Subdural Hygroma (s. Subdural Effusion)

Last updated: January 7, 2022

SUBDURAL HYGROMA - excessive CSF collection in subdural space. [Greek *hygros* – wet]

ETIOLOGY, PATHOPHYSIOLOGY

1. MOST COMMON CAUSE - **cranial trauma** with arachnoid tearing and arachnoid-dura separation (→ CSF escape into subdural space) - **TRAUMATIC SUBDURAL HYGROMA**.
   - develops in ≈ 10% severe head injuries.
   - skull fractures are found in 39% cases.
   - predisposing factors: *cerebral atrophy* (present in 19% hygromas), vigorous therapeutic dehydration (iatrogenic brain collapse), intracranial hypotension (e.g. in prolonged lumbar drainage), pulmonary hypertension (e.g. in chest trauma, pneumonia).
   - CSF is usually xanthochromic.
   - may accumulate immediately after trauma or in delayed fashion.
   - most likely *locations of arachnoid tears*: sylvian fissure, chiasmatic cistern.
   - **"complex hygroma"** - associated with other intracranial lesions (subdural hematoma, epidural hematoma, intracerebral hemorrhage, etc).
2. **Infection** of meninges or skull (most commonly – influenzal meningitis or mastoiditis).
3. Rupture of arachnoid at basal cistern in **communicating hydrocephalus**.
4. **Complication of ventricular shunting**; in patients with shunts (esp. if overdrainage occurs), disruption* of arachnoid can lead to hygroma.
   *spontaneous or elicited by minor head trauma or previous arachnoid injury (e.g. ventricular tap, intracranial pressure sensor).
   - best prevention is use of shunt alternative (third ventriculostomy) or overdrainage-limiting device.
   - increasing valve opening pressure or using flow-rate-limiting system can be successful treatment.
5. **Complication** of arachnoid cyst marsupialization or resection.
6. Rare complication of spinal anesthesia causing CSF leak.

FURTHER COURSE

A. Spontaneous RESOLUTION of subdural collection along with cerebral expansion.

B. Hygroma PROGRESSION: transudation / further CSF accumulation (flap-valve mechanism) → increasing brain dislocation → rupture of bridging veins* → bleeding into newly formed subdural space (well documented *transformation to subdural hematoma*) → neomembrane (capsule) formation (chronic subdural hematoma).
*stretch of draining veins by hygroma can cause multiple venous infarcts

CLINICAL FEATURES

A. Asymptomatic

B. May increase in size (due to flap-valve mechanism, bleeding) → ***mass effect*** with significant **morbidity** similar (in character and evolution) to subdural hematoma:
1. **ICP↑** (headaches, nausea, decreased level of consciousness)
2. **Focal signs**

