Update on the Treatment of Idiopathic Intracranial Hypertension (IIH)

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Idiopathic Intracranial Hypertension

- Young women (2nd-4th decade)
- Prevalence
  - 1 per 100,000 in general population
  - 3.5 per 100,000 in women aged 20-44
- Pathogenesis unknown
- No evidence of cerebral edema by DTI (BK Owler et al. Br J Neurosurg 20:79-81, 2006)
- Obesity is important risk factor
  - 13 per 100,000 in women >10% over ideal body weight
  - 19 per 100,000 in women >20% over ideal body weight
    - Durcan FJ et al. Arch Neurol, 1988
  - 86% of IIH patients obese; 12% overweight
    - Randhawa S et al. Ophthalmology 114:827, 2007
- Increasing cases in obese/overweight men and children

Obesity in the United States: Definitions

Body Mass Index (BMI): a measure of an adult's weight in relation to height; specifically, the weight in kilograms divided by the square of the height in meters

- Overweight: having a high amount of body fat in relation to lean body mass--BMI = 25-29.9 kg/m2

- Obese: having a very high amount of body fat in relation to lean body mass--BMI = ≥30 kg/m2

Does the Type of Obesity Matter? Are You an Apple or a Pear?

- IIH patients more likely to have gynecoid obesity (pear) than central (or abdominal) obesity (apple)
    - A Kesler et al. Ophthalmology 117:169-174, 2009

Management Alternatives

- Nothing (only if no headache and papilledema mild)
- Analgesics for headache (only if papilledema mild)
- Weight loss
- Acetazolamide (Diamox)
- Other medications (esp Topiramate)
- CPAP/BiPAP for sleep apnea
- Surgery

Treatment of IIH: Weight Loss

- The only consistently effective treatment
- First established in 1970s with Duke “rice diet”
- Loss of 7-10% said to either eliminate condition or speed resolution of papilledema

Johnson LN et al. Ophthalmology 105:2313, 1998
Kupersmith M et al. Neurology 50:1094, 1998

- Need formal program that combines exercise and diet
- Bariatric surgery often successful (but significant risks, including Wernicke encephalopathy)

Sugarman HJ et al. Ann Surg 229:634, 1999
Nadkarni T, et al. J Neurosurg 101:878, 2004
Singh S, Kumar A. Neurology 68:907, 2007

Treatment of IIH: Medical Management

- Acetazolamide (Diamox)
  - First choice
    - Efficacy proven but not consistent
    - Begin with 1 gm per day in divided doses
    - 250 mg qid
    - 500 mg sequels bid
  - May increase to 4 gm per day
    - Tolerance limited by side effects (explain)
    - ?Obtain consent/blood studies (aplastic anemia)
- Furosemide (Lasix)
  - Efficacy proven but less effective than Diamox
    - May be additive
- Corticosteroids
  - Generally not indicated
    - Often exacerbates obesity and hypertension
    - ?Helpful for PTC in association with venous sinus thrombosis
- Topiramate
  - Improves headache
    - Appetite suppressant
    - Reduces CSF production
      - Pagan FL et al. Headache 42:695, 2002
- *Concern about teratogenicity (oral clefts)
  - Hunt S et al. Neurology 71:272, 2008

IIH: Surgical Management

- For patients with evidence of optic neuropathy at presentation (must act fast!)
- For patients who develop evidence of optic neuropathy despite maximum medical therapy
- For patients whose papilledema and/or symptoms worsen despite maximum medical therapy
- For patients who can't tolerate or won't take medical therapy

Surgical Options

- Subtemporal decompression
- Ventriculoatrial or ventriculoperitoneal shunt
- Lumboperitoneal shunt
- Optic nerve sheath fenestration
- Venous sinus stenting

Subtemporal Decompression

- Bicoronal incision or bilateral incisions behind the hairline
- Removal of bone from both temporal fossae
- Dura remains intact

Subtemporal Decompression

Advantages

- Almost always effective
- Effect is immediate
- No foreign material to become infected
- Cannot become obstructed
- No risk to vision

