The Added Diagnostic Value of the Bright Rim Sign to Conventional MRI Assessment of Anterior Talofibular Ligament Disruption.

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ISAKOS CONGRESS 2025 | MUNICH GERMANY June 8–11

Disclosure

- This work has not received any funding..

Rationale and Objectives:

- The bright rim sign (BRS) was used as a reliable indicator of anterior talofibular ligament (ATFL) disruption beside other well-known diagnostic criteria.
- This sign can improve accuracy of conventional magnetic resonance imaging (MRI) in diagnosis of ATFL disruption.
- This study aimed to confirm the added diagnostic value of BRS to conventional MRI assessment of ATFL disruption.

Materials and Methods:

- A prospective study included 62 patients (47 males and 15 females; mean age, 36.9 § 12.1 years; range, 17-52 years) with clinically suspected ATFL disruption.
- All patients underwent MRI and arthroscopy of ankle. MRI images were evaluated for the presence of ligament disruption sign (LDS) and BRS.
- The patients were classified into 3 groups:
  - » group 1 included patients with acute lateral ankle ligament sprain.
  - » group 2 included patients with chronic ankle instability.
  - » group 3 included patients with recurring ankle sprain.

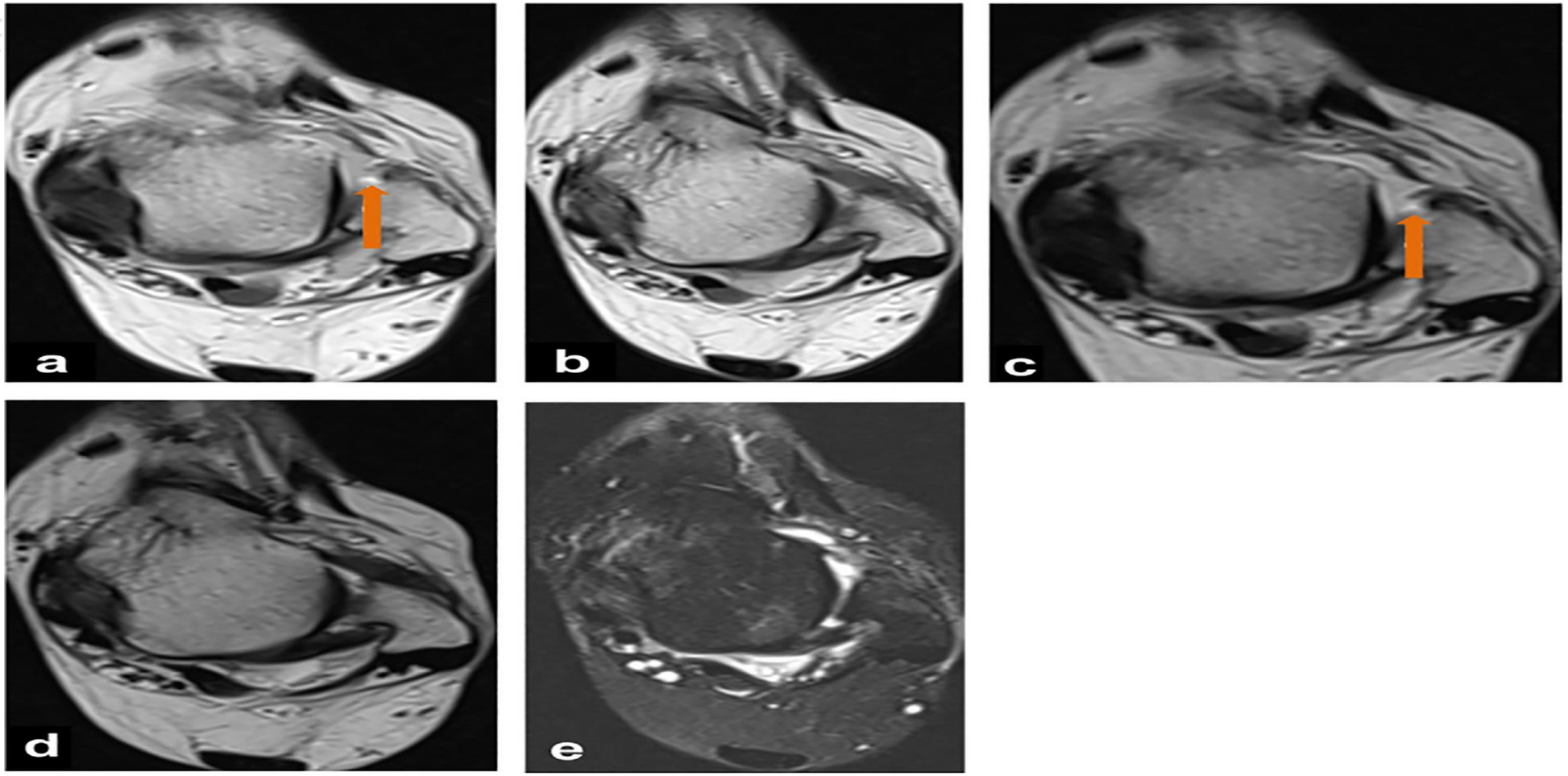
The diagnostic value of the BRS was evaluated using arthroscopy as reference standard.

