Metabolic Dysfunction-Associated Steatotic Liver Disease is Associated with Short-Term Complications Following Total Joint Arthroplasty

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INTRODUCTION:

Metabolic dysfunction-Associated Steatotic Liver Disease (MASLD), previously known as nonalcoholic fatty liver disease, is projected to be the leading cause of liver transplants in the United States within the next few years. Metabolic dysfunction primarily presents with obesity (90%), high fasting glucose, high blood pressure, elevated triglycerides, and/or low high-density lipoproteins. The underlying pathogenesis stems from insulin resistance, leading to free fatty acid synthesis and hepatic steatosis. Metabolic dysfunction-Associated Steatohepatitis (MASH), previously known as nonalcoholic steatohepatitis, results from progressive hepatic damage due to oxidative stress from excess free fatty acids, causing hepatocellular injury and inflammation. The ultimate progression of unaddressed MASLD/MASH is liver cirrhosis, necessitating a liver transplant.

Postoperative complications following total joint arthroplasty (TJA) pose severe health risks for patients, seriously increasing their risk of comorbidities and mortality. Liver cirrhosis is well documented to worsen TJA outcomes, significantly increasing the risk of periprosthetic joint infection (PJI), hemarthrosis, pneumonia, sepsis, and embolic events. However, limited research exists on the risk that MASLD and MASH pose for postoperative complications in TJA patients.

This study aims to determine the postoperative complication risk in patients with MASLD or MASH following TJA. We hypothesized that patients with a recent history of MASLD or MASH face a significantly greater risk of complications following TJA.

METHODS:

We carried out a retrospective database study using the TriNetX national database to identify patients who underwent primary TJA from database inception to June 8, 2025. Patients who underwent TJA were identified using CPT 27447 and 27130 and ICD-9 81.54 and 81.51. Patients with a history of MASLD or MASH within 6 months were identified by ICD-10 K76.0 and K75.81, respectively. The control cohort consisted of patients without a history of MASLD or MASH within 6 months prior to TJA. All cohorts excluded patients with other causes of cirrhosis and required a minimum two-year follow-up. After 1:1 propensity matching, both 90-day and 1-year complications were analyzed. The 90-day complications included surgical site infection (SSI), major medical complications (pulmonary embolism, pneumonia, myocardial infarction (MI), cerebrovascular accident, and sepsis), minor medical complications (acute kidney injury, urinary tract infection (UTI), wound complications, transfusion, thrombocytopenia, and deep vein thrombosis (DVT)), encephalopathy, disseminated intravascular coagulation (DIC), prolonged hospital stay, hematoma, and hypoxemia. One-year complications included PJI, periprosthetic fracture (PPF), hardware failure, and dislocation/instability; manipulation under anesthesia and ankylosis were assessed in the TKA cohort, while revision and mechanical loosening were assessed in the THA cohort. Results are reported as odds ratios (OR) and 95% confidence intervals (CI). Statistical significance was defined as $P < 0.05$.

RESULTS: There were a total of 5,651 patients who had a history of MASLD, of which 3,577 underwent TKA and 2,074 underwent THA. There were a total of 505 patients who had a history of MASH, of which 478 underwent TKA and 272 underwent THA. TKA patients with a recent history of MASLD had increased 90-day postoperative risk for UTI (OR 1.406, 95% CI 1.058-1.868, P=0.0182) and thrombocytopenia (OR 1.977, 95% CI 1.241-3.151, P=0.0035). THA patients with a history of MASLD had increased 90-day postoperative risk for pneumonia (OR 2.181, 95% CI 1.098-4.335, P=0.0225), sepsis (OR 2.196, 95% CI 1.073-4.494, P=0.0273), wound complications (OR 1.516, 95% CI 1.021-2.251, P=0.0379), thrombocytopenia (OR 3.162, 95% CI 1.947-5.134, P=< 0.0001), and hypoxia (OR 2.29, 95% CI 1.33-3.943, P=0.0021) and decreased 90-day postoperative risk for transfusion (OR 0.519, 95% CI 0.332-0.812, P=0.0034). There were no significantly increased rates of complications during the 90-day period for TKA patients with recent history of MASH and no increased 1-year complications for either TKA or THA cohort for both MASLD and MASH.

DISCUSSION AND CONCLUSION: Although both MASLD and MASH can progress to liver cirrhosis when left untreated, initial fatty changes and inflammation are reversible within one year with weight loss >10% from lifestyle, surgical, and pharmacological management. However, patients with MASLD who underwent TJA, specifically those who underwent THA, were shown to have increased 90-day postoperative complications. These risks likely stem from the underlying pathogenesis of MASLD leading to systemic inflammation and metabolic dysfunction. No significant association between MASH and postoperative complications was observed. Limitations of this study include the inability to confirm ongoing MASLD/MASH at the time of TJA and undercoding of MASLD/MASH due to potentially asymptomatic presentation or lack of confirmatory testing.

Given that recent estimates put obesity prevalence in the United States at 40%, of which an estimated 67% have MASLD, our findings highlight the necessity to recognize MASLD as a relevant risk factor in the preoperative assessment of patients planning to undergo TJA. Further research is warranted to clarify the true effect of the hepatic dysfunction caused by MASLD on arthroplasty outcomes.