Rate of shunt revision as a function of age in patients with shunted hydrocephalus due to myelomeningocele

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Background

- Myelomeningocele (MMC) is the most common form of neural tube defect
- Hydrocephalus present in 60-90% of children with myelomeningocele
- Complications of CSF shunts contribute to morbidity and mortality in individuals with MMC

Background

- Young age at first shunt placement is associated with:
  - Increased risk of revision
  - Increased risk of multiple revisions

- Higher risk of revision within 6 months of initial shunt insertion

Suggests a relationship between age and risk of revision

Purpose
Evaluate the burden of shunt revision for a given patient age
Methods

- Multidisciplinary spina bifida clinic
  - Adult: University of Alabama at Birmingham
  - Pediatric: Children’s of Alabama
- Annual visit for all individuals with spinal dysraphism
- 99% are enrolled in the CDC National Spina Bifida Patients Registry (NSBPR)
- Discrete data elements entered into the NSBPR Electronic Medical Record
- All surgeries in past year entered into NSBPR EMR
  - Coordinator interview
  - Chart review
  - Verification with family
Methods

• Identify all patients with MMC and shunted hydrocephalus

• Exclude:
  • Closed spinal dysraphism (lipomyelomeningocele, split cord malformation, dermal sinus tract, etc.)
  • Hydrocephalus treated without shunt (ETV, ETV/CPC)
    • Included if shunted after failed ETV

• Identify each individual incidence of surgical treatment of hydrocephalus
  • Excluded events with no date available

• Identify age at the time of each surgery

• Identify how many patients lived through each year of life

• Calculate revision rate for each year of life
Results

• 655 patients
  • October 2009 to May 2016

• 519 patients with myelomeningocele

• 417 with shunted hydrocephalus
  • 39 shunt revisions without date available (excluded)
Results

Total Revisions in each Year of Life

Revisions

Age (years)
Results
Results
Results

94

417
Results

- First year of life
  - 94 shunt revisions
  - 417 patients at risk
  - 0.23 revisions per patient

- Fewer revisions per year with increasing age
- Increasing revisions per year in teen years
- Continued risk for revisions into middle age
Discussion

- Young age at time of placement is a risk factor for shunt revision

Riva-Cambrin et al.  
JNS:Peds 17(4)382
Discussion

- Young age at time of placement is a risk factor for shunt revision
- Increase in shunt revision frequency in early teen years
Discussion

• Young age at time of placement is a risk factor for shunt revision
• Increase in shunt revision frequency in early teen years
• Adults continue to experience shunt malfunction
Limitations

• Single institution
• Retrospective
• Single hydrocephalus etiology: myelomeningocele
• Assumption:
  • All patients received shunt within the first few months of life
Conclusions

• Risk of shunt failure is highest in the first year of life
• Risk declines with increasing age except in early teen years
• Risk of shunt failure persists into adulthood
Thank You

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