

# Subdural Hematomas and the Help of Computed Tomography

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### Introduction

Subdural hematomas (SDHs) are also known as traumatic brain injuries (TBI). SDHs can occur at any age, but are most commonly seen in the elderly population 65 years or older (Kwon et al., 2022). Subdural hematomas affect about 21 in every 100,000 individuals and are becoming more common (Kung & Lin, 2020).

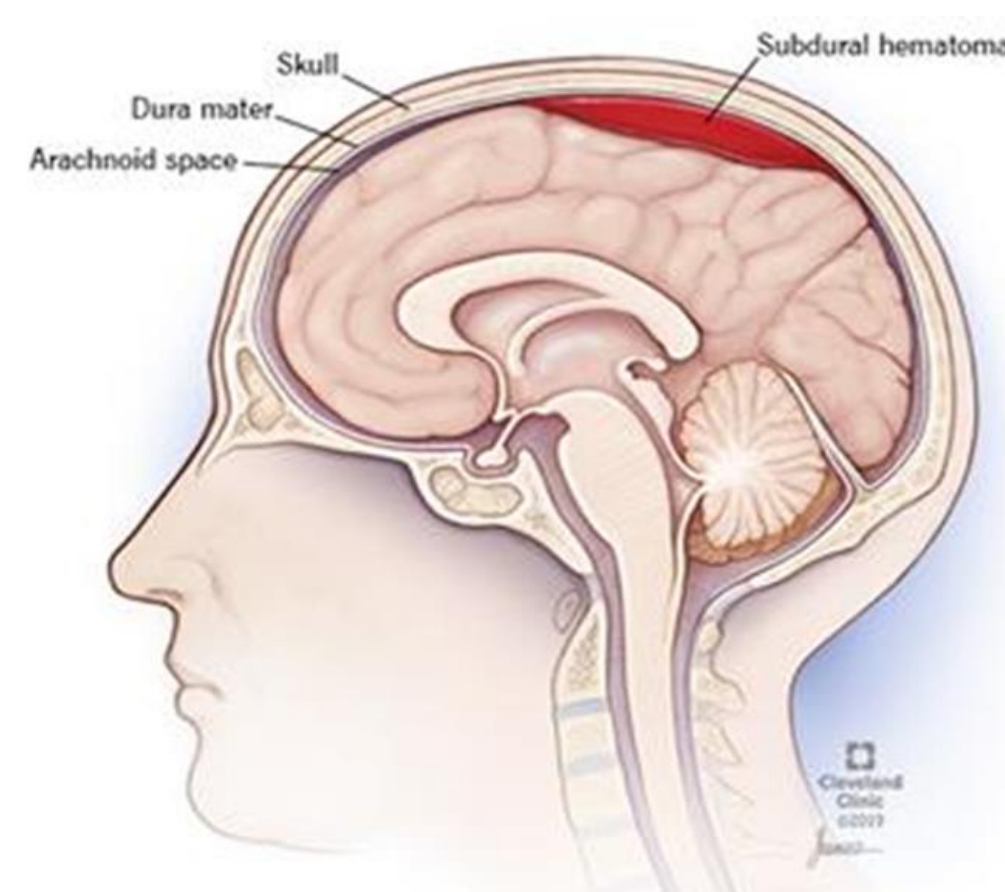
Computed tomography (CT) is an imaging modality that produces cross sectional images using X-rays. An X-ray tube and detector rotate 360 degrees around the specified area of interest, creating cross-sectional images generated during a CT scan. These images can be reformatted in multiple planes and can even generate three-dimensional images which are viewed on a computer monitor. (Long et al., 2019). CT is the imaging modality of choice for detecting SDHs due to the short scan time and the images produced. (Kwon et al., 2022).



The image above demonstrates a CT scanner that would be used to image the patients head if a SDH is suspected. (Single Source CT Scanner, 2023).

### Subdural Hematomas

- Type of brain bleed that occurs within your skull, outside the brain tissue. (Cleveland Clinic, 2020).
- SDH is a tear in a blood vessel, most commonly a vein, and blood is collecting outside of the vessel that is torn. (Cleveland Clinic, 2020).
- Collection of blood accumulating in the subdural space, the potential space between the dura and arachnoid mater of the meninges around the brain. (Gaillard et al., 2023).
- SDH can occur due to trauma such as; motor vehicle accidents, or blunt force trauma to the head.
- Typically, the bleed appears crescent shaped.