COMPLICATIONS

1. Brain **herniation**
2. Transformation into **subdural empyema**

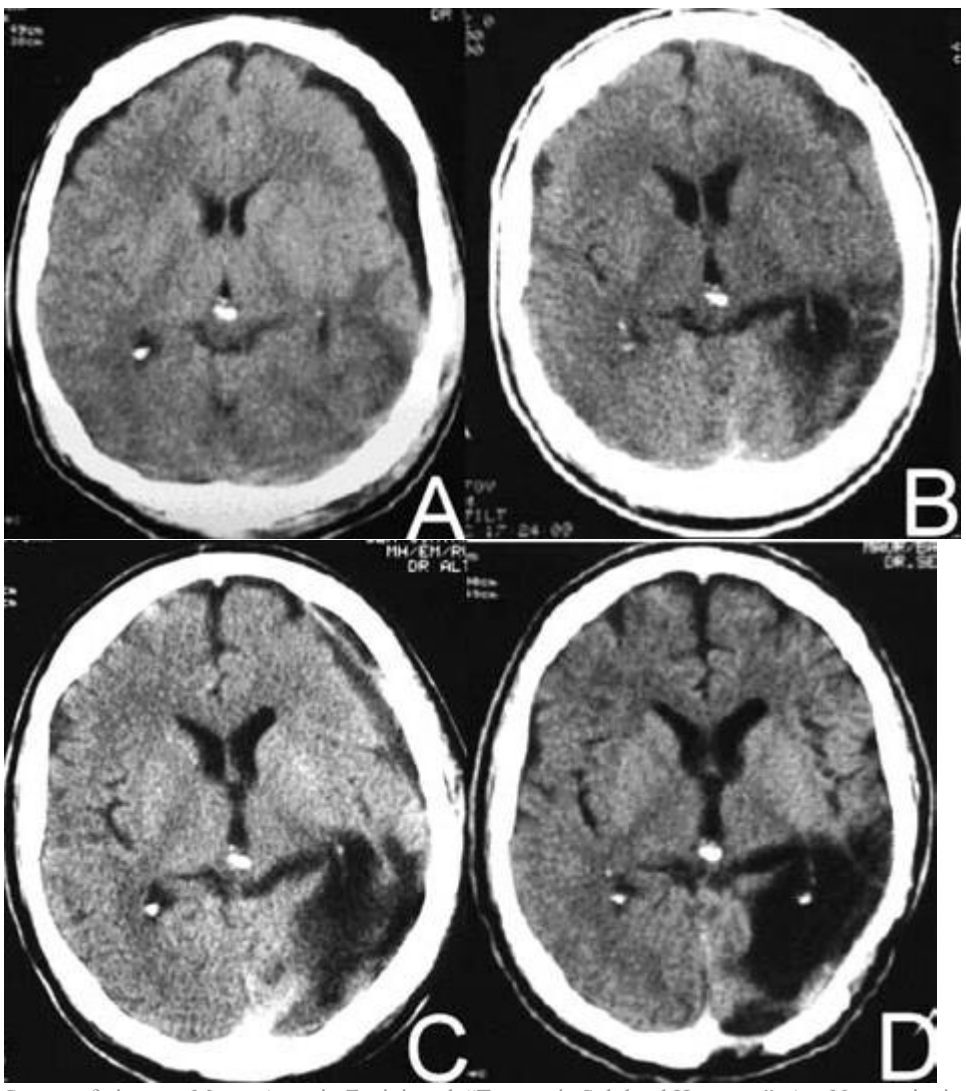
DIAGNOSIS

Neuroimaging - crescent-shaped extraaxial collection with CSF density (hard to separate from chronic subdural hematoma!!!; H: MRI); commonly bilateral.

- **differentiation from BRAIN ATROPHY**:
  - in ***hygroma*** gyri are significantly displaced away from calvaria, occasional slight mass effect, no widening of cortical sulci (sulci even may be obliterated due to mass effect).
  - in ***cerebral atrophy***, appearance of bilateral frontal "subdural hygromas" may be seen when patient is supine; similar finding can be seen in ***young children*** (benign enlargement of subarachnoid space - should resolve in first 2 years of life).
  - ***"cortical vein sign"*** on gadolinium MRI - cortical veins and their branches are seen traversing widened CSF spaces over cerebral convexities - evidence of ***cerebral atrophy*** (rules out diagnosis of subdural hygroma*).
    *hygroma displaces cortex and cortical veins → cortical veins seen only at margin of displaced cortex, and do not traverse fluid collections over cerebral convexities.

