Subdural Hematomas and Cognitive Impairment/Dementia

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The Case & Question

• 75 yo M suffered a fall on ice in Winter 2010
• Presented with cognitive concerns
• Found to have bilateral chronic subdural hematomas

What is the association of subdural hematomas with cognitive impairment/dementia?
Does treating the hematoma improve this?
Search Strategy

• Medline search combining MeSH terms “hematoma, subdural” with “dementia” or “delirium, dementia, amnestic, cognitive disorders”

• Yielded 179 results

• 21 judged relevant
  – 5 population studies of association with dementia
  – 4 studies of outcomes following surgery

Fig 1: CT scan showing bilateral subdural collections, larger on the left.
SDH in the Elderly

• Often occurs following a relatively mild fall
• Brain atrophy $\rightarrow$ widening of subdural space $\rightarrow$ tension of bridging veins, easier rupture when brain displaced in trauma
• Atrophy can delay focal symptoms or raised ICP
• Chronic (CSH) characterized by membrane formation on inner and outer surface: most frequent type of intracranial bleeding
  (Dymecki and Ostrowska 1976, Schebesk et al 2008)

Mechanism of Dementia:
• Direct compression on brain
• Reduction in whole brain CBF
  (Okuyama et al 2000)
• Generalized astrocyte reactivity
  18 wks post-hematoma in rats
  (Eijkenboom et al 2004)
1. Evidence of Association

- **Dementia Pugilistica** – often the result of SDH, can be found decades after the injury (Miele et al 2006)

- Several case reports of “incidental” findings of chronic subdural hematomas in patients being investigated for cognitive decline
  - Alvarez et al 2012
  - Jobse and Feitsma 2011
  - Velasco et al 1995 (improved with surgery)
Population Studies

a. Frequency of SDH in cognitive presentations

Kono et al 1989 (Japan)
• Reviewed incidence of CSH and hygroma in 2 hospitals for elderly pts with dementia over 3y 9mo
• 47 pts (7.7%) had CSH at admission

Alexander et al 1995 (USA)
• Retrospective sequential case series of pts over 65 presenting with cognitive impairment
• Average annual incidence of 46.7 per 100,000 (95% CI 36.0-59.6) for SDH
• Using 65-74yo as reference, RR for SDH 4.8 (2.7-8.5) in 75-85yo, 13.1 (7.7-22.5) in >85
Population Studies

b. Frequency of cognitive deficits/dementia with CSH

Fogelholm et al 1975:
• 109 adults operated for CSH
• Younger patients had more evidence of ICP, older had mental deterioration and pyramidal tract lesion symptoms

Black 1984 (England)
• Retrospective study of 79 patients with subacute or CSH
• 46 (58.2%) had mental changes - delirium most frequent, then dementia

Schebesch et al 2008 (Germany)
• Retrospective study of 356 CSH cases, 1992-2003 (avg 68.3yo)
• Leading pre-op symptom: amnestic, cognitive decline (45.5%)
Treatment of SDH

- **Burr-hole trepanation**
  - done in 96.4% of cases in German retrospective study (Schebesch et al 2008)

- Followed by subdural or subperiosteal drainage
  - Lower complication, mortality with SPD (Bellut et al 2012)
2. Evidence of Treatment Efficacy

*Outcome Studies*

**Tsuboi et al 1984 (Japan)**

- Study of 32 cases of chronic subdurals
- Avg age 55.4yo, neuropsych symptoms in 56%, mostly amnestic syndrome and dementia
- Outcome *less favourable in dementia group* compared to amnestic group
- Complicated by post-op psych symptoms: avg age 68.2, post-op subdural fluid collection with mass effect, chronicity, comorbidities like cirrhosis/HTN
  - Needed subdural peritoneal shunt
2. Evidence of Treatment Efficacy

Outcome Studies

Tanaka et al 1992 (Japan)

- 12 cases of CSH (avg 74yo)
- All had dementia >1yr as per Hasegawa’s dementia scale score
- CBF study performed before and 3-4wks after surgery – compared to 6 healthy volunteers (avg 60)
- Mentation improved in 10 patients with H/A and/or hemiparesis and varied mass effect with min-mod multiple infarctions on CT (compared to severe in other 2)
- Dementia scores and CBF values after surgery correlated on ipsilateral frontal cortex, thalamus $(p<0.01)$, hemisphere and temporoparietal cortex $(p<0.05)$
- Surgical benefits most apparent for LOC disturbance
Bourgeois et al 1999 (France)

• Retrospective study of chronic subdural in 80 patients >80 (incidence of 17 per 100,000)
• Main presenting symptoms were confusion and impaired mentation
  – Surgery was done in all patients
  – Complications in 10%, recurrence of SDH in 5%
  – But 85% returned to their prior neurological status
Outcome Studies

Ishikawa et al 2002 (Japan)

• 26 pts (avg 73yo) received burr-hole irrigation for CSH
• ADLs, MMSE, Hasegawa Dementia Scale-Revised at 2 weeks
• Of 18 patients (69.2%) classified as “dementia” before surgery, 9 recovered to “normal cognitive state”
• Surgery also improved ADLs (p=0.0026), orientation and calculation on MMSE (p=0.0002) and HDS-R (p=0.0008)
• Factors predicting cognitive recovery: age <74 (p=0.0049), preoperative ADL <5 (p=0.0056), MMSE >10 (p<0.0001), HDS-R >9 (p=0.0073)
• Limitation: “Dementia” pre- and post-op defined solely by MMSE score <24
Risks of Drainage

• Botched drainage can itself cause dementia
  ▪ Post-stroke dementia reported following left medial occipitoparietal hemorrhage triggered by drainage of acute traumatic subdural hematoma (Lee et al 2008)

• Symptoms can persist due to atrophic changes from chronic compression (Inagaki et al 2003)

• Post-operative Hyperperfusion Syndrome
  ▪ 14 of 27 patients >75yo (51.9%) on SPECT within 1 h of surgery, of whom 5 had delirium persisting 10-12 hours exacerbated by HTN (Ogasawara et al 2000)
Clinical Bottom Line

• Subdural hematomas in the elderly often present with a primary cognitive concern
• Treatment is associated with various surgical risks, but may improve cognition
  – Some suggestion that younger, more independent individuals are most likely to benefit, and those with a lower burden of cerebrovascular disease
  – Burr-hole with Subperiosteal drainage preferred
• Evidence is dated and limited by poor definitions of what constitutes dementia and improvements
• No North American data on efficacy – techniques have evolved
• Need studies comparing surgery to medical management in patients with CSH and primary cognitive complaint
Tests for “Reversible Dementias”  
(Chronic Metabolic/Structural Encephalopathies)

- CBC (Anemia)
- TSH (Hypothyroidism)
- Cr, Electrolytes (Renal Failure, Hyponatremia)
- Calcium (Hypercalcemia)
- FBG (Hyperglycemia)
- Vitamin B12
- RBC Folate (if no grains, Celiac)
- Serum Homocysteine (insufficient evidence)
- Snoresat or PSG if suspicious of OSA
- Syphilis/HIV if suspicious

- CT Scan for:
  - Ruling in CVA
  - Age<60
  - Rapid (1-2 months) decline
  - Short duration (<2 years)
  - Recent, significant head trauma
  - Unexplained neurological symptoms (headache/seizures)
  - Cancer hx (metastatic potential)
  - Anticoagulants or bleeding history
  - Urinary incontinence or gait disorder early in the course
  - Any new localizing sign
  - Unusual/atypical presentation (e.g. progressive aphasia)

(Third Canadian Consensus Conference on Diagnosis and Treatment of Dementia, 2006)