Juvenile Osteochondritis Dissecans: Correlation of Findings on Histopathology and MRI

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Purpose

- To correlate histopathological specimens with the appearance of juvenile osteochondritis dissecans (JOCD) lesions on MRI

Materials and Methods

- Retrospective collection
- 5 patients diagnosed with JOCD
  - 2 girls, 3 boys; ages 12-13 years
  - ICRS OCDI and OCDII
  - All underwent biopsy at time of surgical intervention for JOCD

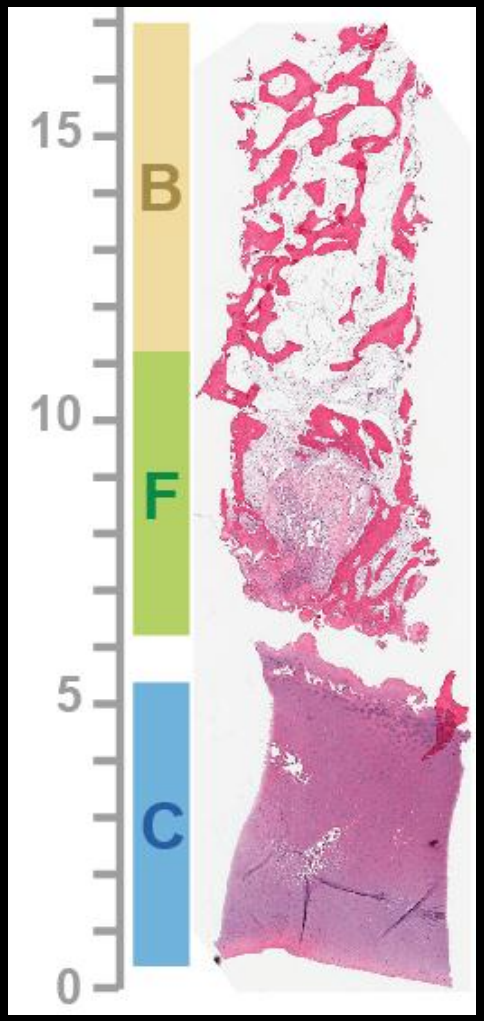
Materials and Methods

- 5 knees
  - 2 no previous intervention
  - 3 prior retrograde drilling and bone grafting
    - Ranging from 3 months – 4 years prior to biopsy
- Time interval between MRI and biopsy
  - 1 week – 5 months

Materials and Methods

- Independent review of histopathology - single pathologist
- Determination of location of prior biopsy site on MRI
  - 3 knees: Follow-up MRI/CT
  - 2 knees: Surgical reports, intra-op photos/videos
- Biopsy – MRI overlay determined by consensus

