

COMPARISON BETWEEN TIME-RESOLVED IMAGING OF CONTRAST KINETICS (TRICKS) AND TIME OF FLIGHT (TOF) MAGNETIC RESONANCE IN CEREBRAL VENOUS ABNORMALITIES DIAGNOSIS

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INTRODUCTION

The cerebral venous system abnormalities including the cerebral venous thrombosis and its differential diagnoses as idiopathic intracranial hypertension and cerebral venous variants are essentially to be differentiated, this requires adequate clinical assessment and good usage of the available diagnostic radiological techniques as adequate diagnosis guarantee adequate treatment and patient prognosis. Many imaging modalities are used; each has advantages and pit falls.

AIM OF THE WORK

The aim of this study was to compare (TRICKS) MR angiography and (TOF) MRV in assessment of cerebral venous system abnormalities.

SUBJECTS AND METHODS

Patients: The study included 20 patients with suspected cerebral venous abnormalities referred from the neurology and neurosurgery department to the radiology department of Alexandria Main University Hospitals for MRV examination in the period from May 2023 till Juli 2024.

Methods: All included patients underwent the following:

Full history taking and Full Clinical examination.

Anesthesia in cases of pediatric age group,

MR images were performed on a 3T system (GE Healthcare) by using a 16-channel sense neurovascular head and neck coil.

All patients underwent the following MRI protocol:

T2 weighted axial sequence, Diffusion weighted images, FLAIR sequence, 3D T1 weighted axial images, Susceptibility weighted sequence (SWI), Coronal T2 weighted images, Pre contrast mask images for TRICKS, Administration of a single intravenous dose (0.1mmol/kg body weight with a maximum of 0.3mmol/kg body weight) of gadolinium. (Magnevist 20ml) at a rate of 1.5 ml/s simultaneously with the start of TRICKS angiography sequence using 48temporal phase, each takes 10 sec, post contrast TOF then Post contrast 3D T1 axial (3D MPRAG), The studies of our cases were Qualitatively analyzed on a remote workstation (GE Medical system) by two neuroradiologists.

RESULTS

Twenty patients were included in this study 15 females (75%) and 5 males (25%) with ages ranging from 1-74 years (mean 34.6 years). TRICKS is superior to post contrast TOF in the assessment of most of the examined cerebral venous structures namely (SSS, ISS, straight sinus, transverse sinuses bilaterally, sigmoid sinuses bilaterally, the junction between the transverse and sigmoid veins bilaterally, the internal cerebral veins and vein of Labbé on both sides) and this is statistically significant regarding the following(ISS, straight sinus, transverse sinuses bilaterally, left sigmoid sinus and the junction between the left transverse and sigmoid veins)

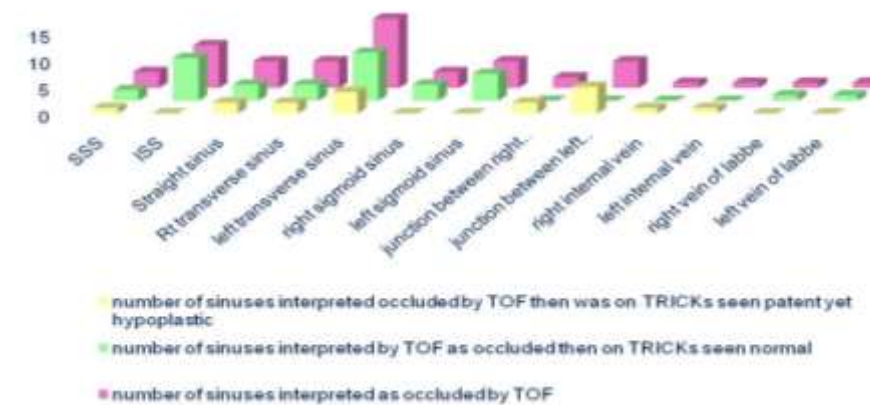


Chart 1:
Diagnostic performance of both TOF and TRICKS .

