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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

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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 20kg (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.

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Autonomic denervation of neuromodulator for the treatment of ventricular tachyarrhythmias

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It is known that hyperactivity of the sympathetic nervous activity plays a critical role in the initiation and maintenance of ventricular tachyarrhythmias in diseases such as long-QT syndrome, catecholaminergic polymorphic ventricular tachycardia (CPVT) as well as electrical storms resulting from any etiology. On the contrary, vagal activity is widely considered to be anti-arrhythmic and anti-inflammatory as well. It has been proposed that therapies aimed at reducing the sympathetic tone and enhancing the vagal tone should provide clinical benefits. However, recent clinical trials of spinal cord stimulation, baroreceptor activation therapy and cervical vagal stimulation, designed to test this hypothesis, have produced conflicting results in patients with heart failure. Low-level transcutaneous vagal stimulation is another promising autonomic neuromodulation showing strong anti-arrhythmic effects on both atrial and ventricular tachyarrhythmias in preclinical studies. Clinical studies are underway to investigate its effects on patients with a propensity for ventricular tachyarrhythmias. The left stellate ganglion (LSG) is viewed as the gateway of the sympathetic innervation to the heart. Various interventions targeting the LSG have been developed, including video-assisted resection of the LSG, epidural anesthesia of the C7-T3 level, and application of local anesthetics to block the LSG. Recent clinical studies demonstrate that sympathetic denervation targeting the LSG is capable of improving the survival in patients with long QT syndrome, reducing the ventricular tachyarrhythmia in CPVT patients and alleviating the arrhythmia burden during electrical storms.

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