Approach to Brief Resolved Unexplained Events (BRUEs) in Infancy

Part 1

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Learning Objectives

- Part 1
  1. Describe the clinical presentation of a BRUE
  2. Develop a differential diagnosis of these events based on etiology
  3. Discuss key considerations for history and physical examination

- Part 2
  1. List appropriate investigations for a BRUE
  2. Outline key points in the management of a BRUE

Case

Clinical Features of BRUE

- BRUE stands for brief resolved unexplained event

- Diagnostic criteria:
  - Infant must be <1 year old
  - Episode must be sudden, brief, and now resolved
  - Event is characterized by at least one of the following features:
    - Cyanosis or pallor
    - Absent, decreased, or irregular breathing
    - Change in muscle tone, either hyper or hypotonia, or
    - Altered level of responsiveness

- BRUE is a diagnosis of exclusion

BRUEs vs. ALTEs

- BRUEs were formerly known as apparent life-threatening events (ALTEs)

- The term ALTE was problematic:
  - Was broad and included nonspecific symptoms
  - Implied concern for a child's life being at risk
    - Led to non-effective investigations or hospitalizations
    - Reinforced parental anxiety

BRUEs vs. ALTEs

- In 2016 the American Academy of Pediatrics released new guidelines for these types of episodes

- The new guidelines on BRUEs:
  - Outline more precise diagnostic criteria
  - Outline a strategy for identifying higher and lower risk patients
  - Recommend how to investigate and manage BRUEs

BRUES vs. SIDS

- Before the terms of BRUE or ALTE existed, these events were called “near-miss SIDS” or “aborted crib deaths”
- These terms are no longer used
- Currently, there is no clear association between BRUEs and Sudden Infant Death Syndrome (SIDS)
  - BRUEs are not a risk factor for SIDS
  - BRUEs are not a precursor to SIDS

Differential Diagnosis for Frightening Episodes

- Common causes:
  - Idiopathic
  - Gastroesophageal reflux
  - Respiratory infections
  - Seizure

- More rare causes:
  - Airway issues
  - Bacterial infections
  - Cardiac
  - Child abuse
  - Congenital abnormalities
  - Drugs and toxins
  - Gastrointestinal
  - Inborn errors of metabolism
  - Metabolic and endocrine
  - Neurologic
  - Respiratory

Differential Diagnosis for Frightening Episodes

- Remember:
  - BRUE is description of an event; it's not a disease entity in and of itself
  - By definition, BRUEs are unexplained
  - If you discover an explanation for the event, it's not a BRUE

Evaluation of a Possible BRUE

1. History
2. Physical Exam
3. Laboratory and imaging investigations

History

- Make sure you ask about what happened:
  1. Before the event
  2. During the event
  3. After the event

Details of What Happened Before the Event

- What the infant was doing before the event
  - Were they sleeping or awake?
- Where they were
- Whether they were behaving normally
- Timing in relation to a feed
- What made the observer check on the baby

Details of What Happened During the Event

- Level of consciousness
- Breathing efforts
- Colour
- Muscle tone
- Limb and eye movement
- Where it occurred
- How long it lasted

Details of What Happened After the Event

- Whether the infant required intervention
  - Type of measure:
    - Gentle or vigorous stimulation
    - Mouth-to- mouth resuscitation
    - Chest compressions
  - How long it was performed for

- How long the infant took to return to baseline

Other Considerations on History

- Associated symptoms that could suggest a particular etiology (i.e. GERD, respiratory tract infection, seizures)

- Past medical history:
  - Pregnancy and birth histories
  - Recent illness
  - Significant health issues
  - Previous similar events
  - Feeding difficulties
  - Failure to thrive
  - Usual behaviour, sleeping, feeding habits
  - Medications

Other Considerations on History

- Family history:
  - Similar events
  - SIDS
  - Early infant deaths
  - Genetic, metabolic, cardiac, or neurologic conditions.

