Obstetric, intra- and peri-partum neurology

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10 years epilepsy-antenatal clinic
now ‘neurology’ antenatal clinic
Helped write green top guidelines for management of epilepsy in pregnancy
Delivered a clinic trial of therapeutic drug monitoring in pregnant women with epilepsy
Medico-legal work
Maternal Mortality in the UK

1952-54


90 per 100,000 maternities

2010-12

Maternal, Newborn and Infant Clinical Outcome Review Programme

10 per 100,000 maternities

2011-13

Maternal, Newborn and Infant Clinical Outcome Review Programme

9 per 100,000 maternities
Causes of maternal death 2011-13

Dark bars show indirect causes, pale bars direct causes.
Neurology

Epilepsy:
14 deaths
0.4 per 100000 maternities

Stroke:
26 deaths
Mostly haemorrhagic
0.75 per 100000
Further reading

- Headache in the over 12
  https://www.nice.org.uk/guidance/cg150
Key principles as a physician

• Obstetrics have a great deal of experience managing neurology emergencies in pregnancy - joint working and problem solving
• Your training and expertise in managing neurological problems broadly transfers into management in pregnant women
• I have never managed eclampsia...
Neurological disease in pregnancy

• Acute neurological symptoms in pregnant and postpartum women could be caused by exacerbation of a pre-existing neurological condition (MS/ EP/ PD)
• The initial presentation of a non-pregnancy-related problem (ie tumour)
• or a new acute-onset neurological problem that is either unique to or occurs with increased frequency during or just after pregnancy.
• Pregnant and postpartum patients with headache and neurological symptoms are often diagnosed with pre-eclampsia; however, a range of other causes must also be considered,
Case

- Phone call thru pm – women 26 weeks pregnant with a headache - 3 days
- Seen in clinic (BWH) following morning
- ‘sitting down sudden hit to back of head’ headache present 3 days
- No signs
- Plan?
Case

- Phone call Thursday pm – women 26 weeks pregnant with a headache- 3 days
- Seen in clinic (BWH) following morning
- ‘sitting down sudden hit to back of head’ headache present 3 days
- No signs
- Plan?
- THE COMMONEST CAUSE NEUROLOGICAL RELATED MATERNAL DEATH is SAH
Case 2 ‘made up’

- 37 female
- Long Hx of anxiety and depression, prev impulsive OD. Occasional panic attacks on SSRI- multiple GP attendances with such symptoms last 15 years.
- Migraine without aura since teenage years
- 2008- stress admitted AMU with migraine headache not settled after 7 days- CT head normal, responded to oral steroids.
- 2016- presented to GP, self reported ‘migraine’ and panic attacks 3 days before
Case 2

- Several GP attendances with headache- prescribed oral steroids no response
- Admitted to AMU 15/40 gestation
- A/E- referred medics- AMU- headache onset 10 Mins with panic attack, now 20 days previously.
- AMU- pain was bilateral, no signs/ now LT side pain only, seen post-take round , referred neurology- migraine advise given.
- No imaging. Bloods normal / BP 140/75/ afebrile/ ‘well’
- Comments?
Case continued

- 20 days later
- Collapsed at home - RIP CT head - catastrophic SAH
- Post mortem 5mm Lt MCA aneurysm
- Evidence of previous hemorrhage....
case

- 32f
- Delivered NVD healthy live female 24 hours previously
- Usually well
- Hx pregnancy induced hypertension
- Thyroxin for hypothyroidism
- Non functioning pituitary macro adenoma known 5 years, non progressive and asymptomatic.
- Obstetric phone call- ‘complaining of sudden onset headache and blurred vision/ and double vision.’
- CT head normal..?
- Advise?
Pituitary apoplexy
Case

- 25-year-old woman who was 34 weeks pregnant and developed abrupt onset headaches and blurring of vision.
Thunderclap headache

The diagram outlines a diagnostic flow for Thunderclap headache, starting with a CT scan.

- If positive, it leads to:
  - Subarachnoid haemorrhage
    - Stroke
    - CVST
    - Pituitary apoplexy
    - Retroclival haematoma
    - PRES

- If negative, it leads to a lumbar puncture.
  - If positive, it leads to:
    - Subarachnoid haemorrhage
  - If negative, it leads to an MRI.
    - If positive, it leads to:
      - Stroke
      - SIH
      - Pituitary apoplexy
      - Retroclival haematoma
      - PRES
    - If negative, it leads to:
      - Magnetic resonance angiography or magnetic resonance venography
        - If positive, it leads to:
          - Aneurysm
          - CVST
          - Dissection
          - RCVS
        - If negative, it leads to Primary TCH.

