Under Pressure: Highs, Lows, and the Fading of Vision

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Intracranial Hypertension: What’s New?

- The Panoptic
- Intracranial Hypertension Without Papilledema
- Stenting of the Transverse Sinus
- Bariatric Surgery: Ultimate Cure for Pseudotumor Cerebri
- Sunken Eyes, Sagging Brain Syndrome

The Panoptic
16-Year-Old Taking Tetracycline 500 mg bid for 4 Months

Opening Pressure ~ 600 mm water
Intracranial Hypertension Without Papilledema

205 pound, 5' 5" woman with intractable headache since 2007
Lumbar Puncture History:

2008: 460 mm water (sitting)
       420 mm water
       430 mm water

3/2009: 330 mm water (by Carson "one pass" Lawall MD)

5/2010: 360 mm water (closing pressure 160 mm water, headache improved from 6.5/10 to 4/10)

7/2010 280 mm water (closing pressure same; headache unchanged at 6-7/10)

8/2010 270 mm water: closing pressure 180 mm water; headache improved from 5/10 to 3/10)
Stenting of the Transverse Sinus

Headache after Shunting

Cerebral Venography with Manometry

Below Stenosis

Transverse Sinus Pressure (mmHg)

Above Stenosis

压力梯度

Stenosis

Halmagyi et al, AJNR, 2011 (in press)
### Venous and CSF pressures

<table>
<thead>
<tr>
<th>Sagittal sinus pre-stent (mmHg)</th>
<th>Sagittal sinus post-stent (mmHg)</th>
<th>Gradient pre-stent (mmHg)</th>
<th>Gradient post-stent (mmHg)</th>
<th>CSF pre-stent (mmH2O)</th>
<th>CSF post-stent (mmH2O)</th>
</tr>
</thead>
<tbody>
<tr>
<td>34* (15-94) (N=46)</td>
<td>16** (6-33) (N=44)</td>
<td>20 (6-41) (N=46)</td>
<td>0.7 (0-14) (N=46)</td>
<td>321 (250-730) (N=36)</td>
<td>220 (130-390) (N=4)</td>
</tr>
</tbody>
</table>

* 462 mm H2O    ** 218 mm H2O

### Significance of Venous Sinus Stenosis?

- **Stenosis in collapsible transverse sinus**
- **Venous Outflow Obstruction**
- **Venous Hypertension**
- **Decreased CSF Absorption**
- **Increased ICP**

### Outcome of Transverse Sinus Stents

- Resolution of papilledema 45/46*
- 3/46 have ongoing headache, but normal pressures on venography post 1 stent
- 43/46 symptom free
- Follow-up 6 months to 9 years (mean 24 months)

*Complications: 1 death, 1 subdural hematoma requiring emergency craniotomy

### Bariatric Surgery: Ultimate Cure for Pseudotumor Cerebri
320 pounds
30 Sept 2009

37 neuro-op exams
35 visual field studies
5.8 kg of diamox

290 pounds
17 Mar 2010
(3 weeks after surgery)
Roux-en-Y
Proximal Gastric Bypass

B₁₂ deficiency
1% mortality rate

192 pounds
11 Feb 2011

Metabolic/Bariatric Surgery Worldwide 2008
Henry Buchwald - Danette M. Olsen
Sunken Eyes, Sagging Brain Syndrome

23-year-old woman with ruptured basilar aneurysm, treated with clipping and a ventriculoperitoneal shunt

At age 38, with severe corneal exposure OU

Progressive enophthalmos: Hertel’s readings: 6 mm OU

Limited ductions; small exotropia
25-year-old man injured in a car accident 4 years earlier, with intraventricular hemorrhage, treated with ventriculo-peritoneal shunt. History of progressive enophthalmos, recurrent conjunctivitis, and diplopia with limited versions.

CT performed right after accident

CT five years later
Control Subjects (n = 10)

right orbit: $24.6 \pm 3.3 \text{ cm}^3$
left orbit: $23.9 \pm 2.7 \text{ cm}^3$

Patient #1:
right orbit: $32.1 \text{ cm}^3$
left orbit: $32.6 \text{ cm}^3$

Patient #2:
right orbit: $32.6 \text{ cm}^3$
left orbit: $35.9 \text{ cm}^3$

Patient #2
(at time of accident)
right orbit: $28.5 \text{ cm}^3$
left orbit: $29.3 \text{ cm}^3$

Patient #2, T1-weighted with gad showing signs of intracranial hypotension
Before Shunt Repair

One Week after Shunt Repair

Refloated brainstem

Dural gad enhancement less
Hwang et al, Ophthalmology 2011 (in press)

- Overshunting can cause progressive enophthalmos from expansion of orbital walls, with strabismus and limited versions.
- Restoration of normal intracranial pressure produces immediate, modest benefit.
- “Non-defensive” skull bones are capable of remodeling in response to pressure gradients.
Lunch!