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Comparison of patient dose and vessel visibility between grid removal and lower radiation dose settings for pediatric imaging in the cath lab

Purpose: The aim was to define an alternative to anti-scatter grid (ASG) removal which achieves similar patient radiation dose reduction as ASG removal without degrading image quality during pediatric imaging.

Materials & Methods: This study was approved by the local institution animal care and use committee (IACUC). Six different digital subtraction angiography settings were evaluated that altered the mAs, (100, 70, 50, 35, 25 and 17.5% of reference mAs) with and without ASG. Three pigs of 5, 15, and 20 kg (9, 15, and 17 cm abdominal thickness; newborn, average 3 year old, and average 10 year old human, respectively) were imaged using the six dose settings with and without ASG. Image quality was defined as the order of vessel branch that is visible relative to the injected vessel. Five interventional radiologists evaluated all images. Image quality and patient dose were statistically compared using analysis of variance and receiver operating curve (ROC) analysis to define the preferred dose level and use of ASG for a minimum visibility of 2nd or 3rd order branches of vessel visibility.

Results: ASG grid removal reduces dose by 26% with similar image quality loss. Only with the ASG present 3rd order branches can be visualized; 100% mAs are required for 9 cm pig while 70% mAs are adequate for the larger pigs. 2nd order branches can be visualized with ASG at 17.5% mAs for all three pig sizes. Without the ASG, 50%, 35% and 35% mAs is required for smallest to largest pig, respectively.

Conclusion: Removing ASG reduces patient dose and image quality. Hence, it can be concluded that image quality can be improved with the ASG present while further reducing patient dose.

Biography

Keith J Strauss has completed his Master's degree in Radiological Physics from the University of Chicago. He worked as an Imaging Physicist for 8 years prior to working in the top three pediatric hospitals of USA. He has published more than 100 papers in various imaging journals and currently serves as an Editorial Board Member of Pediatric Radiology.

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