

The Cloud Band Sign: A Novel CT Finding for Diagnosing Occult Hip Fractures

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Introduction

- ▶ Occult hip fractures (OHFs), defined as hip fractures not visible on radiographs, are relatively common and frequently overlooked.¹
- ▶ MRI is the gold standard for diagnosing OHFs, but it is often difficult to perform due to limited availability, whereas CT is more accessible.²
- ▶ This study aimed to evaluate the diagnostic performance of the cloud band sign, a novel CT finding, as a potential alternative to MRI for diagnosing OHFs.

Materials and Methods

- ▶ Single institution, retrospective study.
- ▶ Inclusion criteria: aged ≥ 65 , suspected OHFs, underwent CT and MRI for diagnosis.
- ▶ Definition of the cloud band sign: ill-defined, band-like hyperdense zone in bone marrow on CT.
- ▶ Presence or absence of the cloud band sign was evaluated by consensus among 3 radiologists.
- ▶ The diagnostic performance of the cloud band sign for OHFs was evaluated using MRI as the gold standard, with a positive sign indicating fracture and a negative sign indicating no fracture.

Results

Patient characteristics

n = 24

| | |
|-----------------------|------------|
| Age (range) | 86 (70-96) |
| Male : female | 9 : 15 |
| Hip fracture type | |
| Femoral neck | 2 (8.3%) |
| Trochanteric | 12 (50%) |
| Neck and trochanteric | 2 (8.3%) |
| No fracture | 8 (33.3%) |

Diagnostic performance

| | Sensitivity | Specificity |
|-----------|-------------|-------------|
| Reader 1 | 93.8% | 100% |
| Reader 2 | 87.5% | 88% |
| Reader 3 | 100% | 88% |
| Consensus | 100% | 100% |

$\kappa = 0.650 (0.450-0.851)$

80-year-old woman with right femoral neck fracture



96-year-old man with right trochanteric fracture



Discussion

- ▶ Previous meta-analyses reported the diagnostic performance of conventional CT for OHFs with a sensitivity of 79% and specificity of 91%.¹ However, our results significantly exceed those results.
- ▶ While CT diagnosis of fractures has traditionally relied on detecting cortical bone discontinuities, the cloud band sign focuses on trabecular bone fractures and hemorrhage or edema within the bone marrow.
- ▶ Although dual-energy CT can improve diagnostic performance of fractures by detecting abnormalities in the bone marrow, the availability of dual-energy CT is currently limited.² Therefore, diagnosing OHFs using the cloud band sign on conventional CT is of great significance.

Conclusion

The cloud band sign is a highly accurate CT finding for both detecting and excluding OHFs without the need for MRI.

References

1. Radiology. 2020;296(3):521-31.
2. AJR. 2019;213(6):1324-30.