# Subarachnoid Hemorrhage

## An Overview

*Emily Hildebrand*
*CCFP-EM*

1

I have no disclosures!

2

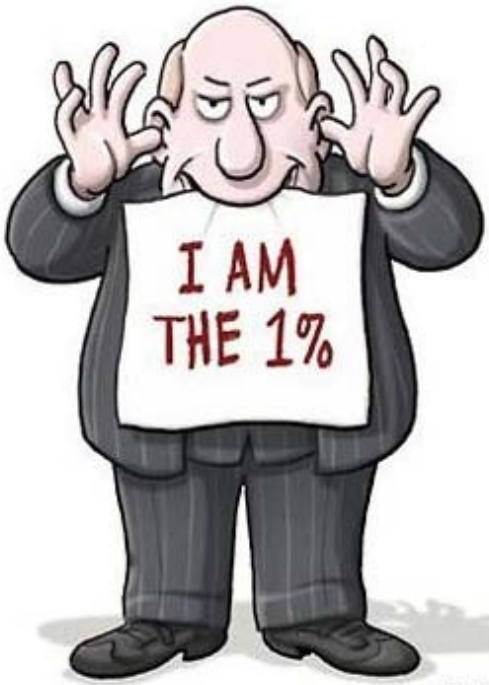
## Case Study

A 45 yo female comes to your ER with HA for 2 days, sudden onset while at rest.
She has had LOC today so came in.
Pmhx: DM

Her exam is unremarkable.

onepixel.com

3




thesgem. com
atokenmanblog.wordpress.com

Chattanooga Times Free Press

4

What is my comfort level with identifying the patients that need a workup for SAH?

5

When working up SAH, how comfortable am I with knowing when CT, LP, CTA are needed?

6

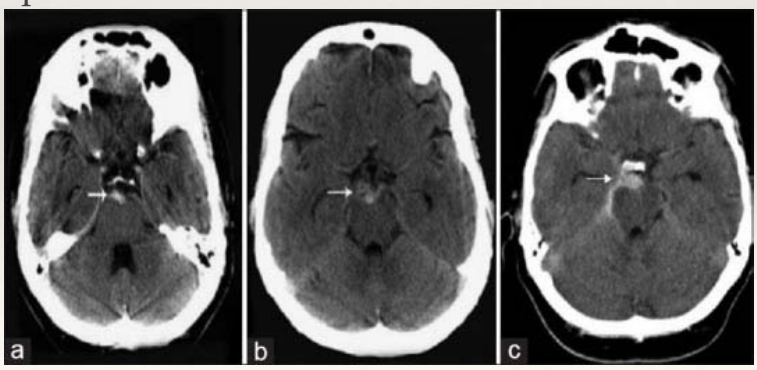
In my patient with SAH, am I aware of the complications that can arise?

How comfortable am I managing them?

7

# Etiology:

- Aneurysmal
- Perimesencephalic
- T.corauma
- neoplasm
- AVM




www.ncbi.nlm.nih.gov/pmc/articles/PMC4732243/

8

# Risk Factors:

- age >50
- sympathomimetic drugs, smoking, ETOH abuse
- HTN
- presence of aneurysm
- previous SAH
- 1st degree relative with SAH

lifeinthefastlane.com

9

# Presentation:

- headache that reaches maximum intensity quickly
- sentinel headache
- exertional
- brief LOC
- focal deficits
- photophobia
- stiff neck
- nausea/vomiting

10

# Ottawa SAH rule

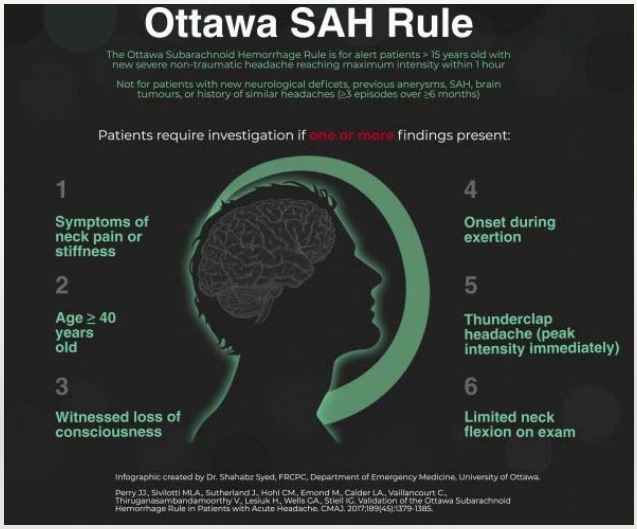
- Inclusion criteria:
  - alert patients (GCS 15)
  - 16 or older
  - non traumatic (no falls in the past 7/7)
  - peaks within 1 hour or syncope
  - onset within 14 days of presentation

