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Next Generation Flat Detector CT Imaging in the Neuroendovascular Suite: A Technological Update

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Introduction

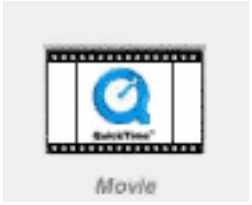
Rotational C-arm Flat Detector CT Angiography (fdCTA) is an imaging technique with evolving technological capabilities and clinical applications.

Methods

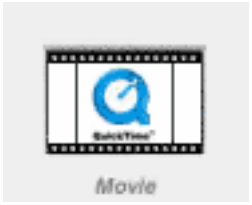
Systematic literature review.

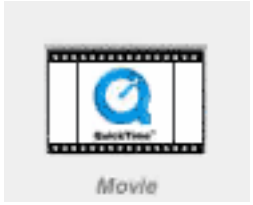
Results

52 research articles were included. Algorithms that initially constrain fdCTA source data to a preliminary reconstruction mask and then intensely process the constrained data within that mask can display cerebrovascular anatomy with spatial resolution and conspicuity superior to DSA, CTA, and MRA. fdCTA can display coil and stent shape and structure in greater detail than DSA, aiding device positioning, deployment, and follow-up imaging. Temporal fdCTA data quantitatively describes intravascular flow parameters that can be visually depicted with color-coding. Dedicated fdCTA C-arm rotation protocols and data processing methods can generate quantitative parenchymal perfusion results. fdCTA reliably displays intracerebral and subarachnoid hemorrhage, though it is inferior to conventional multi-slice CT in this regard. Novel fdCTA algorithms reduce metallic artifacts. The optimization of arterial

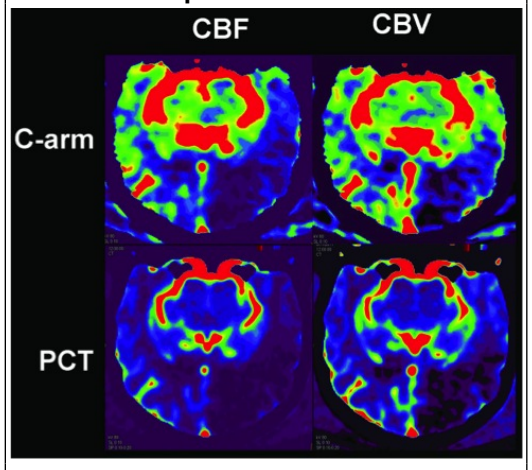


3D fdCTA reconstructions + temporal data = 4D



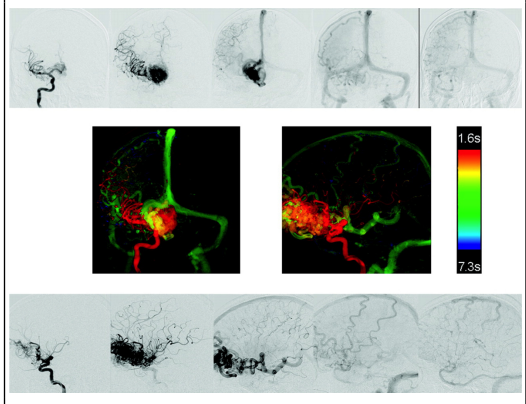


Parenchymal perfusion maps generated by fdCTA compared with conventional perfusion CT



Royalty et al. AJNR 2013;34:2131-8

Temporal color-coded fdCTA images of an AVM's circulation



Strother et al. AJNR 2010;31:919-24

Conclusions

fdCTA displays peri- and intra-procedural anatomical and physiological cerebrovascular information that may guide diagnosis, patient selection, treatment, complication management, and follow-up. It is an increasingly comprehensive and sophisticated tool in the neurendovascular suite.

Acknowledgements

We are indebted to Dr. C Strother and Dr. K Royalty et al for providing these excellent videos.