Biopsy Overlay

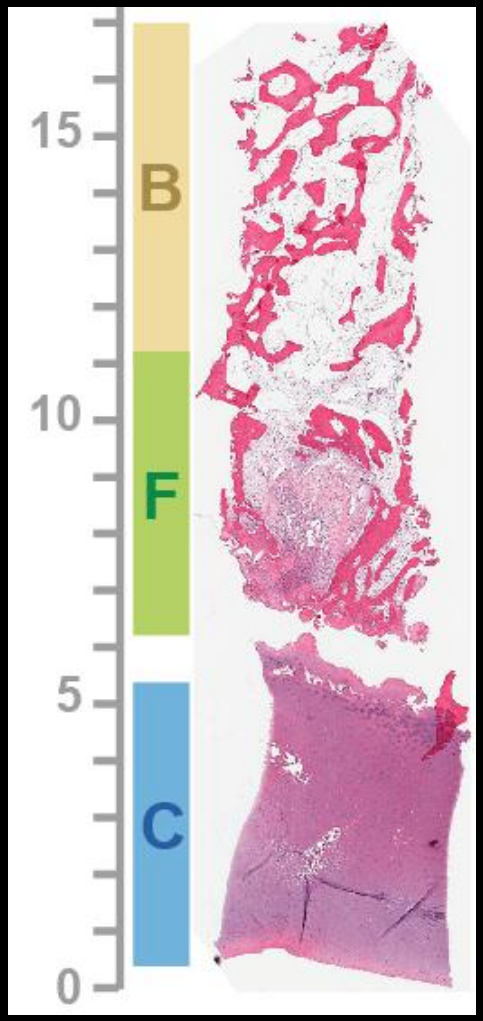


B = Bone

F = Fibrovascular tissue

C = Cartilage

Biopsy Overlay



