

Intracranial Hemorrhage as Initial Presentation of Cerebral Venous Sinus Thrombosis: A Case Series of Four Patients

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DISCLOSURES

- No direct conflict of interests.
- Dr. Chu has been on speaker's bureau for Pfizer Canada, Merck Canada and Genzyme Canada.
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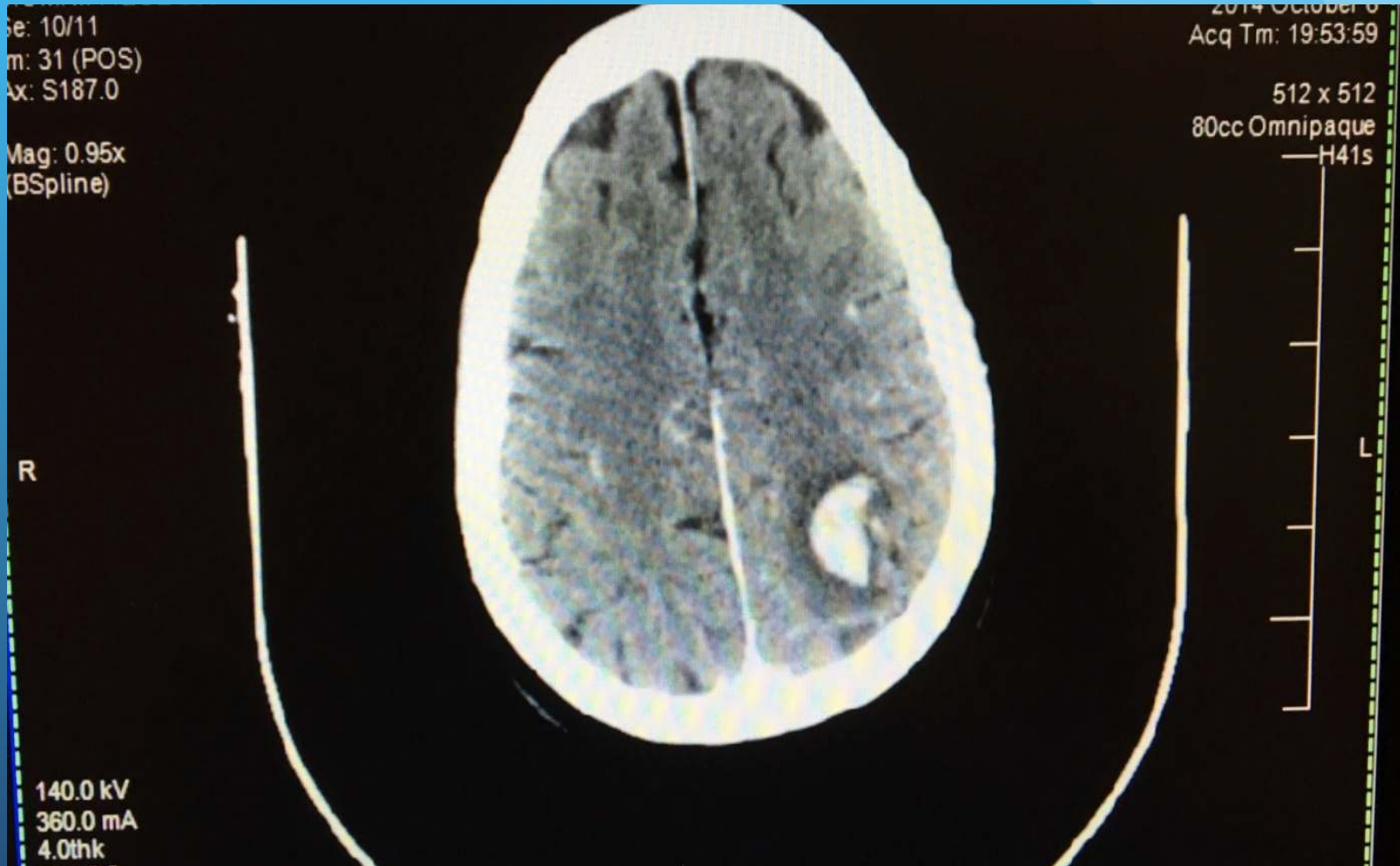
OUTLINE

- Clinical and neuro-imaging of 4 challenging cases of ICH due to Cerebral Venous-Sinus Thrombosis (CVT).
- Discuss management of these interesting cases.
- Literature review of Direct Oral Anticoagulants (DOAC) in management of CVT.