Results:

- The diagnostic value of both signs together increased overall sensitivity in detecting ATFL disruption to 86.7% compared to 60% when considering LDS alone ($p < 0.0001$).
- In group 1 and 3, the sensitivity increased when both signs were considered together compared to LDS alone ($p = 0.004$ and 0.025, respectively).
- In group 2, there was a trend toward significance in sensitivity when both signs were considered compared to LDS alone ($p = 0.08$).

DISCUSSION.

- Adding the BRS to LDS significantly increased the MRI sensitivity for detecting ATFL disruption in acute ankle sprain from 57.1% to 85.7% (p = 0.004) by adding 9 more injured ATFL,which was missed if LDS was considered alone.
- The MRI sensitivity significantly increased in the recurring sprain from 60% to 93.3% by adding 5 more injured ATFL (p = 0.025).
- In patients with chronic ankle instability, the sensitivity showed a trend toward significance from 64.7% if LDS is considered alone, to 82.4% when both signs considered together (p = 0.08), as it added three injured ATFL only.
- BRS alone was able to diagnose ATFL disruption in 16 out of the 60 patients (26.7%) who had arthroscopic proof of ATFL disruption, while LDS was negative.



A 35-year-old woman with acute left lateral ankle instability and partial ATFL tear which was confirmed by arthroscopy. (a) and (b) Axial PD images, and (c) and (d) Axial T2WIs show BRS in the fibula with cortical disruption (arrows) and thickened ATFL. (e) Axial STIR image
at the same level shows absent BRS. ATFL, anterior talofibular ligament; BRS, bright rim sign; PD, protein density; STIR, short tau inversion recovery.

- The BRS was more common on the fibular side (55.6%), compared to 14.8% on the talar side and 29.6% on both sides. The BRS was more associated with a complete tear when compared to partial tear (75% versus 35.4%, p = 0.014).
- The chemical shift is more frequently visible on T2 sequences and is more intensive where the magnetic field is stronger and is usually eliminated in the fat suppression technique, including inversion-recovery imaging.
- In this study, both T2 and PD images showed equal sensitivity and accuracy for detecting BRS, while it was negative in STIR and PDFS images.
- Bone marrow edema signal was observed in 3 patients. It appeared to be more diffuse and wider than the dot-like or curvilinear high signal intensity of the BRS with the absence of the focal disruption of the overlying cortex.
- In these patients, the edema signal was more obvious in the PDFS and STIR images compared to the PD and T2 images.

Limitation

- The lack of a control group with normal ATFL. However, it was very difficult to control because performing arthroscopy on healthy controls does not seem ethical.
- There was no adequate number of patients with normal ATFL in our study, which could represent a limitation in the estimation of the specificity.
- we included only patients who underwent ankle arthroscopy, which is different from the daily practice in investigating the ATFL disruption and could be a potential source of case-selection bias.

Conclusion

- The BRS is a very useful and helpful diagnostic sign in the assessment of ATFL disruption when considered conjointly with the LDS as it increases diagnostic sensitivity of MRI significantly, especially in the acute and recurring ligament sprain.
- It is imperative to include T2 or PD axial images in the MRI protocol when assessing ATFL disruption.

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