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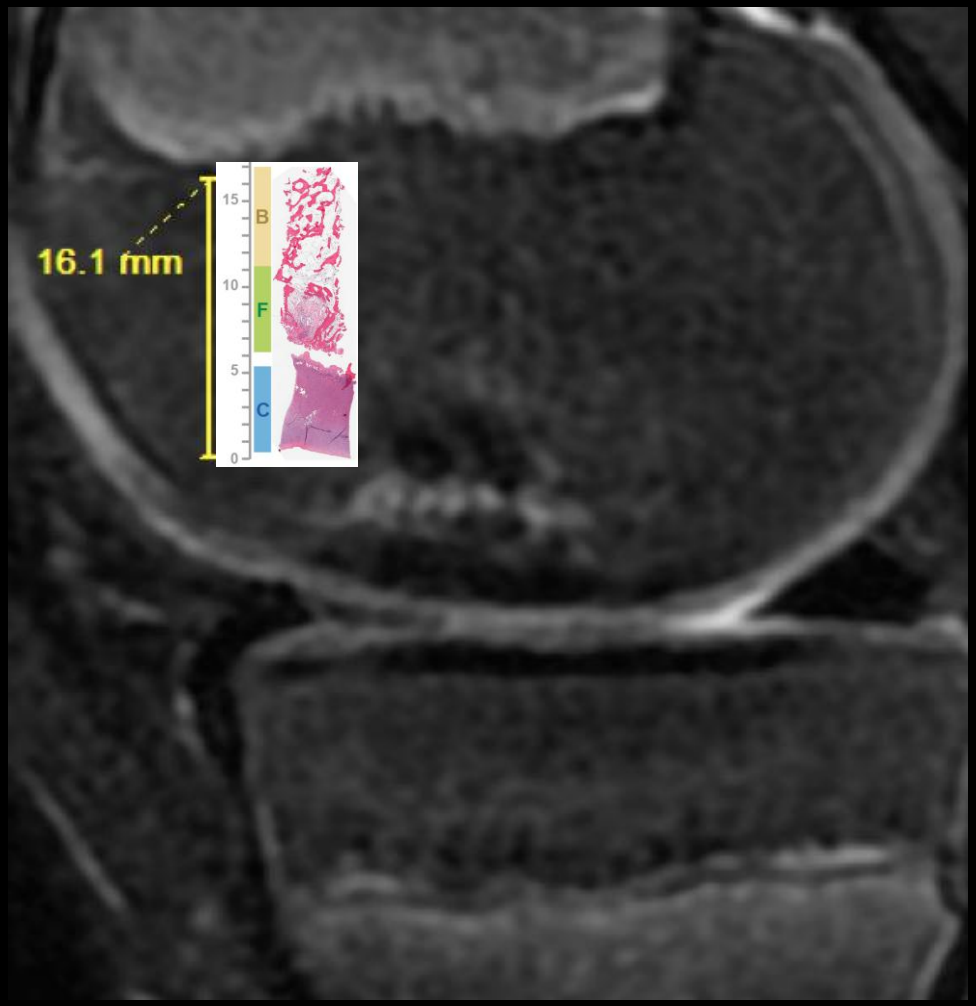
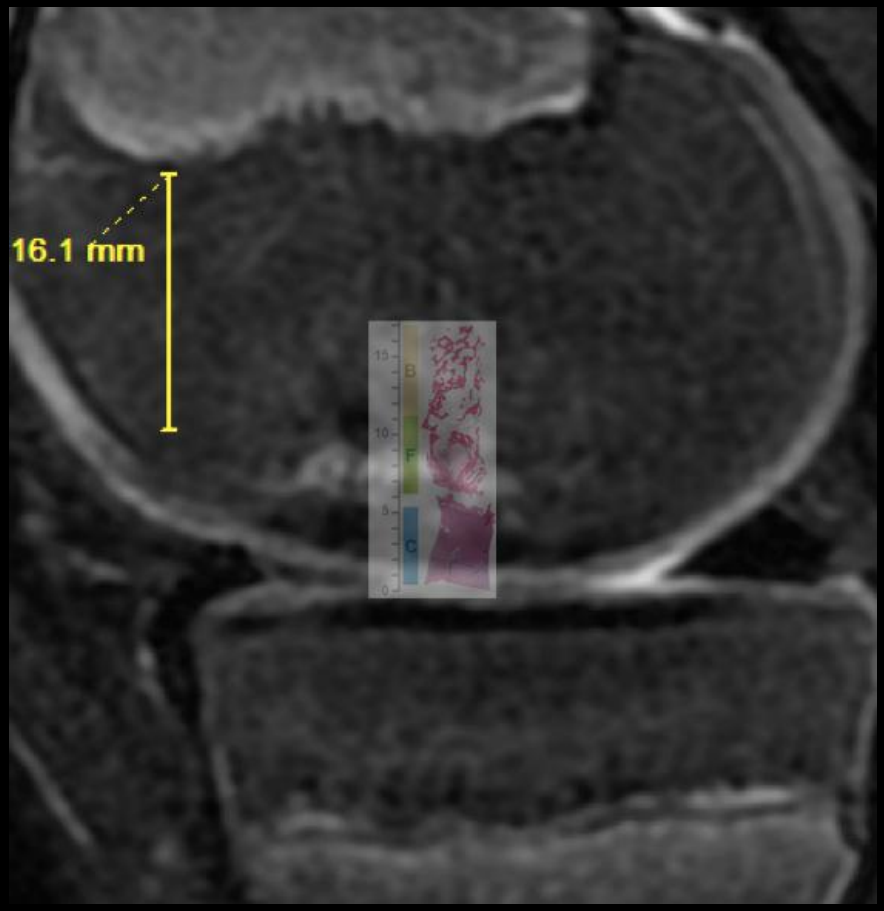