CASE # 1

- S.I. 43 y.o. R-handed housewife, South-Asian decent,
- **06-10-2014** EGH-ICU with sudden headache and right hemiparesis.
- PH: No prior HBP, stroke. Not on any BCP/HRT, non-smoker and non-drinker. Married with 1 daughter.
- Exam: BP= 122/80, P= 70 regular, GCS = 15.
- R. homonymous hemianopsia, R. hemiparesis arm=leg 1/5, extensor R. plantar.

NEUROIMAGING



1.5T MRC25588
Ex: 11850075
SAG VIBE DELAYED
C:GADOVIST
Se: 17/15
m: 99 (ASC)
Sag: R2.2

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CLINICAL COURSE

- After obtaining second opinion by telephone from academic stroke consultant, started on IV Heparin.
- Follow-up CT brain in 24 hours showed no increase in ICH.
- Hypercoagulable work-up was negative.
- Stable on therapeutic doses of Warfarin until 2 weeks later when CT showed expanding left subdural hematoma (SDH).
- Transferred to THP for successful drainage of L. SDH.
- 11-2014 Discharged home on Warfarin .

CLINICAL COURSE

- Seen in follow-up March, 2015 with minimal R. hemiparesis 5-/5.
- Follow-up MRI/MRV showed complete resolution of SST with recanalization and patency of the sinuses.
- Warfarin was replaced with ECASA 325mg OD.
- June, 2016 Another MRV showed no recurrence of SST while on ASA.

FOLLOW-UP MRI/MRV



CASE # 2

- 30-08-2016: D.C. 45 y.o. R-handed IT worker of Chinese decent presented with sudden confusion followed by GTC seizure.
- PH: ? Migraines, no meds., non-smoker/ drinker.
- 10 days prior was involved in a rear-end MVA and hit his head on the head-rest. No LOC.
- Exam.: BP=114/70, P=70, GCS = 15. Normal Neurological exam. No meningismus.