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algorithm for pregnant and post partum acute neurological symptoms

A. Pregnant and post-partum women with acute neurological symptoms

- Are they identical to pre-pregnancy neurological symptoms?
  - Yes
    - Treat as before, and carefully monitor response

  - No
    - Isolated headache?
      - No
        - Headache plus seizures, visual symptoms, motor deficits, or altered consciousness or neurological signs
          - Symptoms and signs consistent with typical prepartum eclampsia?
            - No or post partum
              - Yes
                - Go to part C
              - Isolated headache?
                - No
                  - Go to part B
            - Yes
              - Go to part B

- Additional considerations for post-partum patients
  - Primary headache is still the most common cause
  - If a spinal anaesthetic was used, consider postdural puncture headache (or subdural haematoma complicating postdural puncture headache)
  - Eclampsia can occur up to 6 weeks post partum
  - Non-contrast brain CT or MRI
  - Do lumbar puncture

B. Pregnant and post-partum women with isolated headache

- Symptoms identical to pre-existing primary headache syndrome or compatible with pure pre-eclampsia or postdural puncture headache?
  - Yes
    - Red flags
      - Is this a thunderclap headache, or one that is new, unusual, or unique to the patient?
      - Is there a change in headache pattern for this patient?
      - Does the patient have previous cerebrovascular disease?
      - Is the blood pressure raised?

  - No
    - Treat likely cause and monitor response

C. Patients with other neurological symptoms or signs (with or without headache and not thought to be pure eclampsia), or eclamptic patients not responding to treatment

- Appropriate consultations
  - Neurology and obstetrics
  - In some cases: critical care, neurosurgery, haematology, or endocrinology
  - Consider transfer to speciality centre

- Advanced neuroimaging
  - Most of these patients will need both brain and cerebrovascular imaging by MRI

- Differential diagnosis
  - Eclampsia
  - CVT
  - Stroke (infarct or haemorrhage)
  - SAH
  - RCVS
  - PRES
  - Subdural haematoma
  - Rare conditions
    - Choriocarcinoma
    - Amniotic fluid embolism
    - Pituitary apoplexy
    - Thrombotic thrombocytopenic purpura
    - Wernicke's encephalopathy

- Further imaging and treatment based on lumbar puncture results

- Other steps
  - Laboratory tests including complete blood count, platelet count, uric acid, and liver function tests
  - MRA/CTA might be falsely negative early in RCVS
  - Discuss with radiologist to perform the correct sequences
Right neck pain 36 weeks gestation. CT head normal.
Magnetic resonance angiography confirming a right internal carotid dissection.
Magnetic resonance angiography showing a false aneurysm (arrow) and intramural thrombus.
27 Female - 8 days post-partum
Sudden onset headache and single seizure
Co severe headache, sleepy, papilloedema

Gustavo Saposnik et al. Stroke. 2011;42:1158-1192

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Management

• With significant hemorrhagic transformation
Case

- 19 primip
- Childhood epilepsy off treatment 10 years attack free
- 3 admissions with Vomiting, IV hydration.. Lost 2 stone
- Presents 15 weeks gestation
- Urinary symptoms – dysuria, urgency, fever 24h
- Admitted medical unit confused, unwell
- Fever 38.8 WCC 21 Ur 15 creatine 120.. LFTs normal
- Urine dipstick + wccs++++/ nitrates++
- DX- Urinary sepsis-
- Comments?
Case continued

- 24h after admission
- Conscious level reduced GCS eyes open speech/ confused localizing pain only
- Double vision/ in-coordinated
- OE divergent squint
- .. MRI attempted – unable to lie still
- CT head normal
- Comments?
Diagnosis??

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Delivering the best in care
Neurological symptoms and eclampsia

- Common - headache, blurred vision, seizures.
- Joint management with obstetric colleagues.
Case

- 41 F
- Delivered health male 24 hours previous
- Induced 38 weeks, mild proteinuria BP 140/100
- Noted by midwifes in the morning to be agitated, confused, unable to see, mild headache
- Obstetrics- bp now 130/70, no oedema / LFTs normal/ no proteinuria. Afebrile
- CT head normal
- Plan and diagnosis…?
Posterior reversible encephalopathy syndrome
Ischaemic Stroke

Rare
0.03 per 100,000 maternities

Neither pregnancy, caesarean section delivery nor the immediate post-partum state are absolute contraindications to thrombolysis (intravenous or intra-arterial), clot retrieval or craniectomy.
Case 1

- Weak leg 2 weeks postpartum plus headache
- Migraine diagnosed!
- 6 hours later exacerbation
- Left MCA infarct
- No tPA
- No craniectomy
KEY MESSAGES

- Pregnancy should not alter the standard of care for stroke.
- All women, pregnant or not, should be admitted to a Hyperacute Stroke Unit.
- Neurological examination including assessment for neck stiffness is mandatory in all new onset headaches or headache with atypical features, particularly focal symptoms.
- Neither pregnancy, caesarean section delivery nor the immediate post-partum state are absolute contraindications to thrombolysis (intravenous or intra-arterial), clot retrieval or craniectomy.
Epilepsy

