Standardisation of multidisciplinary obstetric emergency training nationally.
Eclampsia

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Outline

- Purpose and scope
  - Definition
  - Incidence
- Current guidelines- national and international
  - Management
  - Quality standards
Purpose and scope

- Appreciation of the morbidity and mortality associated with eclampsia
- Appreciation of complexity
- Review of international best practice and our national guideline
- What next?
Definition

- Eclampsia is defined as seizure activity unrelated to other cerebral conditions in a pregnant woman with pre-eclampsia.

- Greek εκ/ec(=forth)+λάμπω/lampo(=to shine)

- Literally meaning: shine forth

- Coined: In 1619 in treatise on gynaecology of Varandaeus who based upon the flashing lights or spots before the eyes of pregnant women with pre-eclampsia
Incidence
Incidence

- 287,000 maternal deaths occurred in 2010\(^1\)
- Hypertensive disorders of pregnancy account for nearly 18% of all maternal deaths world-wide, with an estimated 62,000–77,000 deaths per year\(^2\)
- **Eclampsia** complicates 0.28% of pregnancies in low resource settings\(^3\) cf 2.7 cases per 10,000 maternities in the UK\(^4\) (Incidence in 1992 4.9 per 10,000 95% CI 4.5-5.4)\(^5\)

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Incidence

- 0.2 per 1000 maternities in Ireland (12 cases within the report)
- Compares favorably with 2005 figures from UK of 0.27 per 1000 maternities
Pathophysiology

- cerebral vasoconstriction or vasospasm
- hypertensive encephalopathy
- cerebral oedema or infarction
- cerebral haemorrhage
- metabolic encephalopathy
Early detection: presentation

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Douglas and Redman&lt;sup&gt;3&lt;/sup&gt; (N = 325)</th>
<th>Katz et al&lt;sup&gt;7&lt;/sup&gt; (N = 53)</th>
<th>Chames et al&lt;sup&gt;8&lt;/sup&gt; (N = 89)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headache</td>
<td>50</td>
<td>64</td>
<td>70</td>
</tr>
<tr>
<td>Visual changes</td>
<td>19</td>
<td>32</td>
<td>30</td>
</tr>
<tr>
<td>RUQ/epigastric pain</td>
<td>19</td>
<td>Not reported</td>
<td>12</td>
</tr>
<tr>
<td>At least one of the above</td>
<td>59</td>
<td>Not reported</td>
<td>75</td>
</tr>
</tbody>
</table>

RUQ, right upper quadrant.
Data are presented as percentage.
Early detection: presentation

Most common prodromal neurological symptoms (regardless of the degree of hypertension OR whether the seizure occurred antepartum or postpartum):

• Headaches (80%)
• Visual disturbance (45%)
• 20% of women with eclampsia reported no neurologic symptoms before the seizure

## Early detection: timing

<table>
<thead>
<tr>
<th>Study</th>
<th>Antepartum</th>
<th>Intrapartum</th>
<th>Postpartum</th>
<th>≤ 48 h</th>
<th>&gt; 48 h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Douglas and Redman(^3) (N = 383)</td>
<td>38</td>
<td>53</td>
<td>44</td>
<td>39</td>
<td>5</td>
</tr>
<tr>
<td>Katz et al(^7) (N = 53)</td>
<td>53</td>
<td>36</td>
<td>11</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Mattar and Sibai(^6) (N = 399)</td>
<td>53</td>
<td>19</td>
<td>28</td>
<td>11</td>
<td>17</td>
</tr>
<tr>
<td>Chames et al(^8) (N = 89)</td>
<td>67*</td>
<td>. . .</td>
<td>33</td>
<td>7</td>
<td>26</td>
</tr>
</tbody>
</table>

Data are presented as percentage.
* Includes antepartum and intrapartum cases.
Mortality

• Maternal mortality from eclampsia ranges from approximately 1% in the developed world, to as high as 15% in the developing world

• BUT….mortality is the tip of the iceberg
  ▫ The UK eclampsia population based study (Knight 2005) revealed that the perinatal mortality rate for babies still in utero at the onset of convulsions was nearly 6%
  ▫ The long term maternal consequences of pre-eclampsia and eclampsia in particular are not well quantified
Standards of care: CMACE 2011