Biopsy Overlay



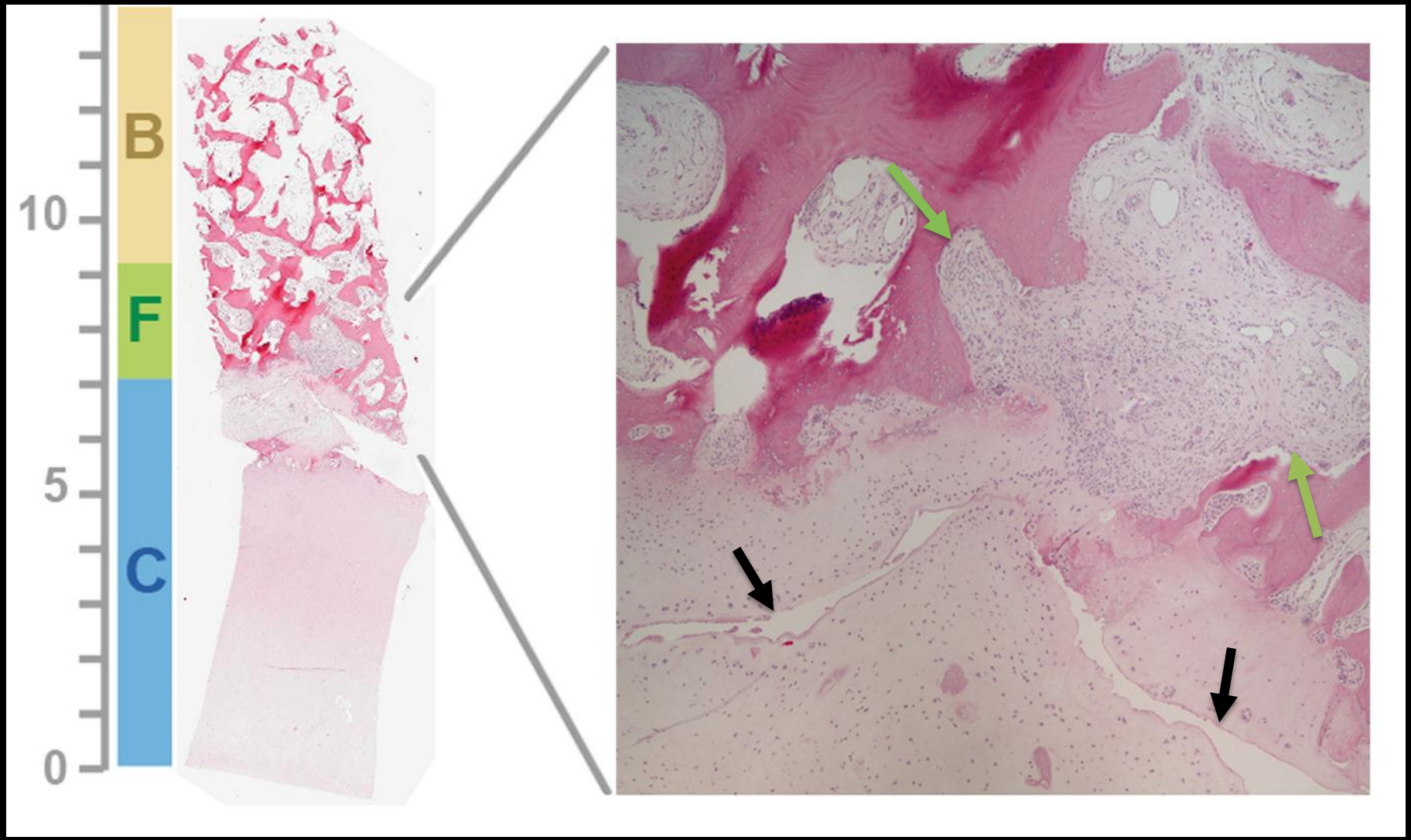
Histopathological Findings

Patient	Core length (mm)	Cartilage length (mm)	Chondrocyte cloning	Bone/cartilage separation	Fibrovascular (FV) tissue	Length FV tissue (mm)
1A	16	5	N	Y	Y	5-10
1B	17	5	Y	Y	Y	5-10
2	14	7	Y	Y	Y	7-9
3	16	4	Y	Y	Y	4-12
4	11	1	N	Y	Y	1-3
5A	16	3	N	N	N	N/A
5B	15	4	N	Y	Y	4-7