emottawablog.com

11

## CT HEAD

**C** - collapse
**T** - thunderclap
**H** - hurt neck
**E** - exertional
**A** - age over 40
**D** - decreased flexion/stiff neck




https://emottawablog.com/2017/11/validation-ottawa-sah-rule/ emottawablog.com

12

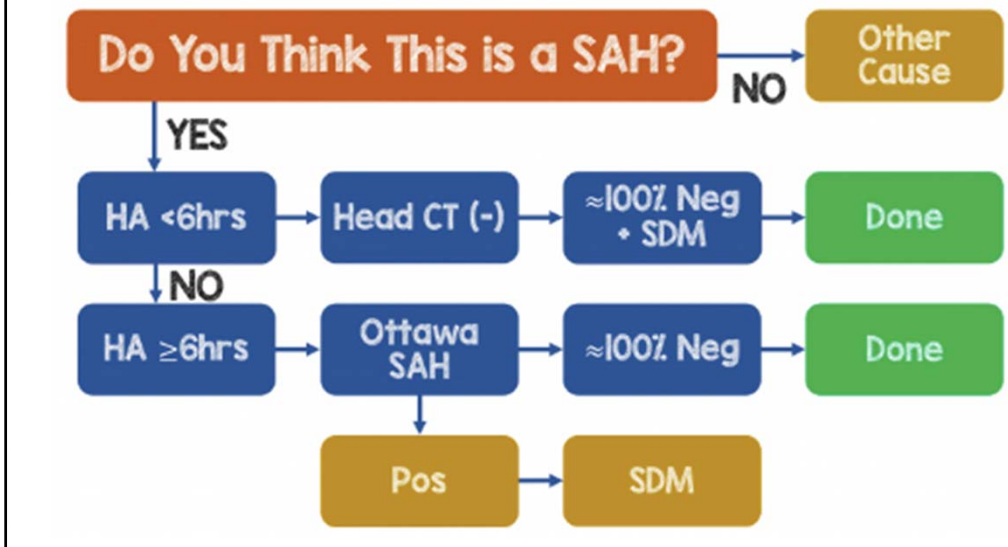
# Case Study

A 45 yo female comes to your ER with HA that she's had for 2 days that began at rest but came on suddenly.
She has had LOC today so came in.
Pmhx: DM

Her exam is unremarkable.

onepixel.com

13




rebelem.com

14

# CT in first 6 hours is reliable

Qry#6/#534:#Qhz#FW#
493#vdfh#dw#DZ GK#
Nhqrud/#RQ

15


https://hwnews.in/business-finance/no-easy-button/52848

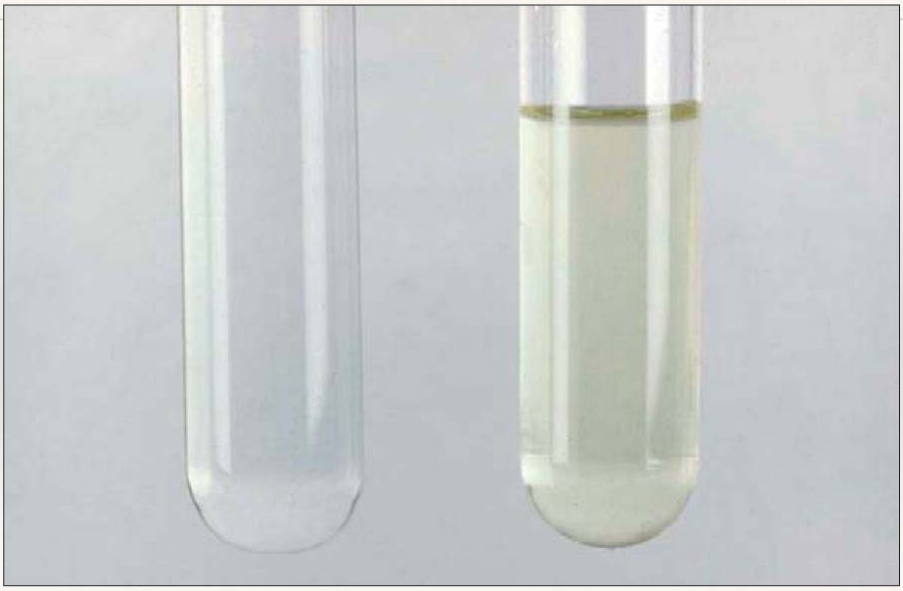
16

# LP

- if CT outside the window and suspicious for SAH
- if negative CT within the window, and very high risk
- if no CT onsite, and transfer will mean outside 6h window

