Visualization of radioembolization micro-embolic effect as seen on dual-phase CBCT

Abstract:
Purpose:
Observed perfusion change, in a per-procedural manner is a technical challenge for interventional radiologist. Radioembolization with yttrium-90 (Y90) microspheres is a therapeutic approach designed for hepatic tumor treatment. The concept is based on an association of high-dose radiation delivery with microembolic effect at the tumor capillary bed, by >30 µM glass microsphere loaded with Y90. Dual-Phase CBCT (DPCBCT) is a multi-phasic scans using only one injection of contrast media. The purpose of this study is to evaluate micro-embolic effect induced by radio-spheres at the capillary level by comparing the tumor enhancement before and after procedure at the early and late arterial tumor enhancement.

Material & method:
14 patients were referred to radioembolization, all underwent DPCBCT (Allura Xper, Philips Healthcare, Best, The Netherlands) imaging prior to and immediately after radio-sphere injection. In retrospective manner tumor attenuation were measured at each DPCBCT phase.

Results:
72 tumors were evaluated, average tumor attenuation at the early arterial phase are respectively 20340.7 and 20158.2 UA p<0.001 before and after radioembolization; and average tumor attenuation at delayed arterial phase are respectively 20091.4 and 19040.7 UA p > 0.001 before and after radioembolization. Average difference in tumor attenuation before and after radioembolisation are respectively at early arterial and delayed phase 182.5 UA and 1050.6 UA p<0.001.

Conclusion:
Tumor enhancement decreases before and after radioembolization at delayed phase is the direct translation for a visible microembolic effect at tumor capillary bed by dual-phase CBCT.