



Introduction

Magnetic resonance (MR) imaging in the setting of gunshot wounds at or near the lumbar spinal canal is controversial.

Methods

A review of the English-language literature was performed. Data from 25 articles was analyzed, including 5 in vitro studies of the interaction between 95 projectiles and MR scanner magnetic fields and the clinical outcomes from 22 patients with metallic fragments at or near the spinal canal who underwent MR imaging.

Results

Properties from 95 civilian and military projectiles were analyzed at an MR of 1.0, 1.5, 3.0 and 7.0 Tesla. The most common projectile core composition was lead (76.9%), either with a copper jacket orunjacketed. Steel containing (core or jacket) projectiles comprised 14.7%. No field interaction was evident in 96.3% (78 of 81) of nonsteel projectiles. All steel projectiles showed at least positive deflection forces, longitudinal migration, or rotation. Heating of the projectiles was clinically insignificant. Image artifact was significant in all 9 steel bullets tested, but was not significant in 88.6% (39 of 44) of nonsteel bullets tested. Overall, 22 patients with complete (82%) and incomplete (14%) spinal cord injury secondary to a projectile lodged inside the spinal canal underwent MR imaging. Discomfort and further physical or neurological deficits were not reported by any patient. Two patients with spinal cord injuries had MR imaging studies before surgical decompression and had subsequent, significant neurological improvement.

Learning Objectives

The authors reviewed the literature on the use of MR imaging in gunshot wounds to the spine. They discuss the results from in vitro and clinical studies, analyze the physical properties of common projectiles, and evaluate the safety and indications for MR imaging when metallic fragments are located near the spinal canal.

Conclusions

Metallic implants near or at the spinal canal are a relative contraindication for MR imaging. However, safe MR imaging might be feasible when a projectile’s properties and individualized clinical presentation are ideal.