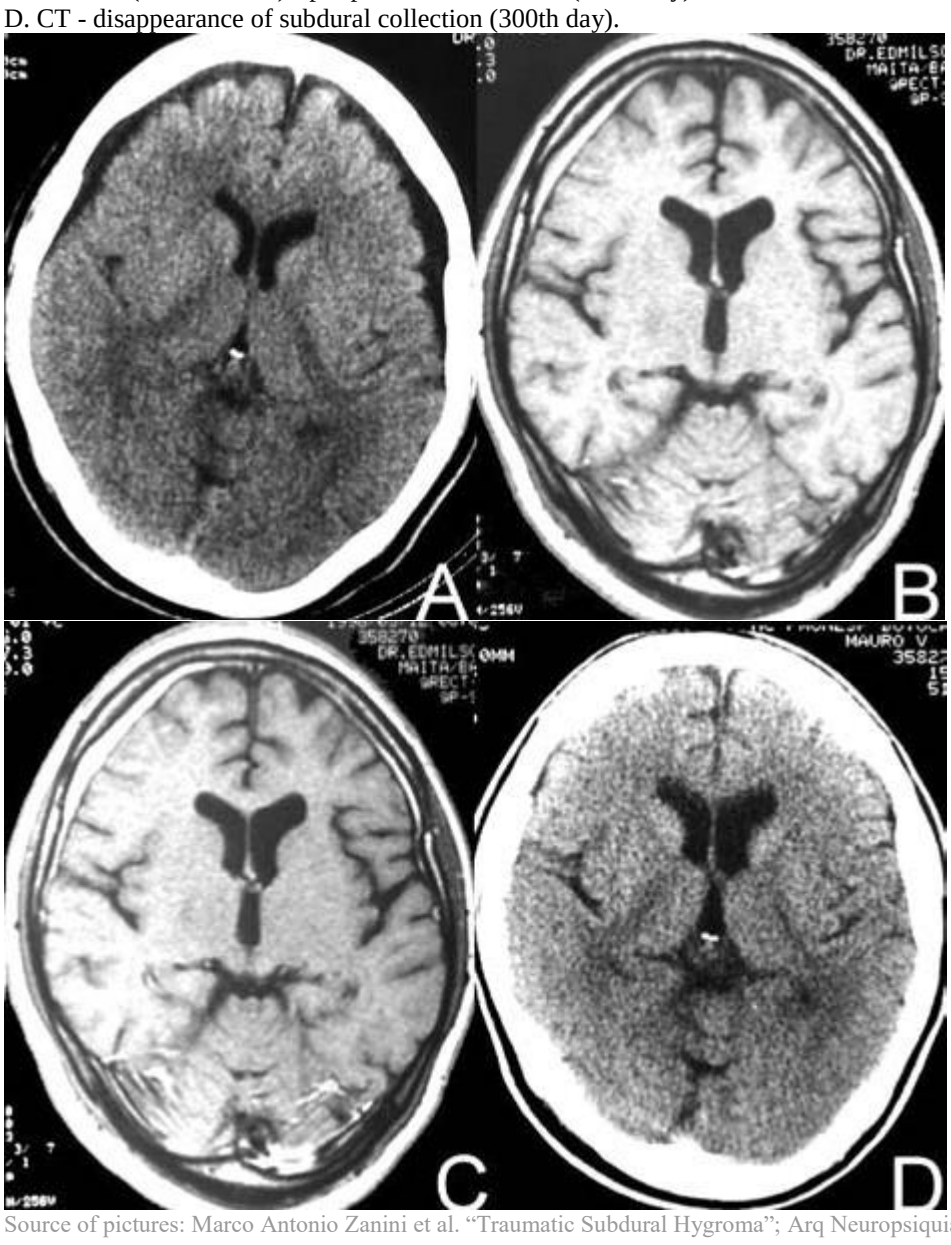
Definitive diagnosis - only by **trephine openings** in skull:
- classically **chronic subdural hematoma** contains dark "motor oil" fluid which does not clot.
- if subdural fluid is *clear*, collection is termed **subdural hygroma**; hygroma fluid (i.e. CSF) contains *prealbumin* (not present in subdural hematoma) and may be under high pressure.

A. CT - left frontal subdural hygroma (9th day).
B. Enhanced density and heterogeneous appearance (53rd day) – signs of subdural bleeding into hygroma space
C. Reduction of hygroma, with probable neomembrane (117th day).
D. Resolution of subdural collection (730th day).