The image is showing where a SDH can occur. When there is a SDH blood leaks out of the blood vessel into the space below the outermost membrane of the brain.

(Cleveland Clinic, 2020).

### Most at risk

- Older adults >65 or older
- Athletes
- Individuals taking antithrombotic medication
- Poor blood clotting conditions
- Repeated head injuries
- Long term alcohol use (MedlinePlus, 2020).

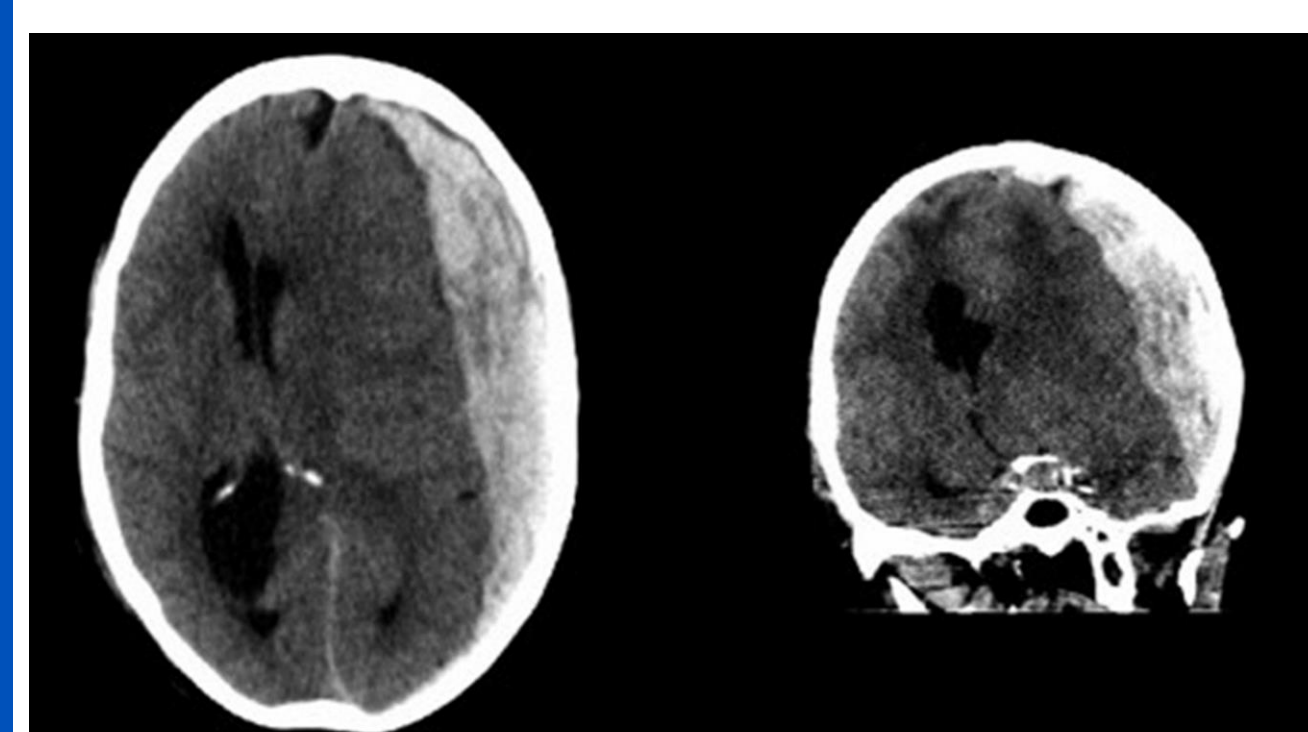
### Symptoms

- There are a variety of symptoms that can accompany a SDH.
- Traumatic SDH symptoms may occur immediately or within a couple hours and chronic SDH symptoms develop slowly overtime.
  - Headache that does not go away
  - Weakness on one side of the body
  - Confusion & drowsiness
  - Nausea & vomiting
  - Slurred speech
  - Changes in vision
  - Weakness on one side of the body
  - Dizziness & loss of balance
  - Memory loss
  - Enlarged heads in babies
- Without intervention, symptoms will worsen, and bleeding will increase the pressure on the brain leading to:
  - Seizures
  - Breathing problems
  - Loss of consciousness
  - Paralysis
  - Coma (Cleveland Clinic, 2020).

