J Comput Assist Tomogr. 2023 Sep 1. doi: 10.1097/RCT.0000000000001543. Online ahead of print.

Dynamic Susceptibility Contrast-Enhanced Perfusion-Weighted Imaging in Differentiation Between Recurrence and Pseudoprogression in High-Grade Glioma: A Meta-analysis

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PMID: 37654056 DOI: 10.1097/RCT.0000000000001543

Abstract

Introduction: In glioma patients that have undergone surgical tumor resection, the ability to reliably distinguish between pseudoprogression (PsP) and a recurrent tumor (RT) is of key clinical importance. Accordingly, this meta-analysis evaluated the utility of dynamic susceptibility contrast-enhanced perfusion-weighted imaging as a means of distinguishing between PsP and RT when analyzing patients with high-grade glioma.

Materials and methods: The PubMed, Web of Science, and Wanfang databases were searched for relevant studies. Pooled analyses of sensitivity, specificity, positive likelihood ratio (PLR), and negative likelihood ratio (NLR) values were conducted, after which the area under the curve (AUC) for summary receiver operating characteristic curves was computed.

Results: This meta-analysis ultimately included 21 studies enrolling 879 patients with 888 lesions. Cerebral blood volume-associated diagnostic results were reported in 20 of the analyzed studies, and the respective pooled sensitivity, specificity, PLR, and NLR values were 86% (95% confidence interval [CI], 0.81-0.89), 83% (95% CI, 0.77-0.87), 4.94 (95% CI, 3.61-6.75), and 0.18 (95% CI, 0.13-0.23) for these 20 studies. The corresponding AUC value was 0.91 (95% CI, 0.88-0.93), and the publication bias risk was low (P = 0.976). Cerebral blood flow-related diagnostic results were additionally reported in 6 of the analyzed studies, with respective pooled sensitivity, specificity, PLR, and NLR values of 85% (95% CI, 0.78-0.90), 85% (95% CI, 0.76-0.91), 5.54 (95% CI, 3.40-9.01), and 0.18 (95% CI, 0.12-0.26). The corresponding AUC value was 0.92 (95% CI, 0.89-0.94), and the publication bias risk was low (P = 0.373).

Conclusions: The present meta-analysis results suggest that dynamic susceptibility contrast-enhanced perfusion-weighted imaging represents an effective diagnostic approach to distinguishing between PsP and RT in high-grade glioma patients.