17

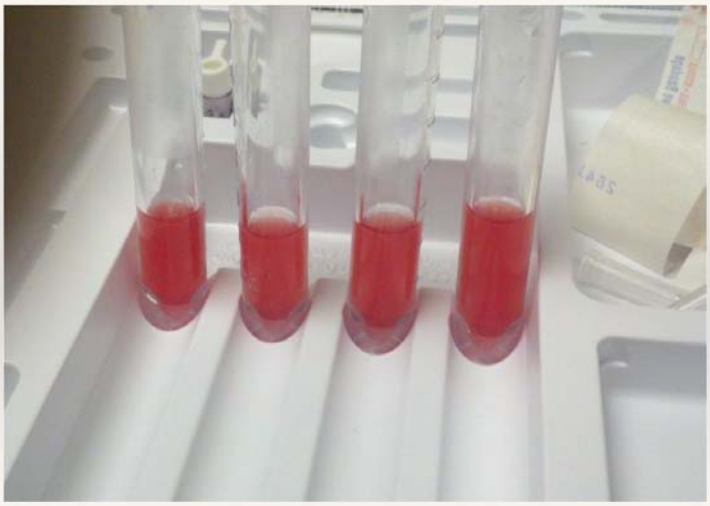
# Xanthochromia



thelancet.com/journals/lancet/a

18

# RBCs



sinaiem.org

19

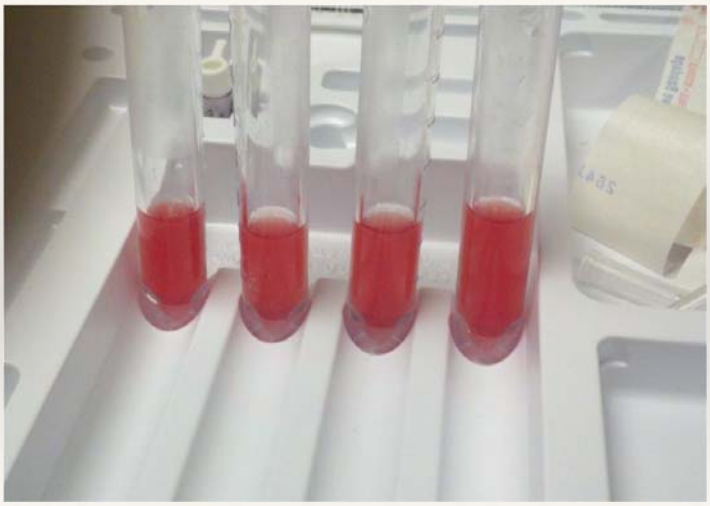
The magic number is:

<2000 x 10^6

(and no xanthochromia)

20

# Can we avoid this?

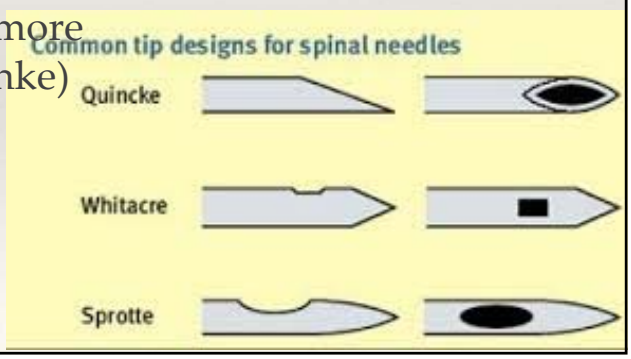


sinaiem.org

21

# Needle choice

- SMALLER is better
- pencil point (Whittacre) or blunt tip atraumatic (Sprotte) (both are more expensive then quinke)




www.aci.health.nsw.gov.au

22

Wolters Kluwer Medicine®
Home Search Submit a Manuscript
Medicine (Baltimore). 2017 Apr; 96(14): e6527. PMCID: PMC5411200
Published online 2017 Apr 7. doi: 10.1097/MD.0000000000006527 PMID: 28383416