Results

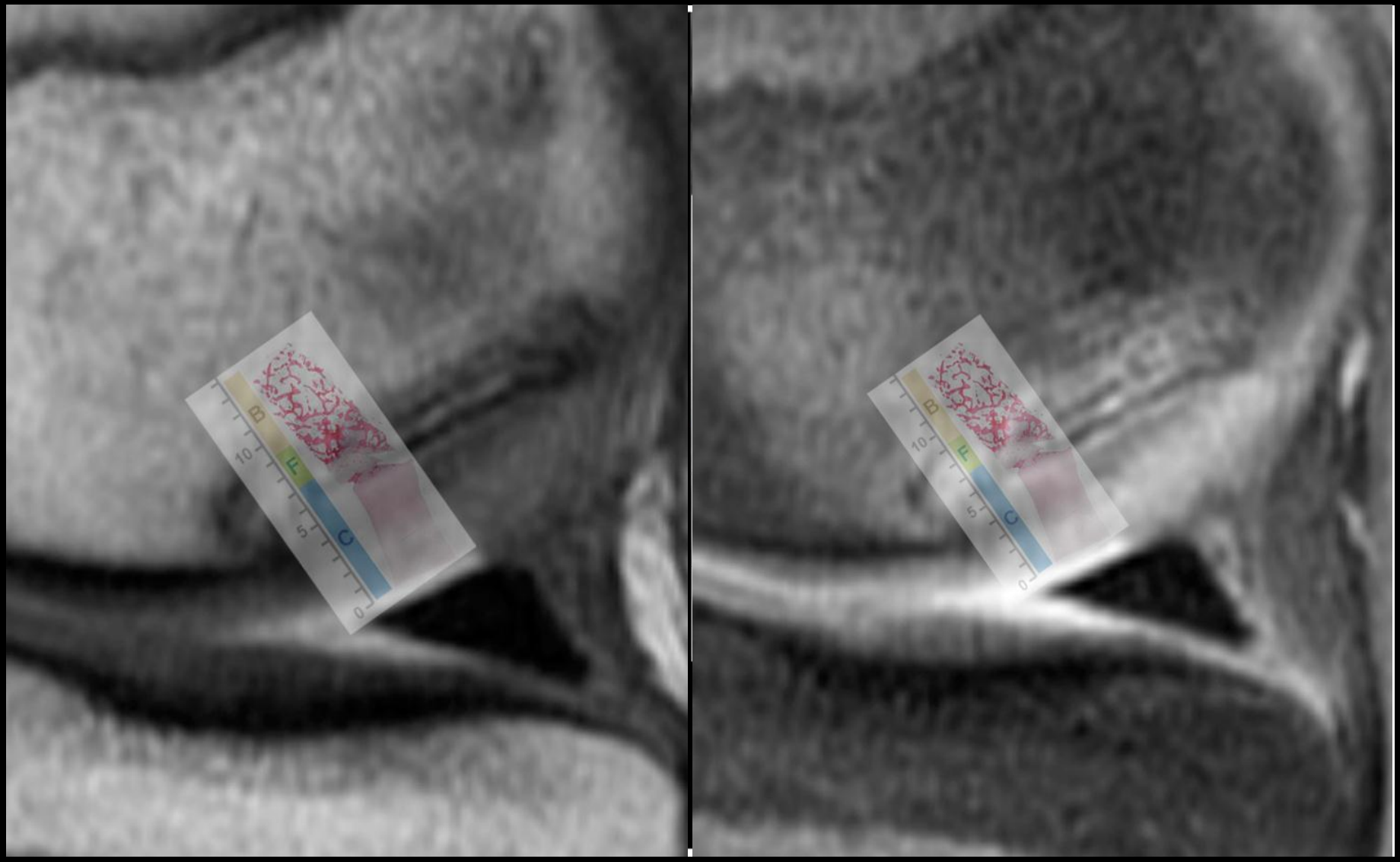
- Abnormal structural relationship between bone and cartilage
  - Abundant fibrovascular tissue and abnormal cleft spaces near the bone-cartilage interface
  - Bone necrosis and inflammation were not a predominant feature
- Location and appearance of fibrovascular tissue corresponds with high T2 signal rim and “cysts” on MRI

