SUBEPIDURAL HEMATOMA IN STROKE: A RARE BUT CRITICAL CONSIDERATION IN ADULT PATIENTS

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Abstract: Subepidural hematoma (SEH) is an uncommon yet potentially life-threatening condition that can arise in the context of cerebrovascular events, including ischemic and hemorrhagic strokes. Unlike epidural and subdural hematomas, SEH occurs in the dural border zone, presenting unique diagnostic and management challenges. This article explores the pathophysiology, clinical manifestations, neuroimaging characteristics, and therapeutic approaches for SEH in stroke patients, emphasizing its role in secondary neurological deterioration. Given the limited literature on this topic, we highlight key case reports, propose diagnostic algorithms, and discuss potential surgical and conservative treatment strategies.

Keywords: Subepidural hematoma, stroke, cerebrovascular disease, neurosurgery, neuroimaging, secondary hematoma

1. Introduction

Stroke remains a leading cause of morbidity and mortality worldwide, with ischemic and hemorrhagic variants constituting the majority of cases. While hematomas are frequently associated with traumatic brain injury, non-traumatic hematomas, such as subepidural hematoma (SEH), may develop as a secondary complication of cerebrovascular events. Due to its rarity and overlapping radiological features with more common intracranial hemorrhages, SEH is often underdiagnosed.

2. Pathophysiology and Etiology

SEH occurs due to hemorrhagic infiltration into the dural-arachnoid interface. Several mechanisms contribute to SEH formation in stroke patients:

- **Ischemic Stroke and Hemorrhagic Transformation:** Ischemia-induced vascular fragility predisposes dural vessels to rupture, especially in patients receiving anticoagulation or thrombolytic therapy.
- **Hemorrhagic Stroke:** Spontaneous or hypertensive intracerebral hemorrhages can extend into the dural layers, leading to SEH formation.
- **Vascular Malformations:** Arteriovenous malformations (AVMs), aneurysms, or dural arteriovenous fistulas may precipitate spontaneous SEH.
- **Coagulopathy:** Anticoagulant therapy, thrombocytopenia, and disseminated intravascular coagulation (DIC) increase the risk of SEH.

3. Clinical Manifestations

The presentation of SEH in stroke patients varies based on the size and location of the hematoma. Common symptoms include:

- Acute neurological deterioration
- Progressive headache
- Seizures
- Altered consciousness
- Focal neurological deficits (hemiparesis, aphasia, visual disturbances)

The clinical course is often insidious, with delayed neurological worsening due to hematoma expansion.

4. Neuroimaging Characteristics

Prompt imaging is crucial for diagnosing SEH. The following modalities are commonly utilized:

- **Computed Tomography (CT):** SEH appears as a hyperdense, crescentic collection along the dural border zone, often with mass effect. Unlike subdural hematomas, it does not cross dural reflections.
- **Magnetic Resonance Imaging (MRI):** T1-weighted and susceptibility-weighted imaging (SWI) provide better visualization of hemorrhagic components and differentiation from other hematomas.
- **Digital Subtraction Angiography (DSA):** In cases of suspected vascular malformations, angiography may be warranted to identify the underlying etiology.

5. Management Strategies

The treatment approach for SEH in stroke patients is guided by hematoma size, clinical stability, and underlying stroke pathology.

5.1 Conservative Management

- Hemodynamic stabilization and close neurological monitoring
- Reversal of coagulopathy in anticoagulated patients using prothrombin complex concentrates or fresh frozen plasma
- Antiepileptic prophylaxis in patients with cortical involvement
- Serial imaging to monitor hematoma evolution

5.2 Surgical Intervention

Surgical evacuation is indicated in cases of:

- Significant mass effect and midline shift
- Rapid neurological deterioration
- Refractory intracranial hypertension

Minimally invasive approaches, including endoscopic-assisted hematoma evacuation, are emerging as potential alternatives to craniotomy in select cases.

6. Prognosis and Outcomes

The prognosis of SEH in stroke patients depends on the timing of diagnosis, hematoma volume, and the presence of underlying cerebrovascular pathology. Early intervention is associated with improved neurological recovery, whereas delayed diagnosis may lead to irreversible brain injury and increased mortality.

7. Conclusion

Subepidural hematoma in stroke is a rare but clinically significant entity requiring high diagnostic suspicion. Advanced neuroimaging techniques play a crucial role in differentiating SEH from other intracranial hemorrhages. A multidisciplinary approach involving neurologists, neurosurgeons, and critical care specialists is essential for optimizing patient outcomes. Future research should focus on defining standardized management protocols and exploring minimally invasive surgical techniques for SEH in stroke populations.

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