CORTICAL VENOUS THROMBOSIS

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History

The patient is a middle-age old right-handed female with no significant PMH comes with c/c/o right sided weakness which she had noticed while playing tennis earlier in the morning because her right foot felt heavy and her body co-ordination was off while playing. By evening, she was dragging her right foot and she felt she was veering towards the right side while walking.
She was taken to outside hospital by her husband. On enquiry She gave h/o headaches upon leaning the night before which was unusual but it resolved by itself the next morning. Her vitals were within normal limits. Her exam was notable for Right pronator drift and an unsteady gait with drifting to the R while standing.

While on her way to the MRI scanner she had a witnessed generalized tonic-clonic seizure. She was then given anti-epileptics and MRI was then successfully obtained which showed abnormal edema and enhancement of the R frontal, L temporal, and L parietal lobes.
It was diagnosed to be of infectious origin most likely Herpes encephalitis as she had a h/o shingles 4 years back. So, they started her on Acyclovir. Her Lab work including CBC, Blood chemistry, LFT and Cardiac enzymes were unremarkable.

She was then sent to BIDMC for further management. Upon arrival here, she was also given vancomycin and ceftriaxone and a LP was urgently performed. This is how her MRI looked like:
Axial T1 showing hyper-intense area of hemorrhagic infarct with surrounding hypo-intense edema in frontal lobe.
T2*SW MRI showing hypo-intense area of hemorrhagic infarct
Common Differential Diagnosis of Haemorrhagic Infarct

- Metastasis – M/C seen is bronchogenic carcinoma; choriocarcinoma and malignant Melanoma
- Primary tumor – Glioblastoma Multiforme
- Coagulopathies
- Bleeding Cavernoma
- Cerebral Venous Thrombosis – can be Dural Sinus Thrombosis or isolated cortical vein thrombosis
  - or both
- Contusion /trauma
- Amyloidosis
Sagittal T1 MRI showing an area of hyperintensity along the sagittal sinus indicating the thrombus in superior sagittal sinus
• **T1 MRI**
  showing thrombosed vessel as linear hyperintensity
• **T2*SW images** showing “blooming” effect of thrombosed vessels
• **Blooming Effect**: object appears larger than their actual size due to distortion of local magnetic field
The pink box shows the loss of signal in antero-superior part of sagittal sinus.

The blue box shows infarct in frontal lobe.
Diagnosis

Venous thrombosis involving Superior Sagittal sinus and cortical veins causing Hemorrhagic infarct in Frontal Lobe
When to suspect CVT ???

Cortical Venous Thrombosis is a relatively rare disorder to cause Stroke. It is a part of the spectrum of the entity called cerebral venous thrombois. It can be seen along with Dural sinus thrombosis or as isolated cortical vein thrombosis. The clinical presentation is highly variable.

Signs and Symptoms – most common headache (in >80 %), seizures (Generalized or focal) and focal neurological deficit
Here are few key points to keep in mind for diagnosis:

- Infarcts not respecting arterial boundaries
- More common in females than male – 3:1 ratio
- Young patients - Oral contraceptives, Pregnancy and Puerpurium
- Older Patients – Malignancy, Thrombophilia
- Any prothrombotic conditions
- Ear-nose-throat Infections
- Ulcerartive colitis pts – rare complication

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CT SCAN is not specific but still important as it is one of the first investigations to be done. Important signs to look for are:

- **The dense triangle sign**: seen on non-contrast head CT as a hyperdensity with a triangular or round shape in the posterior part of the superior sagittal sinus caused by the venous thrombus.

- **The empty delta sign**: (also called the empty triangle or negative delta sign), seen on head CT with contrast as a triangular pattern of contrast enhancement surrounding a central region lacking contrast enhancement in the posterior part of the superior sagittal sinus.

- **The Cord sign**: seen as hyperdensity in Non-contrast CT showing thrombosed vessels.
Empty Delta sign

A triangular area of enhancement with central filling defect

usually resolves by 2 months

Courtesy: http://www.ajronline.org/content/196/1/23/F2.expansion
Choice of Imaging in CVT

MRI – T2*SW imaging along with MR venography

- Areas of hypointensity showing thrombosed vessel in T2 weighted imaging

- Absence of same vessel in MR venography confirms the diagnosis
A retrospective study of 114 MRI examinations from 39 patients with CVT using a structured assessment was done to analyze the time course of sensitivity in the detection of clot for different MR sequences:

- Within the first 3 days of symptom onset, the frequency of MSE on T2*SW images was over 90%, whereas the frequency of a hyperintense signal on T1SE was 70%.
- The frequency of MSE on T2*SW is high early in the course of clot formation and decreases very slowly with time.
Conclusion

According to the study it was seen:

• In acute stages of CVT – T2*SW Images were shown to be more sensitive in diagnosis than T1 along with MR venography

• However for dating of thrombus, T1 along with T2 was useful
Treatment

• The mainstay of the treatment is anti-coagulants but the safety of anti-coagulants in hemorrhagic infarct is controversial.

• In acute period – Low molecular weight Heparin followed by oral anticoagulant for 1-3 months.

• Thrombectomy – an attractive alternative but the data proving the benefits are limited. And done in specialised centers only.

• Anti-epileptics – for control of seizures.

• Neurological Deficit – physical therapy and rehabilitation.
Index Patient

- During the discharge, patient was alert, ambulatory and had improved with only mild pronator drift in right hand
- She was started on IV heparin but was shifted to Coumadin indefinitely and was advised INR monitoring with Goal INR 2-3
- Anti-seizure medications for at least 6 months.
References

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