Comparison of cutting and pencil-point spinal needle in spinal anesthesia regarding postdural puncture headache
A meta-analysis

Hong Xu, MD, Yang Liu, MD, WenYe Song, MD, ShunLi Kan, MD, FeiFei Liu, MD, Di Zhang, MD, GuangZhi Ning, PhD,* and ShiQing Feng, PhD*

23

# Sprotte Introducers

- need it to prevent bending
- can use 18 gauge needle if no introducers in kit

www.medline.com

24

## Ok, so we've LP'd…

- if no visible xanthochromia and RBC in last tube <2000 x 10^6/L low risk unless "ultra high risk"
- if over 2000 x 10^6/L -> **CT ANGIO**
- if xanthochromia -> SAH

25

## CTA: The new kid on the block (sort of)

- Advantages:
  - easy to do
  - can ID other etiologies of HA
  - less invasive
  - ??avoid LP

26

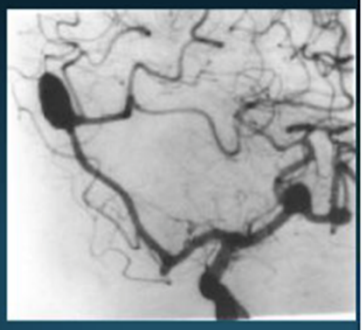
# AAEM

| Approach | Benefits | Risks |
|---|---|---|
| CT plus LP (lumbar puncture or "spinal tap") | Well known performance (rules out disease well) | Pain, headache, small risk of serious complications, possibly test will not give diagnostic results (traumatic tap), radiation from CT scan, additional time to await results from LP |
| CT alone | Simple, quick, likely performs well within 6 hours of headache onset | Does not exclude aneurysm, radiation, may not pick up older (a headache that started 24 hours ago or more) blood well. |
| CT plus CTA | Reliably identifies aneurysms (can rule out disease well) | More radiation, IV contrast, time, cost. May identify aneurysms or other findings that have nothing to do with headache and lead to additional testing or surgeries that aren't needed |

27

## When to Order Cerebral Angiography (CTA)

- Clear evidence does not exist!
- 1% - 5% of the general population has a cerebral aneurysm
- Most aneurysms will never cause harm, treating them may result in stroke or other surgical harms



**My Suggestion:**

- If CSF is "high risk" or patient is "ultra high risk" without completely normal LP get CTA
- If there is a time lag > 1 week or there is a contraindication to LP get CTA
- If the CT is positive order CTA
- All other cases do not order due to incidental aneurysms

28

# Summary:

- when evaluating patients initially, consider using ottawa SAH rule: CT HEAD ->if negative, were done
- CT is first step, can consider definitive <6h in *most* patients
- LP is next step -> atraumatic technique
- CTA if SAH diagnosed or if LP > 2000 x 10^6/L (or super high risk)

29

PgAhVj8IMKHT %2Farticles%2F

30

ABCDEFG…and get them out!

31

## Airway

- considerations:
  - indications
  - assume increased ICP and use a neuroprotective approach
    - AVOID hypotension
    - AVOID increased ICP
    - Drug choice

AIME

32

# Airway - ICP management

- a successful airway is not just about the tube, its about the CPP, or specifically in SAH -> avoiding REBLEED
- CPP = MAP -ICP

33

# Airway

- Drug choice:
  - ketamine ok! Etomidate is another good choice (propofol and midaz are more likely to drop BP, not first choice)
  - pretreatment with lidocaine, succinylcholine, rocuronium NOT helpful
  - consider prophylactic antiemetic

34

# Breathing - ICP management

- aim for: NORMOXIA and NORMOCARBIA
  - Target PaCO2 ~35 (lower end of normal)