NEURO-IMAGING



MRI / MRV



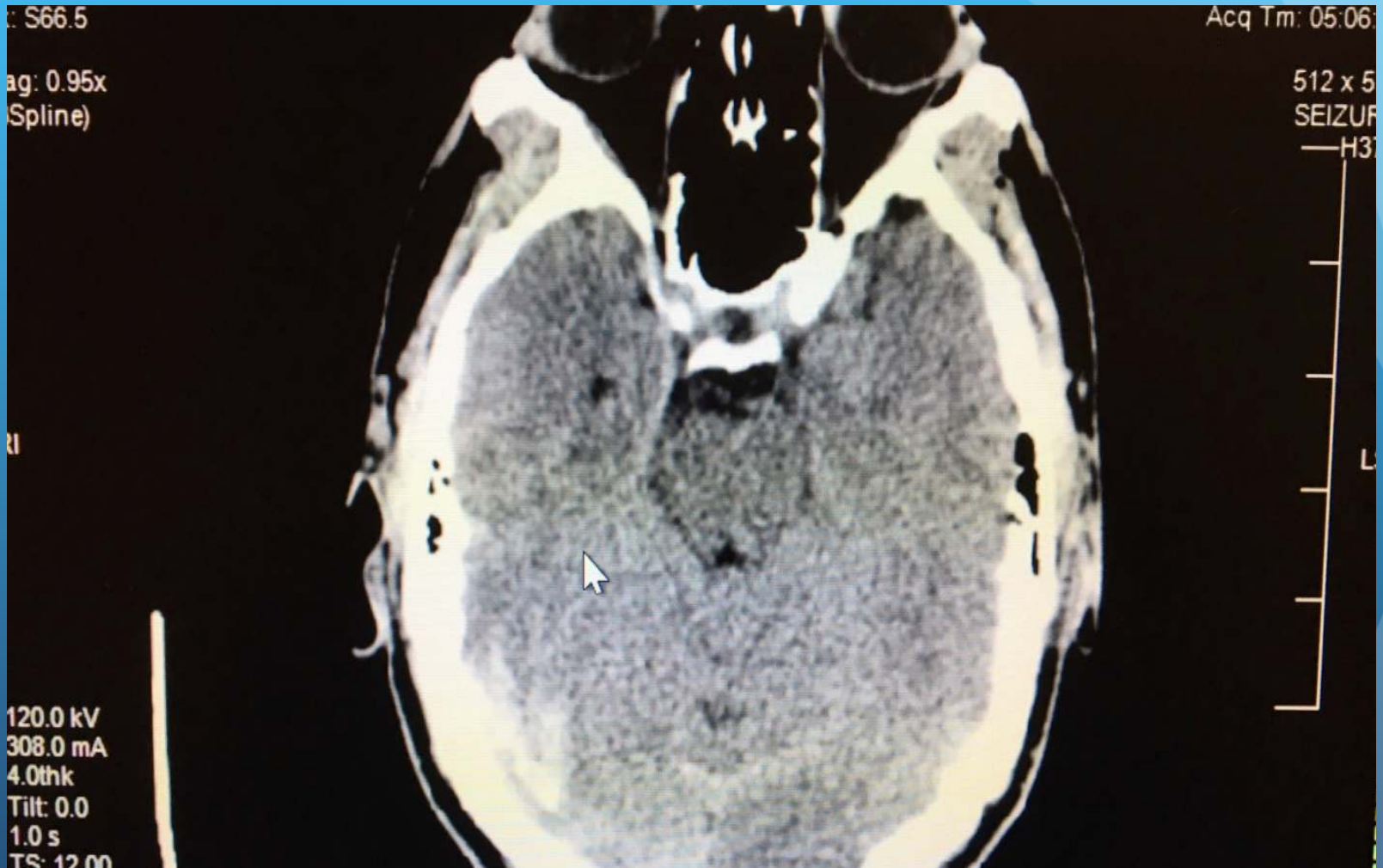
CLINICAL COURSE

- Started on IV Heparin with therapeutic PTT. Keppra 1000mg BID for seizure prevention.
- Eventually changed over to Warfarin with therapeutic INR between 2.0 to 3.0
- While on Warfarin, slightly low Protein C (0.57, N>0.7) and Free Protein S (0.49, N >0.65). Anti-thrombin 3, thrombophilia gene all negative. Normal serum homocysteine.
- Repeat CT brain showed complete resolution of SAH. Discharged home for OP cognitive assessment at West Park ABI program.

CASE # 3

- **17-09-2016:** G.S. 32 y.o. L-handed construction worker presented with sudden headaches and GTC seizure.
- **PH:** 16 years old pulmonary embolism treated with Warfarin.
- **March, 2016:** L. leg DVT with bilateral pulmonary embolism Rx: Xarelto 20mg OD and stopped 1 week prior to admission.
- **Ulcerative Colitis on Asacol TID.**
- **Exam.:** BP= 120/60, P= 70 , GCS= 15, Normal Neurological exam. Normal CBC and INR/PTT.

NEURO-IMAGING



MRI / MRV

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RA



MANAGEMENT

- IV Dilantin loading followed by maintenance.
- IV Heparin with therapeutic PTT followed by Warfarin with INR between 2.0 to 3.0.
- Hematology consultation regarding hypercoagulable workup. (TGH referral)
- Factor V Leiden, Protein C and S all normal.
- Anti-thrombin III ACT slightly reduced.
- Switched from Warfarin to lifelong Rivaroxaban 20mg OD and maintained on Keppra 1500mg BID for seizure prevention.

Case # 4

- 26-07-2017: R.K. 41 y.o. PSW with 1 week history of headaches and decrease in level of consciousness.
- PH : “ Migraines” but no HBP. Non-smoker, non-drinker
- Meds.: Amitryptiline, Advil, Tylenol # 2.
- Exam.: GCS = 8, BP =107/59, P = 75, T = 37 C.
Drowsy but arousable, PERL, mild R. hemiparesis.
- CBC, INR/PTT, lytes, RBS, BUN, CK, Creatinine = N.
- CT and CTA, MRI and MRV.