### Types of Subdural Hematomas

**Acute** is the most dangerous

- Symptoms appear instantly and may cause rapid onset of neurological deterioration. (Kung & Lin, 2020).
- Pressure on the brain that continues to increase as the blood pools. (Cleveland Clinic, 2020).
- Most commonly seen with head trauma in young individuals.
- Can lead to death if not treated immediately.
- There is a 50-90% mortality rate. (Choudhary et al., 2020. p. 20).



(ST. Vincents Hospital,n.d).

Acute subdural hematoma non-contrast CT in the axial plane on the left. CT in the coronal plane on the right shows a crescent-shaped SDH, extending over the frontal, parietal and temporal lobes

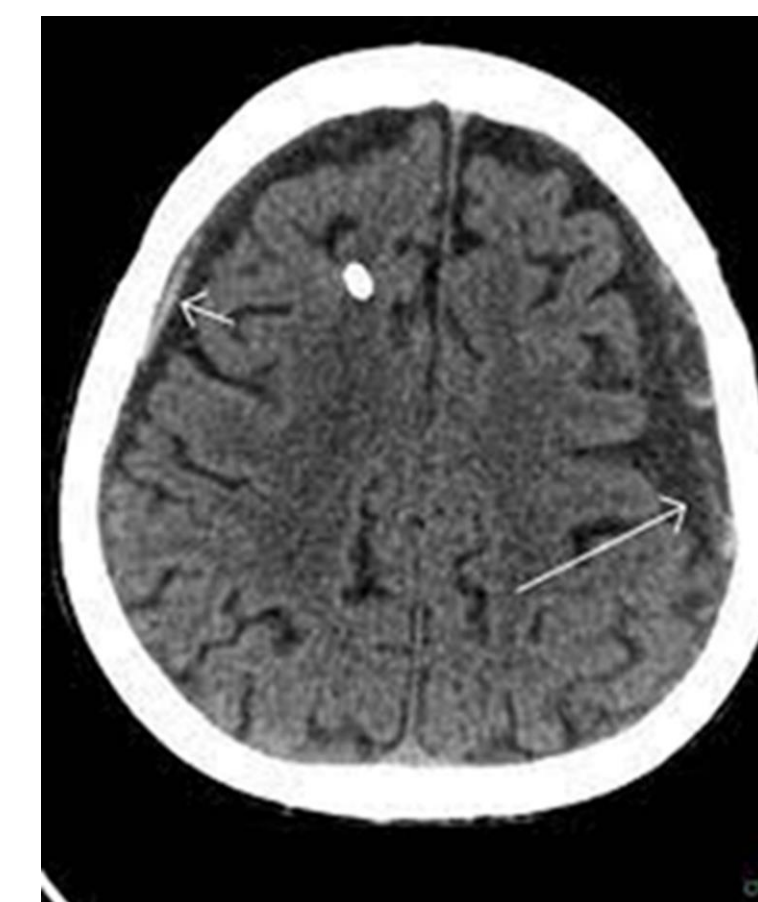
### Types of Subdural Hematomas Continued

#### Subacute

- Symptoms can appear hours to days or possibly weeks after injury to the head. (Cleveland Clinic, 2020).
- As the clot ages and protein degradation occurs, the density of the subdural hemorrhage starts to drop. (Gaillard et al., 2023).