35

# Circulation

- same as in our airway, we want to avoid extremes that may cause a rebleed
- generally target systolic <140-160

lifeinthefastlane.com

36

# D, E, F and G

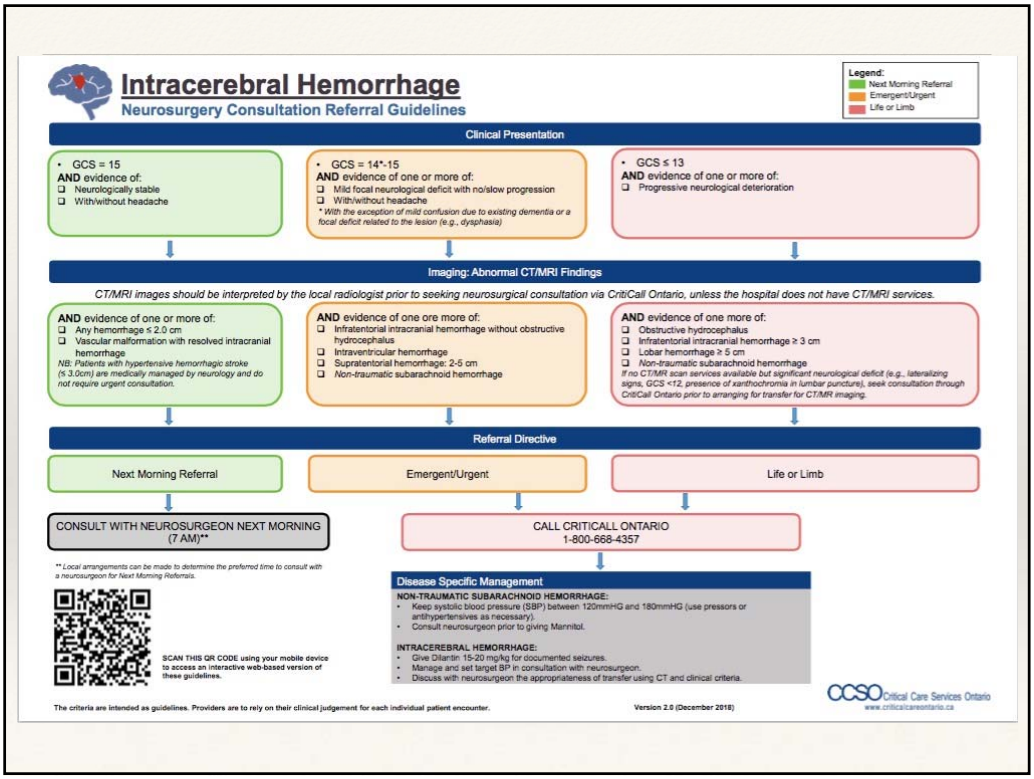
- Disability: GCS, neuro deficits
  - serial neurovitals!
- Environment: avoid hyper or hypothermia
- Fast exam - if traumatic SAH
- Glucose - maintain normoglycemia

37

# Now what…

- analgesia and sedation (and that antiemetic)
- seizure prophylaxis??

38




39

# Complications

- **REBLEEDING** - 5-10% in first 72hours, 80% death/disability rate
- seizure
- other:
  - vasospasm
  - hyponatremia
  - pulmonary edema - cardiogenic or neurogenic

lifeinthefastlane.com

40

# Prognosis

- mortality ~35%
- 15% die prior to reaching hospital
- 8-20% long term dependence

41

# Prognosis

- most important prognostic factors:
  - age
  - LOC and neurologic grade on initial presentation
  - amount of blood on initial CT head

42

# Prognosis

**Hunt – Hess Scale + Survival**

| | | |
|---|---|---|
| 1 | Asymptomatic / mild headache | 70% |
| 2 | Moderate / severe headache; neck stiffness +/or cranial nerve palsy | 60% |
| 3 | Altered mental status +/- mild focal neurological deficits | 50% |
| 4 | Reduced GCS +/or hemiplegia | 20% |
| 5 | Coma or decerberate posturing | 10% |

**World Federation of Neurological Surgeons scale:**

| | |
|---|---|
| Grade 1 | GCS 15 |
| Grade 2 | GCS of 13-14 |
| Grade 3 | GCS of 13-14 + motor deficit present |
| Grade 4 | GCS of 7-12 |
| Grade 5 | GCS of 3-6 |

43

# Modifiable factors:

- rebleeding
- fever
- seizures
- anemia
- vasospasm
- hyperglycemia
- infection
- treatment at neurosurgical centres with IR services

44

What is my comfort level with identifying the patients that need a workup for SAH?

45

When working up SAH, how comfortable am I with knowing when CT, LP, MRA, CTA are needed?

46

In my patient with SAH, am I aware of the complications that can arise?

How comfortable am I managing them?

47


48