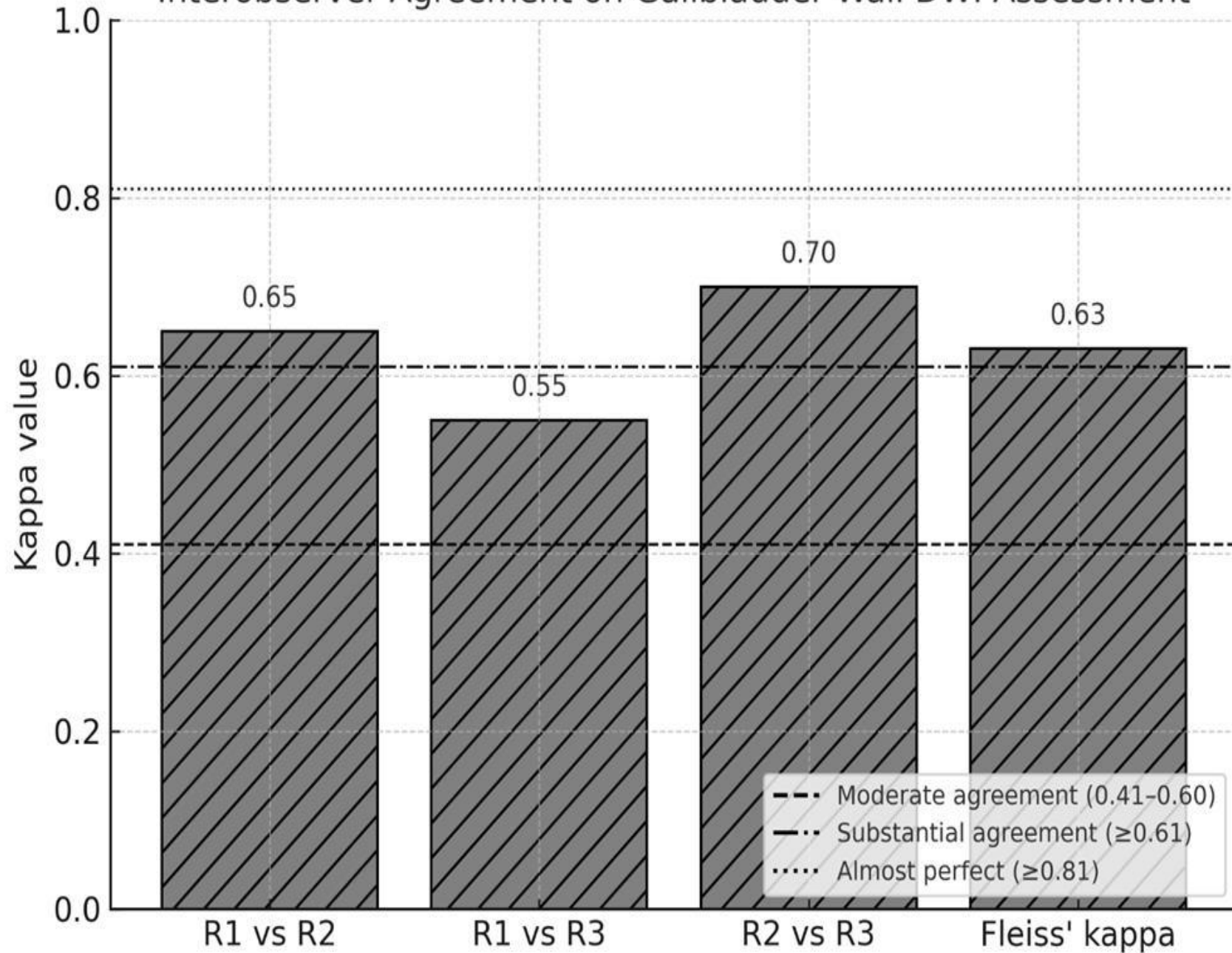
ROC curves for diagnosing acute cholecystitis



Adding gallbladder wall thickness did not significantly improve performance ($p = 0.76$)

DWI alone captured most of the diagnostically relevant information

Interobserver Agreement on Gallbladder Wall DWI Assessment



Interobserver agreement
Fleiss $\kappa = 0.63$
(substantial agreement)