- Remains 2nd most common cause of Direct Death – rate unchanged over last 2 reports
- 22 deaths (including 3 from AFLP)
- 9 due to intracranial haemorrhage directly related to uncontrolled blood pressure
- 5 after eclamptic fit
- 3 from cardiac arrest post fit and 2 unknown cause
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Standards of care: CMACE 2011

- 20 of the 22 cases demonstrated substandard care
- In 14 cases this was classed as ‘major’
- “There were, undoubtedly, avoidable deaths”
Maternal near-miss cases were:
- eight times more frequent in women with pre-eclampsia
- increased to up to 60 times in women with eclampsia, when compared with women without these conditions

Standards of care: World Health Organization Multicountry Survey on Maternal and Newborn Health
Management
Clinical practice guidelines

- National Institute for Health and Clinical Excellence (NICE, UK), “Hypertension in Pregnancy”

- Revised January 2011
Clinical practice guidelines

• The American College of Obstetricians and Gynecologists “Hypertension in Pregnancy”

• Published 2013
Clinical practice guidelines

- Published 2008
Clinical practice guidelines

- HSE & Institute of Obstetricians and Gynaecologist’s Guideline on “The Diagnosis and Management of Pre-eclampsia and Eclampsia”

- Published September 2011
Management: basic algorithm

1. Do Not Leave Patient Alone
2. Airway
3. Breathing
4. Circulation
5. Control seizures
6. Control hypertension
7. Deliver
Do not leave the patient alone

- Place in semi-prone position
- Call for HELP – duty obstetric and anaesthetic SpRs; senior midwife
- Inform consultants – obstetrician and anaesthetist
Airway

• Assess
• Maintain patency
• Apply oxygen
Breathing

- Assess
- Protect airway
- Ventilate as required
Circulation

- Evaluate pulse and BP
- If absent, initiate CPR and call the arrest team
- Secure IV access as soon as safely possible
Control seizures

• To avoid drug prescription and administration errors, magnesium sulphate should be administered in pre-mixed solutions.
• Loading dose: Magnesium sulphate 4g in 50ml intravenously over 10 minutes
• Maintenance dose: Magnesium sulphate 20g in 500ml via a volumetric pump at 25ml/hour (i.e. 1g/hour of magnesium sulphate)
Magnesium sulphate: monitoring

- Formal clinical review should occur at least every 4 hours.
- Hourly IMEWS (Irish Maternity Early Warning System) should be recorded with the following additional observations performed:
  1. Continuous pulse oximetry (alert anaesthetist if $O_2$ sat<95%)
  2. Hourly urine output
  3. Deep tendon reflexes (every 4 hours)
Magnesium sulphate: toxicity

- Check magnesium levels and review management with consultant if:
- Urine output < 100 ml in 4 hours or/if deep tendon reflexes are absent
  or/if respiratory rate < 12/minute or/if oxygen saturation < 90%
Levels at which magnesium sulphate toxicity occur

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>MgSO₄ level (mmol/l)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feeling of warmth, flushing, double vision, slurred speech</td>
<td>3.8–5.0</td>
</tr>
<tr>
<td>Loss of tendon reflexes</td>
<td>&gt; 5.0</td>
</tr>
<tr>
<td>Respiratory depression</td>
<td>&gt; 6.0</td>
</tr>
<tr>
<td>Respiratory arrest</td>
<td>6.3–7.0</td>
</tr>
<tr>
<td>Cardiac arrest</td>
<td>&gt; 12.0</td>
</tr>
</tbody>
</table>
Magnesium sulphate: toxicity

- The antidote is 10ml 10% calcium gluconate given slowly intravenously
Control hypertension

- Treat hypertension if systolic BP > 160 mmHg or diastolic BP > 105 mmHg or MAP >125 mmHg
- Aim to reduce BP to around 130–140/90–100 mmHg
- Beware maternal hypotension and FHR abnormalities – monitor FHR with continuous CTG

