how to set up a contrast enhanced MRA

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MRA imaging sequences

3D time – of – flight

3D navigator enabled

2D time – of flight
MRA imaging sequences

3D time – of – flight
requires IV Gd
fast imaging time – 10-30 seconds
able to perform multiple phases or
requires bolus injection – hand or power injector

3D navigator enabled
does not require, but is best with IV Gd
may repeat
long imaging time
sensitive to flow artifacts

2D time – of flight
MRA imaging sequences

3D time – of – flight

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fast imaging time – 10-30 seconds
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3D navigator enabled

does not require but is better with IV Gd
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MRA imaging sequences

- no IV contrast required
- shows blood flow direction

2D time–of–flight
MRA sequence tips

k-space

centric linear ordered

center

contrast noise detail

periphery
MRA sequence tips

sensitivity encoding

SENSE

increases the encoding efficiency of gradient-echo imaging was increased by factors of up to three
The spatial resolution of BH scans is improved, and the temporal resolution of time resolved 3D CE-MRA is also improved. Sensitivity encoding (SENSE) is used to enhance these resolutions.
MRA sequence & tricks

3D time-resolved (TR) imaging of contrast kinetics
TR echo-shared angiographic technique
TR angiography using Keyhole
TR angiography w/ interleaved stochastic trajectories

increased sampling rate for lower spatial frequencies,
temporal interpolation of k-space views,
zero-filling in the slice-encoding dimension
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