- Social history:
  - Smoking in home
  - Concerns for non-accidental injury
  - Recent stressors in home
  - Supports in home

Case

Physical Exam

- General appearance
- Return to baseline
  - Any lingering limpness, colour change, or reduced alertness?
- Vital signs
- Height, weight, and head circumference
- Cardiac exam
- Respiratory exam
- Neurological exam
- Developmental assessment.
- Signs of trauma or maltreatment;
  - Observe caregiver's interactions with infant

- *A more detailed list of physical exam considerations can be found in the guidelines*

Case

Summary

1. Clinical presentation of a BRUE
2. Differential diagnosis based on etiology
3. Considerations for history and physical exam

- Be sure to check out the second podcast in this series for an approach to investigating and managing BRUEs!

Approach to Brief Resolved Unexplained Events (BRUEs) in Infancy

Part 2

Learning Objectives

- Part 1
  1. Describe the clinical presentation of a BRUE
  2. Develop a differential diagnosis of these events based on etiology
  3. Discuss key considerations for history and physical examination

- Part 2
  1. List appropriate investigations for a BRUE
  2. Outline key points in the management of a BRUE

Evaluation of a Possible BRUE

1. History
2. Physical Exam
3. Laboratory and imaging investigations
   - Decisions based on risk stratification of events
     - Was it a higher or lower risk event?

Risk Assessment

- Risk assessment means classifying BRUEs as either higher or lower risk events

- Why bother?
  - Helps you figure out which patients are more likely to have a serious condition as the cause of the episode, and possibly more events in the future

- What to consider:
  - History and physical exam findings
  - Event characteristics
  - Patient characteristics

Higher Risk Patients

- An infant could be considered higher risk in one of three ways:

1. If they have concerning features on history or physical exam
   - Signs and symptoms of an underlying condition, or
   - Risk factors predisposing an infant to a serious condition (such as those identified on family history)

2. If the BRUE was a recurrent event, lasted >1 min, or required CPR from a medical provider, or

3. If they are <60 days old or were born <32 weeks gestation (corrected gestational age <45 weeks)

Lower Risk Patients

- Lower risk patients would:
  - Have no concerning features on history and physical exam,
  - Present with a first event which lasted <1 min and didn't require CPR, and
  - Be >60 days old and born at 32 weeks gestation or later (corrected gestational age of at least 45 weeks)

Investigations (Lower Risk Patients)

- In low risk patients:
  - Extensive laboratory or imaging studies are unlikely to be helpful
  - Extensive workup and hospitalization could expose them to unnecessary risk

  - There are guidelines as to what you:
    - Should do
    - May consider
    - Need not do
    - Should not consider

  - The guidelines were designed:
    - In response to these events being over investigated in the past
    - In the interest of providing high value care

Investigations (Lower Risk Patients)

- In low risk patients, you should:
  - Make decisions about evaluation, management and follow-up in partnership with the infant's caregivers
  - Teach caregivers about BRUEs and offer info about CPR training
    - *More to come when we discuss management*

Investigations (Lower Risk Patients)

- In low risk patients, you may:
  - Order pertussis testing if you suspect an infectious cause
  - Order an ECG as part of a cardiac workup
  - Observe infants and monitor oxygen saturations for a short period of time
    - *More to come when we discuss management*

Investigations (Lower Risk Patients)

- In low risk patients, you need not:
  - Order viral respiratory testing or a urinalysis as part of an infectious workup
  - Order blood glucose, serum bicarbonate, or serum lactic acid to check for inborn errors of metabolism
  - Order neuroimaging for suspected child abuse
  - Admit the patient just to receive cardiorespiratory monitoring
    - *More to come when we discuss management*

Investigations (Lower Risk Patients)

- In low risk patients, you should not:
  - Evaluate for anemia based on lab tests
  - Obtain blood work including CBC, electrolytes, renal function, or tests for inborn errors of metabolism
  - Sample CSF to look for a subclinical bacterial infection
  - Order a chest x-ray, blood gases, echocardiogram, or polysomnograph as part of a cardiopulmonary evaluation
  - Order EEG for a neurologic workup
  - Order tests for gastroesophageal reflux
  - Prescribe anti-epileptics or medications for acid suppression; or
  - Send patients home on home apnea monitors
    - *More to come when we discuss management*

