

CONTRAST-ENHANCED ULTRASOUND OF THE INJURED SPLEEN AFTER EMBOLIZATION. COMPARISON WITH COMPUTER TOMOGRAPHY.

Johann B. Dormagen¹, Oliver Meyerdierks¹, Christine Gaarder², Leiv Sandvik³, Pål A. Næss², Nils E. Kløw¹

¹Department of Radiology, ²Trauma Unit, ³Center for Clinical Research, Oslo University Hospital – Ullevål, Oslo, Norway.

Background:

Splenic injuries are usually treated with non-operative management (NOM). Minor injuries are treated with observation and bed-rest only, while more severe injuries often undergo transarterial embolization (TAE) as an adjunct to NOM. A non negligible number of complications occur in the patients with severely injured spleen and careful reexaminations and follow-up are usually performed. Computed tomography (CT) is the standard radiological modality in follow-up. However, in the recent years contrast-enhanced ultrasound (CEUS) has emerged as an attractive alternative to CT. The aim of this study was to evaluate the diagnostic performance of CEUS in trauma patients after splenic embolization using CT as the standard of reference.

Patients and methods:

Twenty-two patients (17 male and 5 female) at a mean age of 32 (15-57) were studied with ultrasound (US), CEUS and CT in 23 early follow-up examinations 5 (0-12) days after intervention and 17 late follow-up examinations 69 (52-189) days after intervention. Interobserver agreement for US and CEUS was measured with kappa statistics. Perisplenic fluid, hematoma, laceration, infarction, scars and injury grade were evaluated and compared with CT using McNemars test.

Results:

Overall intermodality agreement with CT for all lesions at early and late follow-up was 0.49 for US and 0.77 for CEUS, respectively. Sensitivity and specificity for CEUS at early follow-up were 85% and 70% for perisplenic fluid, 80% and 94% for subcapsular hematomas, 83% and 73% for lacerations and 75% and 87% for infarctions, respectively. Sensitivity and specificity at late follow-up were 60% and 100% for subcapsular hematomas, 91% and 67% for intrasplenic hematomas, 100% and 93% for lacerations and 89% and 100% for scars. Overall sensitivity and specificity for all lesions was 87% and 88% respectively at early follow-up and 85% and 96% respectively at late follow-up. In most cases, the reduced detection rate was caused by misinterpretation of lesions. Only five lesions out of 88 lesions (6%) were missed completely. Compared to CT, CEUS underestimated the injury grade in 2/40 cases and overestimated the injury grade in 3/40 cases.

Conclusion:

CEUS is comparable to CT in follow-up after splenic embolization and may replace CT in follow-up studies.