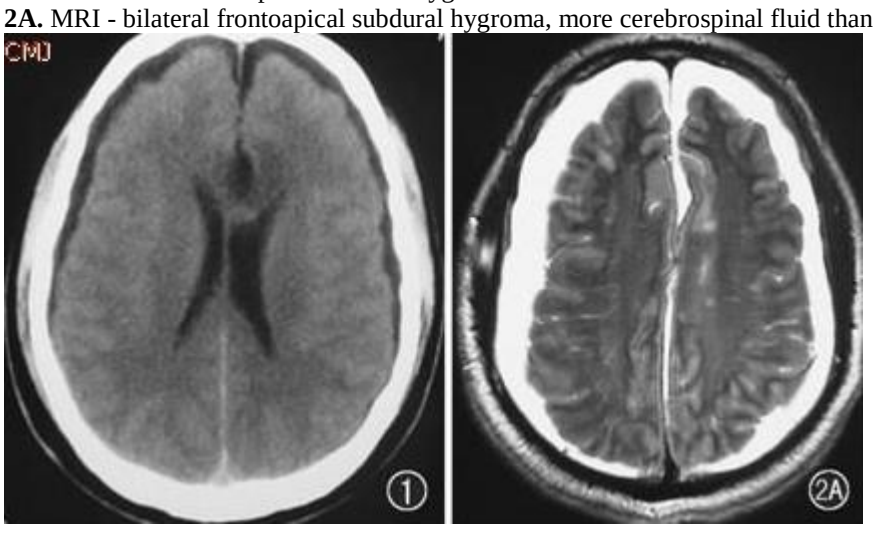
Source of pictures: Marco Antonio Zanini et al. "Traumatic Subdural Hygroma"; Arq Neuropsiquiatr 2007;65(1):68-72 >>

A. CT - bilateral frontal subdural hygroma (12th day).
B. T1-MRI (no contrast) - laminar subdural hematoma, without compression on underlying brain (191st day).
C. T1-MRI (with contrast) - peripheral enhancement (191st day).
D. CT - disappearance of subdural collection (300th day).

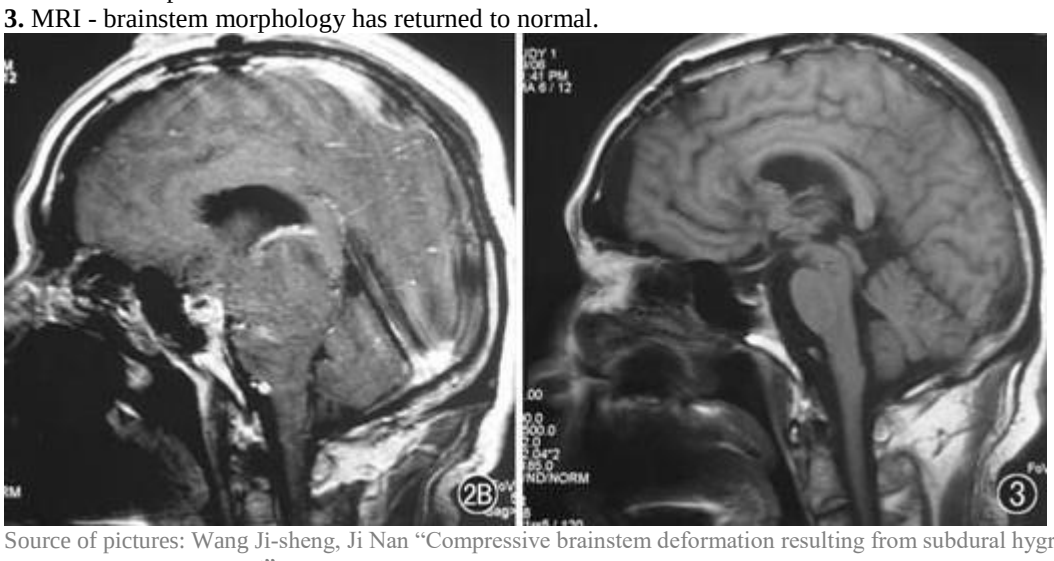


Source of pictures: Marco Antonio Zanini et al. "Traumatic Subdural Hygroma"; Arq Neuropsiquiatr 2007;65(1):68-72 >>