Disadvantages

- Risk of infection
- Risk of dural tear
- Risk of hemorrhage

Ventriculo-Atrial/Peritoneal Shunt

Advantages

- Straightforward procedure
- Highly effective in reducing ICP
- Highly effective in reducing headache unless sx longstanding (>2 yrs)
- Less likelihood of tonsillar herniation
- VA shunt better because no risk of fat obstruction
  - **Bynke G et al. Neurology 63:1314-1316, 2004.**
  - **McGirt MJ et al. J Neurosurg 101:627-632, 2004**.
  - **Garton JHL. J Neuro-Ophthalmol 24:146-155, 2004.**

Disadvantages

- Must be performed with stereotactic apparatus
- Potential for cerebral injury (eg, intracranial or intraventricular hemorrhage)
- Potential for malposition of proximal shunt catheter
- Infection risk
- Failure to function normally (44%) but better than LP shunts (86%)

Lumboperitoneal Shunt

Advantages

- Treats increased pressure directly
- No (little) risk to visual function
- Can be performed under general or regional anesthesia
- New valves offer improved predictability

Disadvantages

- Some studies show failure rate of 60% over 5 years
- Revisions common (2.5/pt in some series)
- Infection risk
- Low pressure risk
- Tonsillar herniation risk

Optic Nerve Sheath Fenestration

Advantages

- Can be performed by ophthalmologist
- Immediate effect on vision
- Eliminates pressure on optic nerve without need for implantation of foreign material
- May lower intracranial pressure (resolution of contralateral papilledema)

Disadvantages

- Risk to vision
- Loss of visual acuity/field (CRAO, CRVO, ON)
- Diplopia
- Does not necessarily reduce intracranial pressure
- Failure rate quite high over time (PTC is a chronic disease)

Venous Sinus Stenting

- Increasing evidence for venous sinus stenosis in presumed idiopathic intracranial hypertension

- May be cause or effect of increased ICP (chicken or egg?)
    - **Simister R et al. J Neurol 255:601, 2008**

- Multiple series report resolution of papilledema and headache with normalization of ICP after stenting
    - Higgins JN et al. JNNP 74:1662-1666, 2003
    - **Owler BK et al. J NS 98:1045-1055, 2003**
    - **Donnet A et al. Neurology 70:641-647, 2008***
    - Bussière M et al. AJNR 31:645-650, 2010

- Multiple reports of disappearance of stenosis after lowering ICP
    - **Simister R et al. J Neurol 25:601, 2008**

- Should be performed only in patients with VSS by neuroimaging and evidence of pressure gradient across area of stenosis by direct retrograde cerebral venography and manometry

- First-line rx vs failure of medical management

Venous Sinus Stenting

Advantages

- May treat underlying cause
- Rapid resolution of symptoms and signs when appropriate patients selected

Disadvantages

- Must have experienced interventional neuroradiologist
- Risks of procedure include fatal intracranial hemorrhage
- Long-term safety and efficacy unknown

Prognosis of Patients with IIH

- If identified before significant field constriction (and definitely before reduction of VA), prognosis good
- Even pts who have lost vision may regain substantial visual function if treated aggressively
- Patients with IIH may experience recurrence after resolution or delayed worsening--usually occurs in setting of recent weight gain
    - **Shah VA et al. Neurology 70:634-640, 2008**

Special Considerations

- African-American pts more likely than non-AA pts to have poor outcome with severe visual loss in at least one eye
- Not related to time of diagnosis, treatment, or access to care
- A more aggressive disease requiring closer follow-up and more aggressive treatment?
  - **Bruce BB et al. Neurology 70:861-870, 2008**
- Men have a poorer prognosis than women
- Different symptoms vs different thresholds (?less likely to report headache)
- More likely to have OSA
  - **Bruce BB et al. Neurology 72:304-309, 2009**
- Pubescent children have a poorer prognosis than adults
  - **Stiebel-Kalish H et al. Am J Ophthalmol 142:279-283, 2006**

Summary

- There are a variety of medical and surgical therapies available for the treatment of patients with IIH
- A number of different factors need to be considered when determining the appropriate treatment for a particular patient
- A randomized, prospective clinical trial is underway to compare treatment with weight loss alone with weight loss and acetazolamide