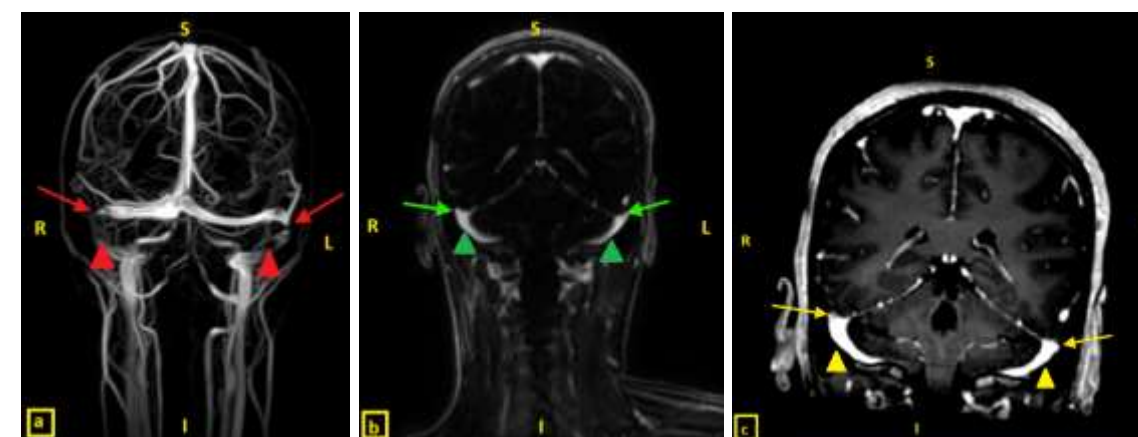


Figure 1: 3D reconstruction post contrast TOF MRV (a) shows abnormality in the caliber and signal of:
- The junctions between the transverse sinuses and the sigmoid sinuses bilaterally (the red arrows). Which are seen patent yet hypoplastic on Coronal post contrast TRICKS (b) (the green arrows) and on Coronal post contrast MPRAG (c) (the yellow arrows).
- The right and left sigmoid sinuses (the red triangles) which are patent on Coronal post contrast TRICKS (b) (the green triangles) and on Coronal post contrast MPRAG (c) (the yellow triangles).
(TRICKS and MPRAG are superior to TOF in the assessment of the junctions between the transverse sinuses and the sigmoid sinuses bilaterally, the right and left sigmoid sinuses)

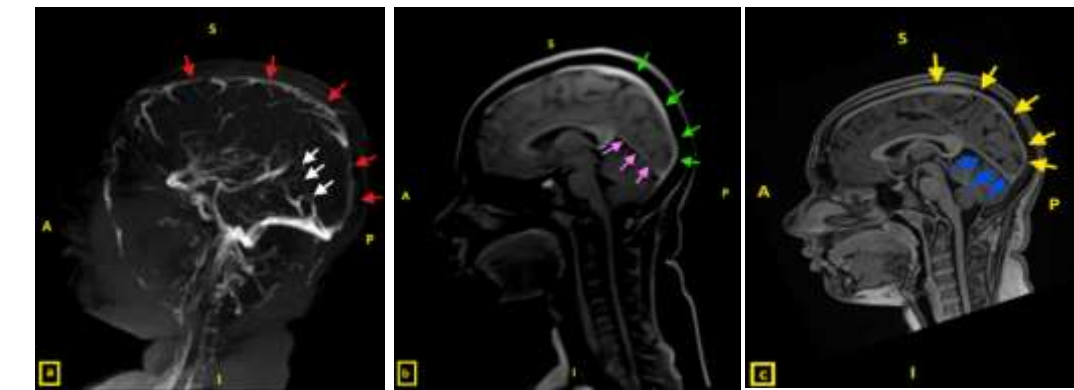


Figure 2: 3D reconstruction post contrast TOF MRV (a) shows signal and caliber abnormality of:
- The SSS (the red arrows) which is seen patent on Sagittal post contrast TRICKS MRV (b) (the pink arrows) and on Sagittal post contrast MPRAG MRV (c) (the yellow arrows).
- The straight sinus (the white arrows) which is seen patent yet hypoplastic on Sagittal post contrast TRICKS MRV (b) (the pink arrows) and on Sagittal post contrast MPRAG MRV (c) (the blue arrows).
(TRICKS and MPRAG are superior to TOF in the assessment of SSS and straight sinus)

CONCLUSION

As cerebral venous thrombosis (CVT) has increasing incidence over the past years we need to find non- invasive, accurate, fast and easily performed radiological technique that use the optimum capacity of the used MRI device to diagnose CVT and differentiate it from its differential diagnoses. In our study we compared one of the most commonly performed techniques namely contrast enhanced TOF with a new 4 D MRV (TRICKS) in a trial to substitute the former with the latter and we reached a conclusion that 4D MRV has higher sensitivity and specificity for diagnosing CVT than TOF-MRV.