

Contrast Blush on CT Is a Poor Predictor of Active Bleeding on Pelvic Angiography

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Purpose: Angiographic embolization is the therapeutic intervention of choice for massive pelvic hemorrhage. Contrast extravasation (CE) on CT, or CT blush, is a widely used indication for pelvic angiography. We hypothesize that in isolation, CE is not a reliable predictor of clinically relevant arterial bleeding in patients with pelvic trauma.

Methods: 189 patients over 16 years underwent angiography for pelvic ring injury. Demographic and injury data, including Young-Burgess classification (YB), ISS, Glasgow Coma Scale (GCS), hypotension (persistent systolic blood pressure <90 mm Hg), and heart rate upon presentation were recorded. CE on CT scan was noted. Angiographic findings were classified as either active bleeding or none.

Results: Mean age was 49 years, with 64% male. Indications for angiography included: hypotension (n = 118, 72.4%), CE (n = 112, 61%), anteroposterior compression (APC) pattern, and vital signs unresponsive to resuscitation. CE was reported in 112 patients (61%), with increasing frequency over the study period. Patients under age 55 were less likely to have CE on CT (55.4% vs 83.6%, $P < 0.001$). GCS was higher and ISS lower in patients with CE ($P < 0.05$). Other characteristics, such as mechanism, YB pattern, and mortality, were not different for patients with and without CE. When investigating CE as a predictor of active bleeding, sensitivity was 66.7%, specificity was 33.8%, positive predictive value (PPV) was 57.7%, and negative predictive value (NPV) was 57.1% with $P = 0.95$. For CE as a predictor of overall mortality, the sensitivity, specificity, PPV, and NPV were 66.7%, 33.3%, 16.1%, and 16.1%, respectively, with $P = 1.0$. Hypotension predicted active bleeding with sensitivity 83%, specificity 40%, PPV 61.9%, and NPV 33.3% ($P = 0.001$). Furthermore, hypotension sensitivity, specificity, PPV, and NPV for predicting overall mortality were 96.7%, 33.1%, 24.6%, and 2.2%, respectively, with $P = 0.001$.

Conclusion: Contrast extravasation was neither sensitive nor specific for active bleeding. Alternatively, hypotension was a better indicator for pelvic angiography, with sensitivity of 67% for active bleeding. Over the study period there was more CE reported, potentially due to greater detail of modern CT scanner technology. These findings suggest that CE is not independently a sufficient indication for pelvic angiography. CE may present more often in older patients with less alarming sources of arterial bleeding. Eliminating pelvic angiography when CT blush is the only indication would prevent unnecessary interventions, reduce costs, and ease patient burden.