Investigations (Higher Risk Patients)

- Higher risk patients:
  - Need more thorough investigations for less common causes
  - Should be worked up based on your degree of clinical suspicion of a concerning underlying etiology
    - Focus on that particular area of concern

Case

Management

- General approach:
  - For low risk patients, management is focused on education
  - If there are signs and symptoms that suggest an underlying etiology, it will involve:
    - Treating the apparent cause
    - Possible inpatient observation
  - In all cases, provide follow-up and support for caregivers

Medical Treatment

- If concerns were identified on history and physical exam:
  - Treat the suspected underlying condition
  - If more events occur despite intervention:
    - Reassess the diagnosis
    - Pursue further investigations as warranted

- If no concerns were identified on history and physical exam:
  - The event is most likely isolated and idiopathic
  - No medical treatment is needed
  - Manage parental anxiety
    - You may consider a brief period of observation

Hospital Admission

- In general, only consider admitting patients who have high risk events
- Once admitted:
  - Regularly assess the infant
  - Monitor their cardiorespiratory function and oxygen saturations
- Regardless of when discharge occurs, arrange close follow-up and support

Hospital Admission

- Infants with lower risk events don't need to be admitted just for cardiorespiratory monitoring

- However, it may be reasonable to admit them for a clearly defined period of time (24-48 hours) if:
  - There is a great deal of parental anxiety
  - Timely outpatient follow-up is not available

- As another option for a lower-risk patient, you can also consider monitoring them for a short amount of time (1-4 hours)
  - Continuous pulse oximetry monitoring and serial observation

Home Apnea Monitoring

- Home apnea monitoring is generally discouraged

- Patients with lower risk events should not receive home cardio-respiratory monitoring
  - It does not seem to improve outcomes
  - It can increase parental anxiety

- Monitoring may be warranted in a small subset of high risk cases
  - This decision would likely be made with a pediatric pulmonary medicine specialist
  - Make sure you provide proper instruction to caregivers

Caregiver Education

- Reassure caregivers that:
  - BRUE does not imply SIDS risk
  - Home monitoring is not preventative and is generally discouraged

- Provide information about:
  - Infant safety, especially safe sleeping practices
  - Appropriate intervention
    - Not shaking infants to revive them if they are unresponsive
  - Basic CPR training
  - Psychosocial supports available to them

Case

Prognosis

- Depends on the underlying cause of the event
  - Infants with more serious underlying causes typically have poorer outcomes
  - For the majority of lower risk patients, there is no reason to believe there will be long-term sequelae

- Given the uncertainty, it can be challenging to counsel caregivers about prognosis

Case

Summary

1. A BRUE is a sudden, brief, and now resolved event in an infant younger than 1 year

- It involves 1 or more of:
  - Cyanosis or pallor
  - Absent, decreased, or irregular breathing
  - Change in muscle tone; or
  - Altered level of responsiveness

- BRUEs remain unexplained after history and physical exam

Summary

2. A wide variety of conditions can manifest as a BRUE

- But remember that in the end, they are unexplained events

Summary

3. A diagnostic workup for an event includes a detailed history and complete physical exam

- Laboratory or imaging investigations may be conducted based on whether the patient meets the criteria for having experienced a lower or higher risk event

- Keep in mind that guidelines recommend against taking certain steps in the cases of low risk events

Summary

4. The management of a BRUE varies

- In higher risk patients where red flags are identified on history and physical exam, management should focus on addressing these
- Inpatient observation may be warranted in some cases
- In all cases it is important to provide education to caregivers

Summary

5. Currently there is no clear association between BRUEs and SIDS

- BRUEs are not thought to lead to or be a risk factor for SIDS
- Home monitoring is generally discouraged
- It is more important to encourage infant CPR training and remind caregivers of safe sleeping practices

Thanks for listening!

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