72.6% complete agreement

Good reproducibility of
qualitative DWI assessment

MRI-to-surgery interval and DWI sensitivity

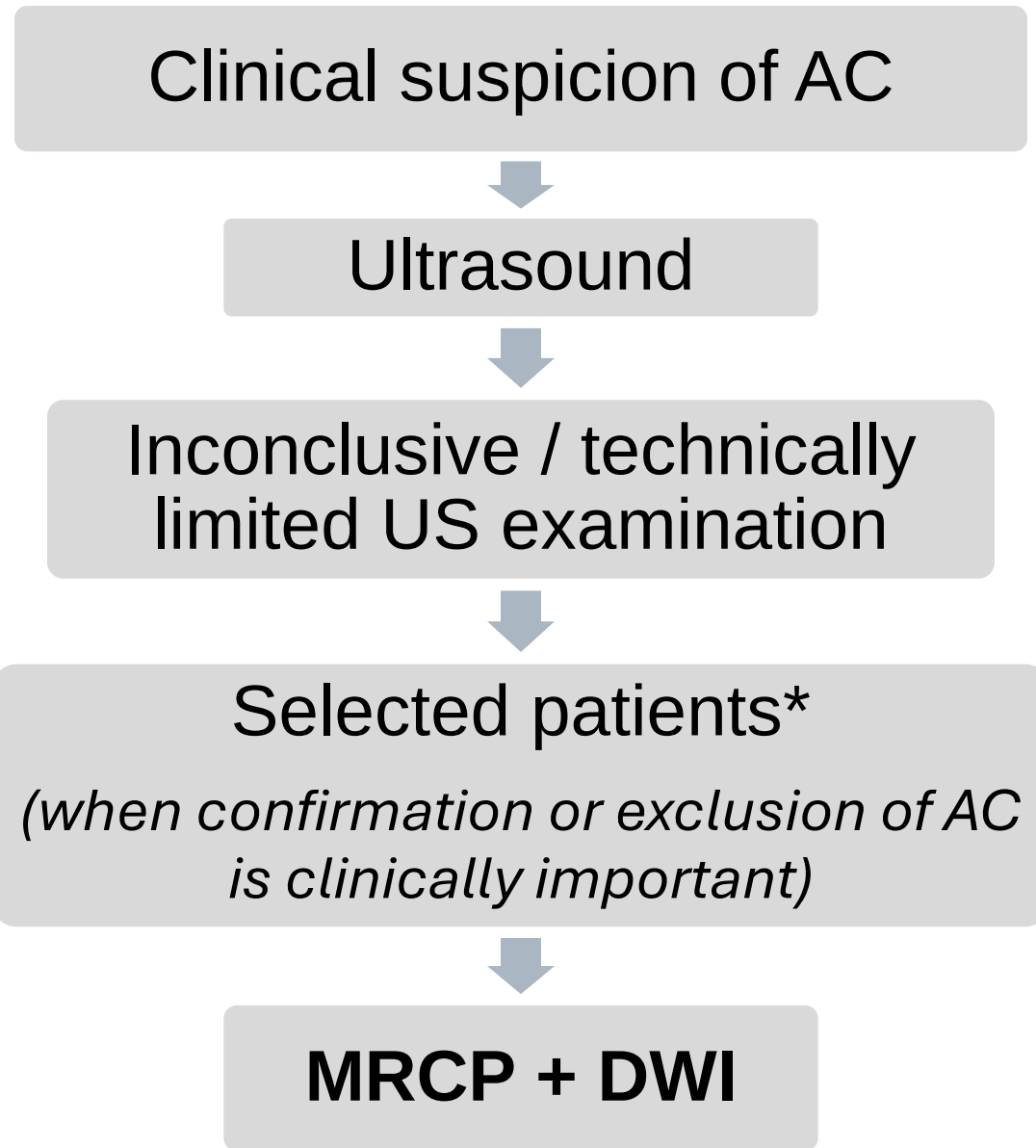


Sensitivity decreased numerically with longer MRI-to-surgery interval ($p = 0.056$)

Conclusion

- Restricted diffusion in the gallbladder wall demonstrated high diagnostic accuracy for acute cholecystitis
- DWI sensitivity exceeded ultrasound in this cohort
- Diagnostic assessment showed substantial interobserver agreement

Potential future role of DWI



Thank you

Questions?