

Comparison of CT and MRI in the Diagnosis of Occult Hip Fracture: A Systematic Review and Meta-Analysis

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ADMINISTRATIVE INFORMATION**Support** - N/A.**Review Stage at time of this submission** - Completed but not published.**Conflicts of interest** - None declared.**INPLASY registration number:** INPLASY202420093**Amendments** - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 21 February 2024 and was last updated on 21 February 2024.**INTRODUCTION**

Review question / Objective The aim of this study was to compare the diagnostic accuracy of computed tomography (CT) scans and magnetic resonance imaging (MRI) in detecting occult hip fractures. A systematic literature search was conducted, and a total of 12 articles involving 1,819 participants were included in the final analysis. Data extraction and quality evaluation were performed using the Quality Assessment of Diagnostic Accuracy Studies-2 (QUADAS-2) tool. The results showed that both CT scans and MRI demonstrated good diagnostic performance in detecting occult hip fractures. The pooled sensitivity and specificity for MRI were significantly higher than those of CT, suggesting that MRI has better accuracy in excluding or confirming occult fractures. Meta-regression analysis indicated that sequence parameters and

sample size had notable contributions to the differences in sensitivity and specificity between CT and MRI.

Condition being studied The hip joint is an important weight-bearing joint of the human body, which can easily cause injury. Although the X-ray has the advantage of simplicity and speed in the fracture diagnosis, the conventional X-ray is a compound plane image, which lacks three-dimensional sense. The anatomical structure around the hip joint is very complex, so conventional X-rays cannot objectively and genuinely show the displacement of complex hip fracture fragments[6]. Therefore, further imaging evaluation is needed for patients whose initial X-ray results are typical but suspected of occult hip fracture. CT processing techniques can obtain images of anatomical structures and related pathological hip joint injuries. However, the

accuracy of CT in the diagnosis of bone trabecular and cortical interruption is low. MRI has the characteristics of multi-angle and multi-plane, can fully display the fracture signal of bone trabeculae, and has high resolution for bone trabeculae, articular cartilage, and tissue edema. Considering these data and deliberating the vital role of the early diagnosis of occult hip fracture, we should conclusively identify which imaging examination (between CT and MRI) can ensure supreme diagnostic accuracy. Therefore, the current meta-analysis aimed to compare the accuracy of CT and MRI in the diagnosis of occult hip fracture.

METHODS

Search strategy Databases: PubMed, Web of Science, Cochrane, and EMBASE.

Terms: "Occult Hip Fractures," OR "Occult Femoral Neck Fractures," OR "Occult Fractures of the Proximal Femur," OR

"Occult Intertrochanteric Fractures" OR "Occult Trochanteric Fractures" AND "Magnetic Resonance Imaging" OR "MRI" OR "MR Tomography" OR "NMR Imaging" AND "Computed Tomography" OR "CT" OR "CT Scan".

Participant or population The subjects were patients with hip trauma.

Intervention N/A.

Comparator N/A.

Study designs to be included The purpose of the study was to compare the diagnostic value of CT or MRI in occult hip fracture.

Eligibility criteria The inclusion criteria were: (1) Observational study published in English; (2) The subjects were patients with hip trauma and ≥ 30 cases; (3) The purpose of the study was to compare the diagnostic value of CT or MRI in occult hip fracture; (3) Study providing details (true positives/negatives, false positives/negatives) on the accuracy of the MRI or CT in the diagnosis of patients with occult hip fracture. We excluded review articles, duplicate papers, letters, case reports, and publications with missing data.

Information sources PubMed, Web of Science, Cochrane, and EMBASE up to August 2022.

Main outcome(s) This meta-analysis suggests that both CT scans and MRI are effective in detecting occult hip fractures.

Quality assessment / Risk of bias analysis Data extraction and quality evaluation were independently carried out by two investigators. General data and clinical statistics were extracted from the articles, including year of publication, author, total patients, age of patients, reference standard, type of study, and study purpose. Literature quality was evaluated using the Quality Assessment of Diagnostic Accuracy Studies-2 (QUADAS-2) tool. The third author was consulted for the divergences.

Strategy of data synthesis RevMan 5.3 and Stata 15.1 software were employed for data analysis. Meta-analysis was carried out through random-effects modeling to obtain the pooled sensitivity, specificity, diagnostic odds ratio (DOR), and 95% confidence intervals (CIs). The sensitivity and specificity were employed to depict an SROC curve, which implies the overall diagnostic accuracy by the area under the curve (AUC). We used Cochran Q was applied to depict the heterogeneity across involved articles, and I² statistic was employed to assess the heterogeneity.

Subgroup analysis MRI vs. CT.

Sensitivity analysis The sensitivity and specificity were employed to depict an SROC curve, which implies the overall diagnostic accuracy by the area under the curve (AUC).

Language restriction Observational study published in English.

Country(ies) involved China.

Keywords Occult hip fracture; Computed tomography; Magnetic resonance imaging; diagnostic odds ratio; diagnostic accuracy.

Contributions of each author

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