1. CT - bilateral frontoapical subdural hygroma.
2A. MRI - bilateral frontoapical subdural hygroma, more cerebrospinal fluid than CT.

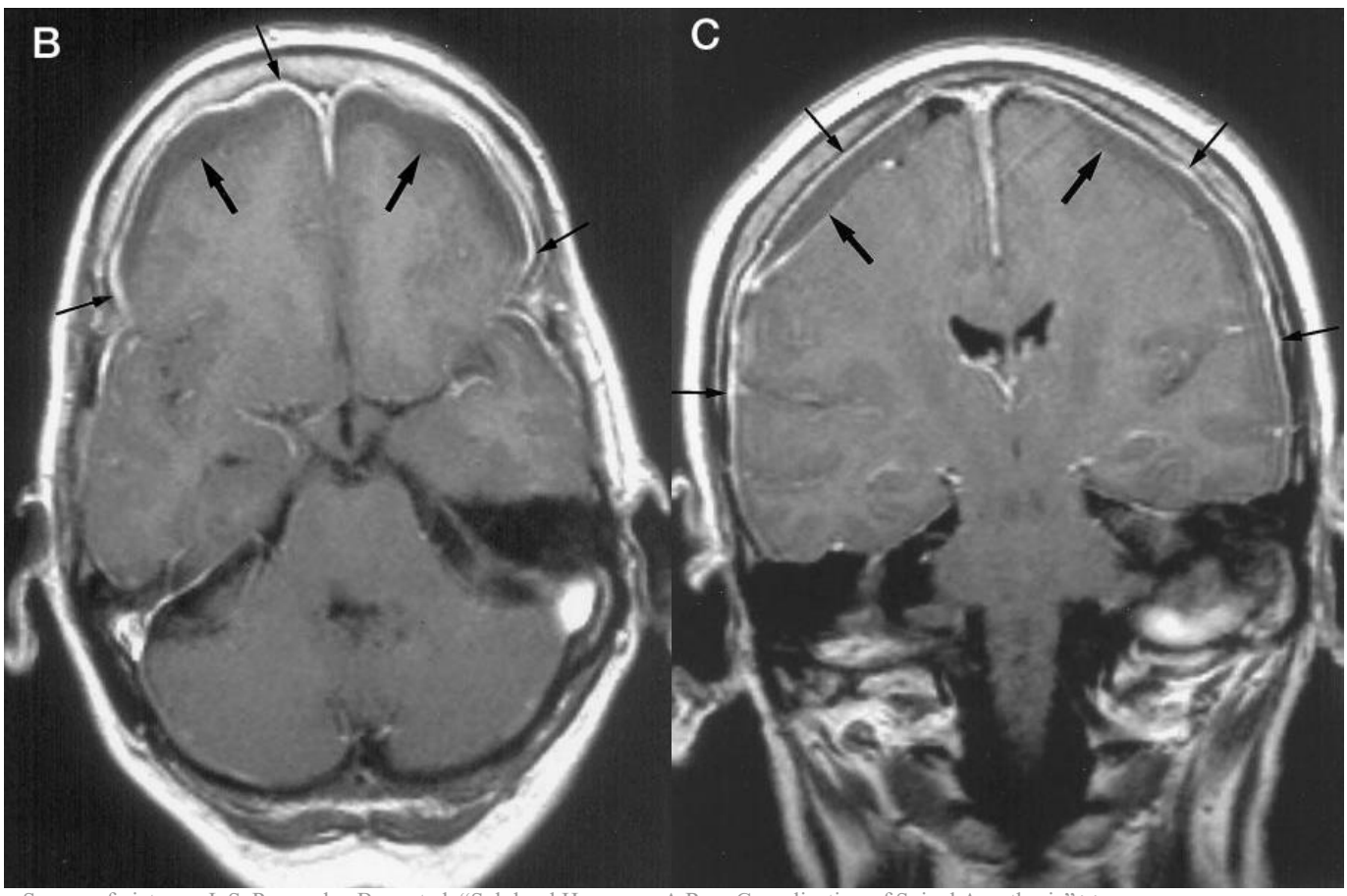


2B. MRI - compressive brainstem deformation.
3. MRI - brainstem morphology has returned to normal.



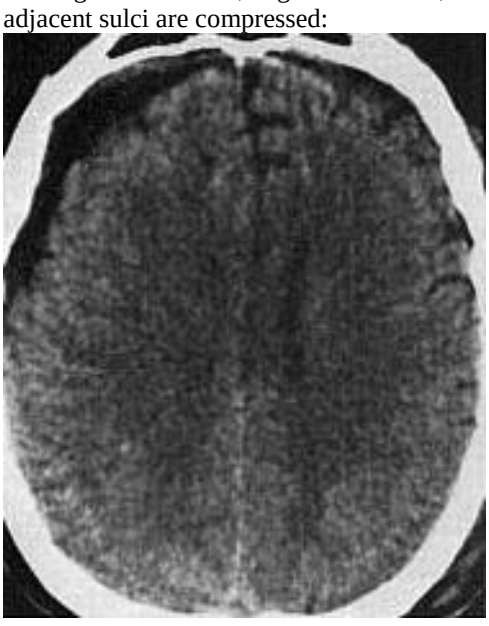
Source of pictures: Wang Ji-sheng, Ji Nan "Compressive brainstem deformation resulting from subdural hygroma after neurosurgery: a case report"

Gadolinium T1-MRI - diffuse, high enhancement of pachymeninges (*small black arrows*) together with bifrontal hygromas compressing frontal lobes (*black arrows*):



Source of pictures: J. S. P. van den Berg et al. "Subdural Hygroma: A Rare Complication of Spinal Anesthesia" >>

Small, low-density, extra axial collection over right frontal lobe; slight mass effect; adjacent sulci are compressed:



Benign enlargement of subarachnoid space in child (CT) – no mass effect; normally resolves within first 2 years of life:

Source of picture: Andrew L Wagner, MD, Subdural Hematoma: Multimedia >>

Postoperative MRI - child with large cystic craniopharyngioma and hydrocephalus; sudden tumor removal and hydrocephalus decompression resulted in subdural hygroma formation (*small arrows*); hygroma stretched draining veins, causing multiple venous infarcts (*open arrow*):

Source of picture: Julian R. Youmans "Youmans Neurological Surgery", 4th ed. (1997); figure 126-7; Publisher: W.B. Saunders Company; ISBN-10: 0721668453; ISBN-13: 978-0721668451 >>

TREATMENT

Asymptomatic → **observation** (usually resolve spontaneously within several months).
N.B. observation leaves risk of transformation into subdural hematoma (which already requires **craniotomy**).

Symptomatic (esp. deteriorating clinical status accompanied by hygroma volume↑ with brain compression → herniation) → **surgery**: **external burr-hole drainage**;

- maintain subdural drain for 24-48 hrs post-op; if satisfactory resorption does not occur → shunting of subdural space.
- recurrence following simple burr-hole drainage is common; for recurrent cases:
  a) ***craniotomy*** to locate site of CSF leak (may be very difficult)
  b) subdural-peritoneal ***shunt***.

BIBLIOGRAPHY for ch. "Head Trauma" → follow this LINK >>