#### Chronic

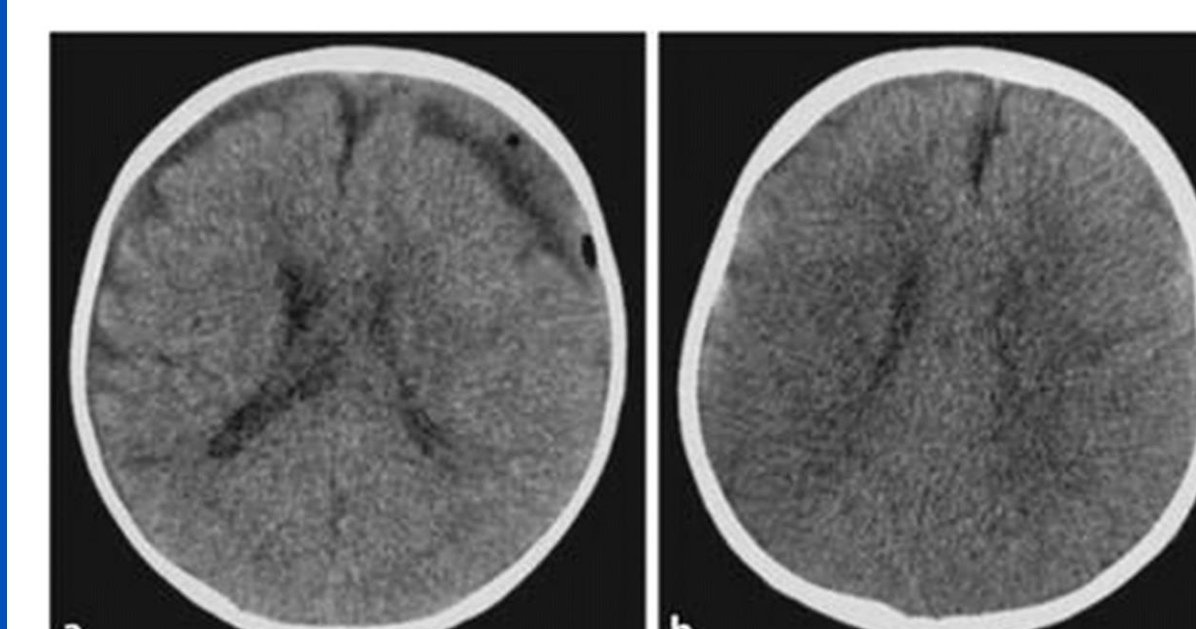
- Gradual accumulation of blood in the subdural space of the brain.
- Symptoms may not appear for weeks or months
- SDH is categorized as chronic when the bleed is at least 3 weeks old. (Gaillard et al., 2023).
- Most chronic SDH bleeds are in the shape of a crescent and may develop into a biconvex shape. (Gaillard et al., 2023).
- Most seen among elderly patients, 80 years and older with an incidence rate of 36.6 out of 100,000 people developing an CSDH (Hamou et al., 2022. p. 2777).
- Chronic SDHs are best seen in non contrast study. (Kwon et al., 2022)



Chronic subdural hematoma in axial plane without contrast. The CT scan is showing thin slightly hyperdense membranes paralleling the skull vault.

(O'Donnell, 2012).

- CT findings for SDHs include:
  - Hematoma thickness (may thicken over time and may not be seen on the initial scan)
  - Midline shift
  - Presence of subarachnoid hemorrhage
  - Presence of basal cistern obliteration
  - Presence of intraparenchymal hematoma
  - Presence of effacement of the sulcal spaces (Choudhary et al., 2020).



(Senturk, 2010).

A.) Two-day postoperative CT scan showing minimal subdural collection with air bubbles.  
B.) Two months after surgery. The subdural hematoma and air bubbles had completely disappeared.

### Treatment

- SDHs that have few or no symptoms and are small enough do not require surgery.
  - Treatment for small hematomas may be bed rest, medications and observation. (Cleveland Clinic, 2020).
  - The body can absorb the small amount of blood over time, usually a few months.
  - Regular imaging tests are done to monitor the hematoma and ensure there is healing.
  - Surgical intervention of decompression is needed for most cases.
  - When surgery is needed there are two options:
    - A twist drill craniotomy without drainage.
    - Burr hole craniotomy with placement of non-suction subdural drains after irrigation of the cavity of the hematoma.
- (Hamou et al., 2022).

### Outcomes

- Dependent on the type and location of head injury, the size of the blood collection, and how soon treatment is started.
  - Early intervention and diagnosis lead to a better outcome and reduces the reoccurrence rate. (Hamou et al., 2022).
  - Recovery is dependent on:
    - Patient age
    - Initial Glasgow Coma Scale
    - Timing of surgical intervention
    - Initial CT findings
- (Choudhary et al., 2020).
- The overall brain damage also determines outcome.

### Conclusion

The use of computed tomography provides fast and effective diagnosing of subdural hematomas. Timely care is most important when a SDH is suspected to improve the outcome of the patient. There are many ways a SDH can occur and there are a variety of types that can develop. The mortality rate is relatively high in acute SDHs as it is the most severe due to trauma. The reoccurrence of reoperating is a complication that is common in SDHs and occurs in 5- 30% of cases (Hamou et al., 2022). Reoperating may be due to the hematoma size, preoperative antithrombotic treatment, if there is a history of epileptic seizures, along with postoperative persisting midline shift and the brain failing to re-expand (Hamou et al., 2022).