Do not leave patient alone
- Airway
- Breathing
- Circulation
- Control seizures
- Control hypertension
- Deliver
Antihypertensive 1st choice

- Labetalol 50mg (10ml of labetalol 5mg/ml) IV slowly
- If necessary repeat after 20 minutes
- Or commence infusion of labetalol 5mg/ml at a rate of 4ml/hour (20mg/hour) via a syringe pump
- Doubled every half hour to a maximum of 32ml/hour (160mg)/hour until the blood pressure has dropped and stabilised at an acceptable level
Antihypertensive 2nd choice

- Hydralazine as a bolus infusion 2.5 mg over 5 minutes
- Can be repeated every 20 minutes to a maximum dose of 20 mgs.
- Or an infusion of 40mg of hydralazine in 40 mls of normal saline run at 1-5ml/hr (1-5mg/hr)

1. Do not leave patient alone
2. Airway
3. Breathing
4. Circulation
5. Control seizures
6. Control hypertension
7. Deliver
Antihypertensive 3\textsuperscript{rd} choice

- Nifedipine should NOT be given sublingually to a woman with hypertension. Profound hypotension can occur with concomitant use of nifedipine and parenteral magnesium sulphate and therefore nifedipine should be prescribed with caution in women with severe pre-eclampsia.
Delivery

“The delivery should be well planned, done on the best day, performed in the best place, by the best route and with the best support team”
Delivery

- The continuation of pregnancy is not an option if eclampsia occurs
- **STABILISE THE MOTHER BEFORE DELIVERY**
- **DELIVERY IS A TEAM EFFORT** involving obstetricians, midwives, anaesthetists and paediatricians
- Ergometrine should not be used in severe pre-eclampsia and eclampsia
- Consider prophylaxis against thromboembolism
- Maintain vigilance as the majority of eclamptic seizures occur after delivery
Blood Tests

Blood should be sent for:
- Serum electrolytes
- Liver function tests
- Full Blood count
- Clotting *
- Group and save serum

All tests should be checked daily or more frequently if abnormal
*questionable in the presence of a normal platelet count
Prevention of Eclampsia

- Magpie Trial Collaboration Group
  - 58% reduction in seizures
  - 45% reduction in maternal death*
  - 33% reduction in placental abruption

*The 45% reduction in maternal death is not statistically significant but clinically important

Do women with pre-eclampsia, and their babies, benefit from magnesium sulphate?

- Magpie Trial Collaboration Group
  - 58% reduction in seizures
  - 45% reduction in maternal death*
  - 33% reduction in placental abruption

*The 45% reduction in maternal death is not statistically significant but clinically important

Practical skills & drills elements

- Eclampsia is rare and complex
- With an estimated incidence of 2.7 cases per 10,000 maternities, each of the busiest 4 hospitals in Ireland will each expect to see 2-4 cases per annum
- Drills are essential!
Practical skills & drills elements

• Use of pre-eclampsia-specific checklists, team training and communication strategies, and continuous process improvement strategies will likely reduce hypertensive related morbidity

• Use of patient education strategies, targeted to the educational level of the patients, is essential for increasing patient awareness of signs and symptoms of pre-eclampsia
Practical skills & drills elements

- Eclampsia Box
  - Loading dose of magnesium sulphate
  - Maintenance dose of magnesium sulphate
  - Cannulas, giving sets, tape etc.
Resources

- MOET
- PROMPT
- ALSO
- High fidelity simulations are the gold standard
- Low fidelity solutions can save lives
Summary

• Fitting in the second half of pregnancy or post partum is eclampsia until proven otherwise
• Eclampsia is rare but carries a high fatality rate for mother (and baby)
• It frequently occurs post partum and can occur in the absence of classic symptoms and signs
• A high index of suspicion is needed
• MgSO$_4$ saves lives- use it
• Uncontrolled systolic blood pressure is the leading causes of death- do not ignore it!
Looking forward

If you do only one (three!) thing(s) when you return to your unit:

- Read the HSE/Institute guideline- it’s about to be revised- your feedback is essential!
- Check (construct?) your eclampsia box
- Drill, drill and drill again