Patient 2

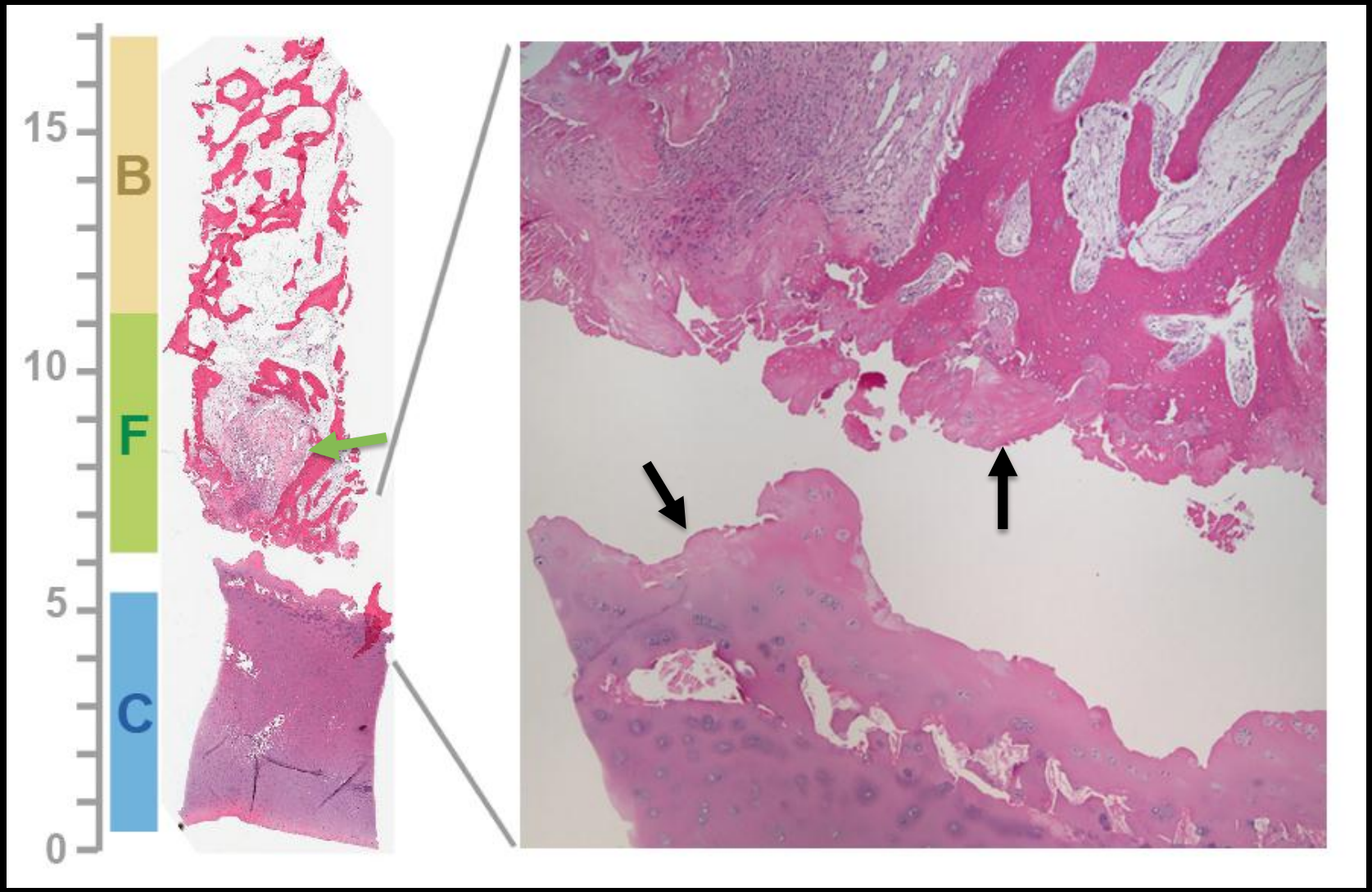


Green arrows = fibrovascular tissue; Black arrow = cleft space

Patient 2



Patient 1



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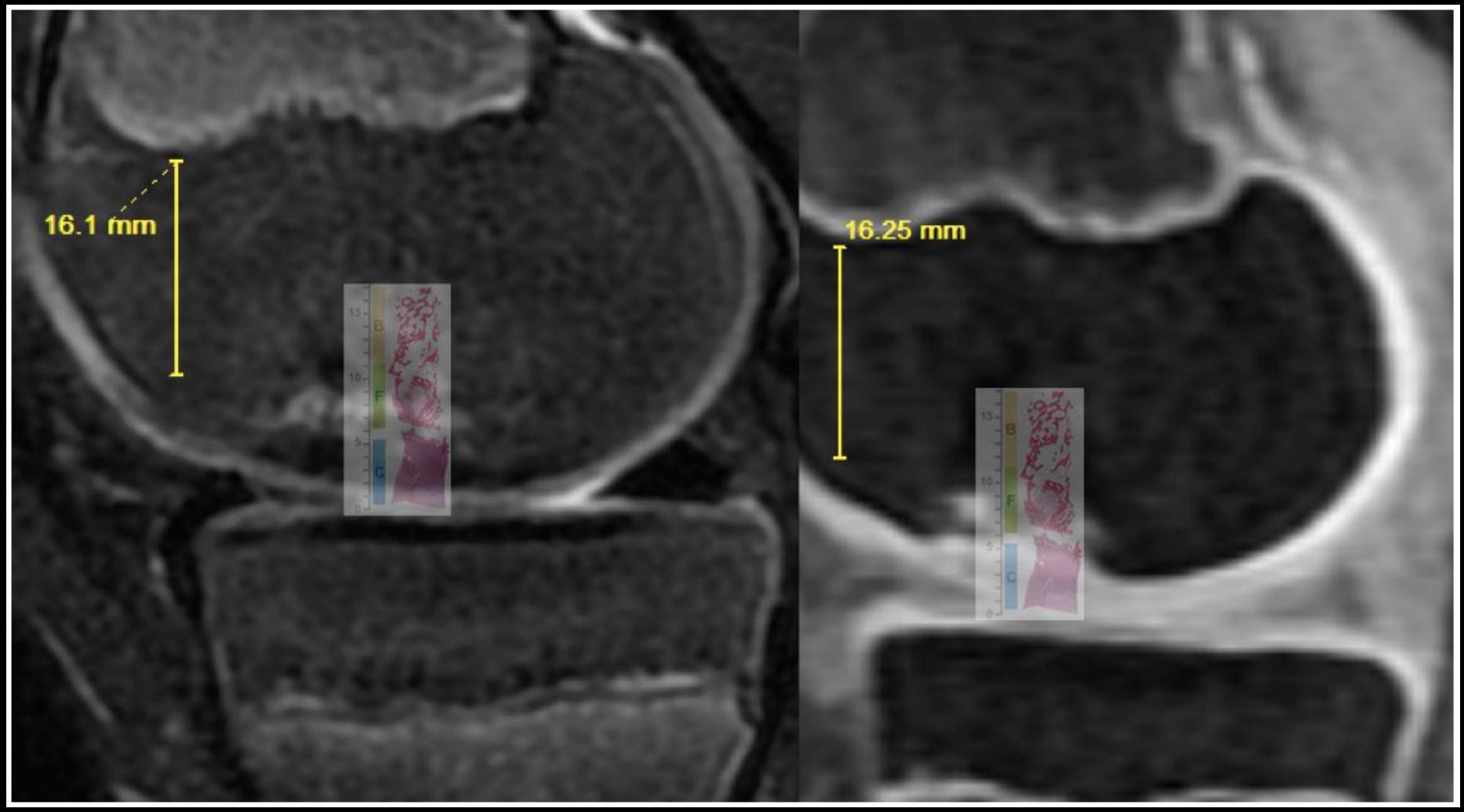

Specimen 1A

Discussion

- Excellent visual correlation between histopathological and MRI findings

Future Imaging Goals

- Predict which patients are more likely to not heal prior to development of gross instability at surgery
- Aid with triage of patients into surgical and conservative treatment plans

Limitations

- Small sample size
- 3/5 cases had prior surgical intervention
  - However all cases had similar histopathological findings
- Determination of location of biopsy on MRI could have been incorrect

Conclusion

- Distinct correlation between histopathological and MRI findings of JOCD
- Ultimate goal of imaging is to help with establishing a prognosis and therapeutic plan for children and adolescents with JOCD