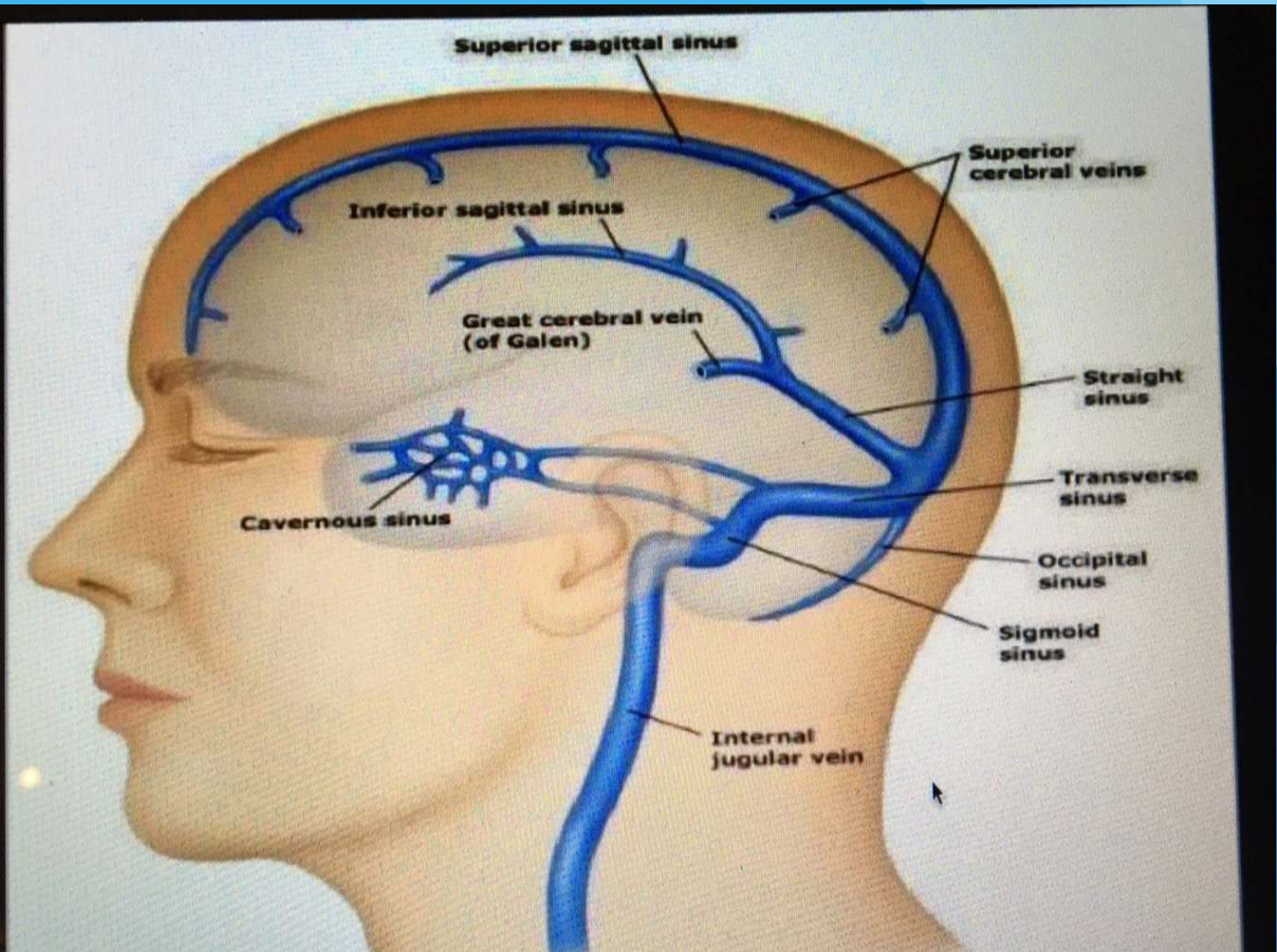




Clinical Course

- IV Heparin followed by Warfarin to maintain INR between 2.0 to 3.0 due to left transverse and sigmoid sinus thrombosis into the jugular vein.
- Monitored in ICU but does not require intubation.
- Transferred to in-patient rehabilitation unit. Warfarin was switched to Apixaban 5mg BID.
- Seen in follow-up in October, 2017. Arranged for follow-up MRI/MRV. Beta-2-glycoprotein and anticardiolipin antibodies were negative.
- Follow-up MRI/MRV showed partial resolution of transverse sinus thrombosis, to continue with Apixaban.

ANATOMY OF DURAL VENOUS SINUSES



Precipitating factors for CVT

- Hypercoagulable conditions predisposing to venous thrombosis: Protein C and/or S deficiency, Anti-Thrombin III, PCRV , Hyperhomocysteinemia, birth control pill/ hormone replacement therapy, dehydration.
- Penetrating head injury including skull fractures.
- Infections: Sinusitis, mastoiditis, meningitis.
- ?? Minor head injuries.

Cerebral venous thrombosis and DOACS

- Geisbusch et al: **(STROKE 2014)** Novel Factor Xa Inhibitor for the treatment of Cerebral Venous and Sinus Thrombosis: First Experience in 7 Patients.
- 7 patients Rx Rivaroxaban , 9 patients received extended release coumadin.
- None with major bleed.
- No differences between 2 groups regarding rate of recanalization and outcomes.

CVT and DOACS

- Mendonca et al: (**Int J Stroke 2015**) Oral direct thrombin inhibitor as an alternative in the management of cerebral venous thrombosis: a series of 15 patients.
- 11 patients on dabigatran, 4 switched from warfarin, started 14 days after IV heparin.
- 5 had ICH on CT/MRI initially. Median follow-up= 19 months.
- 3 had full recanalization, none with hemorrhagic complications.

CONCLUSIONS:

- Intracranial hemorrhage (ICH) may be the initial presentation of cerebral venous-sinus thrombosis (CVT).
- Pathophysiological mechanism of ICH is due to venous hypertension secondary to venous congestion.
- Careful anticoagulation is indicated even in the presence of ICH due to CVT.
- Minor closed head injury has been reported to be associated with the development of CVT.
- Direct oral anticoagulants had been reported efficacious in CVT in small case series but need confirmatory randomized trial.

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