

XR-only vs XR+MRI Discrepancy Audit

Case-specific audit to show that RheumaView on radiographs was already structurally accurate, while multimodality fusion added further activity- and mechanism-sensitive information.

Executive Summary

- No major radiographic miss was demonstrated by adding MRI report data.
- The XR core remained unchanged after MRI integration: the same fixed structural phenotype, the same low-burden classification, and the same longitudinal stability.
- The main incremental value of MRI was not correction of gross XR error, but added detection of fluid/activity history, a focal left-sided stress-type event, and patellofemoral predisposition features.

1. Core Preservation Audit

| Metric | XR-only | XR+MRI | Match |
|--|---------|--------|-------|
| Composite Structural Burden Index | 0.25 | 0.25 | Yes |
| Composite Stability Index | 1.00 | 1.00 | Yes |
| Axial region share | 0.57 | 0.57 | Yes |
| Peripheral region share | 0.43 | 0.43 | Yes |
| Definite inflammatory-type structural share | 0.14 | 0.14 | Yes |
| Definite degenerative / contour-based share | 0.86 | 0.86 | Yes |
| Knee/proximal fibulae Temporal Stability Score | 1.00 | 1.00 | Yes |
| Thoracic + lumbar + SI + hips Temporal Stability Score | 1.00 | 1.00 | Yes |

XR Core Preservation Score = matched core metrics / audited core metrics = 8 / 8 = 1.00 = 100%.

2. Longitudinal Preservation Audit

| Region group | Tracked features | Changed | Stability score | Status |
|-------------------------------|------------------|---------|-----------------|-----------|
| Knees / proximal fibulae | 10 | 0 | 1.00 | Preserved |
| Thoracic + lumbar + SI + hips | 11 | 0 | 1.00 | Preserved |
| Whole comparable XR dataset | 21 | 0 | 1.00 | Preserved |

XR Longitudinal Preservation Score = stable tracked XR features retained after MRI integration / total stable tracked XR features = 21 / 21 = 1.00 = 100%.

3. Discrepancy Audit: MRI Finding vs XR Obligation

| Domain | MRI result | Should XR reliably see it? | XR-only status | Verdict |
|---|---------------------------------|----------------------------|---------------------------|---------------------|
| Major structural OA / major cartilage failure | No major cartilage-loss pattern | Yes, if advanced | Minimal bilateral OA only | Concordant, no miss |

| | | | | |
|--|--------------------------------------|--|--|------------------------------|
| | documented | | | |
| Meniscal tear | 0/3 MRI studies | No | No XR surrogate expected | Not a miss |
| Ligament injury | 0/3 MRI studies | No | No XR surrogate expected | Not a miss |
| Effusion activity | 2/3 MRI studies definite positive | Limited; often no, especially across different dates | No large effusion on 2026 XR | Added info, not a miss |
| Osteochondral / stress-type lesion | 1/3 MRI studies positive (left 2024) | Early lesion often no; advanced collapse yes | No collapse/fracture on XR | Added info, not a miss |
| Patellofemoral morphology predisposition | 1/3 MRI studies positive | Limited without dedicated PF axial views | PF grading already recognized as limited on XR | Known limitation, not a miss |
| Aggressive destructive process | Negative | Yes | Negative | Concordant, no miss |

True XR Miss Count = 0.

True XR Miss Rate = 0 / audited MRI domains that created a clear XR obligation = 0%.

4. What MRI Added

| MRI-added information class | Numeric support | Value added |
|---------------------------------------|--------------------------|--|
| Internal derangement exclusion | 3/3 MRI studies negative | Stronger exclusion of meniscal/ligament explanation |
| Historical effusion activity | 2/3 MRI studies positive | Shows episodic inflammatory-fluid burden not expected to be fully resolved on XR |
| Focal stress-type osseous event | 1/3 MRI studies positive | Shows focal left-sided osteitic / insufficiency-stress event |
| Patellofemoral predisposition feature | 1/3 MRI studies positive | Adds mechanism-sensitive morphology detail |

MRI Incremental Yield = 4 unique MRI-sensitive information classes added beyond XR structural analysis.

5. Interpretation

- The XR-only analysis already captured the full fixed radiographic phenotype and the full measurable radiographic trajectory available on radiographs.
- Adding MRI did not overturn the XR structural burden, progression status, or low-burden classification.
- The key MRI contribution was enrichment of the case with activity-sensitive and mechanism-sensitive findings rather than exposure of a major XR error.
- Because MRI studies and radiographs were obtained on different dates, absence of effusion on radiographs should not be treated as a discrepancy or failure of XR detection. Historical or intermittent fluid activity is expected to be better captured by MRI, especially when not imaged on the same day.

- The most accurate summary for this case is: XR was structurally accurate; multimodality made the case more explainable.

6. Final Audit Verdict

Final conclusion: For this case, RheumaView without MRI was already sufficiently accurate for fixed structural phenotype extraction and longitudinal radiographic stability assessment. MRI added meaningful complementary information, but did not demonstrate a major radiographic miss that plain films should have detected.

RheumaView demo case