- Epilepsy commonest serious neurological disease
- 1% of UK population
- Suggestion that seizure related deaths (inc SUDEP) more common in pregnant women
- Previous reports expressed concern regarding use of lamotrigine in pregnant women
- Mortality 0.4 per 100000 pregnancies
Epilepsy

- The death rate from epilepsy in pregnancy (0.40 per 100,000) is now higher than the death rate from hypertensive disorders in pregnancy (0.38 per 100,000)
Pre-conception counselling

- NICE guidance makes strong recommendation that pre-conception counselling for all women and girls of childbearing age
- Lack of evidence that this available to women that died
- Multi-disciplinary approach required – it’s everyone’s responsibility
- Opportunistic value of counselling for future pregnancies
case

- 28 female, from Indian subcontinent 8 years ago. Presents at ‘fitting’ 39/40 gestation
- 2 previous live births one, 1 cardiac surgery and modest LD, maternity care at another hospital. Tx valproate 1200mg daily, lamotrigine 300mg daily/ levetiracetam 3000 mg daily.
- No record of previous investigations. Attacks from aged 18 years.. Consisting of violent 4 limb ‘shaking’ thrashing.. Stops emotionally distressed, then restarts can have many – up to 20 over 1 hour…
Good pregnancy care begins at diagnosis and pre-conceptually.
Multi-disciplinary and expert care

- Value of Epilepsy nurse specialists increasingly recognised
- Ideally placed to integrate with a number of different disciplines
- Emphasis on psychosocial outcomes
- Reduce admissions
- Improve medication compliance
- More responsive service
- Epilepsy nurses and other specialists could have been used more effectively for the women that died
Delays in care

- Pregnant women with epilepsy need prompt and responsive epilepsy care, including for new referrals
- Usual out-patient waiting times may not be appropriate
- Other barriers may prevent prompt engagement (chaotic lifestyle, language problems)
- Pregnant women with epilepsy should be seen promptly by an epilepsy specialist as soon as possible
- The specialist could be an epilepsy nurse

A woman with a diagnosis of childhood epilepsy and several years of seizure freedom off medication had a recurrence of tonic clonic seizures in pregnancy. Referral to an epilepsy specialist was made by her GP but she died from drowning associated with a tonic clonic seizure before she was reviewed, several months after her referral. She was not prescribed AEDs
High risk patients

- Women with epilepsy require diligent medical and nursing care during hospital admissions.
- A policy of never nursing women with epilepsy in single rooms may be life saving.
- Medical and nursing teams should always be aware of the potential effects of pregnancy and its complications on a woman’s epilepsy.
- Pregnant women with epilepsy are still not routinely identified as a high risk group, both in outpatient and inpatient settings.

A woman with epilepsy was admitted to hospital in early pregnancy with hyperemesis gravidarum. She was placed in a single room. She did not see a senior doctor for the entire 5 day admission. She did not see any doctor for the 3 days prior to her death. Hypokalaemia was identified but not treated. She died of SUDEP on day 5 of her hospital admission.
Anti-epileptic drugs

- Previous enquiries have demonstrated a relationship between lamotrigine and maternal death.
- Possible co-factors could include epilepsy syndrome, falls in lamotrigine levels during pregnancy, or direct effect of the drug itself.
- This report does not demonstrate such a strong relationship as in previous reports.
- Greater understanding of metabolism and effects of AEDs in pregnancy required.
- EMPIRE study results awaited.
Sudden Unexplained Death in Epilepsy (SUDEP)

- SUDEP remains predominant cause of death in epilepsy
- Antenatal and postpartum
- Estimated risk of SUDEP higher than expected in pregnancy than expected
- Women and their families should be expressly counselled regarding risk
- Modifiable factors (first aid, recovery position, not sleeping alone, AED compliance) should addressed, including in the post-partum period
Bathing and drowning

- Death by drowning still occurs
- 2 deaths in this series due to drowning (including one washing hair over edge of bath)
- Entirely preventable
- All women need robust advice regarding risks of bathing

A woman was found kneeling on the bathroom floor having drowned with her head in a bath of water.

She had been washing her hair, and showed signs of having had a generalised seizure.
Consensus

- Lack of consensus on how epilepsy care can and should be provided
- Obstetric, neurology and primary care have different priorities
- Can’t move forward without agreeing what best care should look like
- Basis on which to commission appropriate services
Case

- 25 female, focal Temporal lobe epilepsy several admissions with seizures, on CBZ 600mg bd/ LEV 1500mg bd
- Now 39 weeks.. Planned induction 3 days away..
- Admitted with 2 further Tonic-clonic seizures
- Plan?
Further Reading: Diagnosis of acute neurological emergencies in pregnant and post-partum women

Prof Jonathan A Edlow, MD, Prof Louis R Caplan, MD, Karen O’Brien, MD, Carrie D Tibbles, MD

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Thank You