## Assessing and managing patients with Chronic subdural hematoma

# More common in the elderly, chronic subdural hematoma may be mistaken for stroke.

By Mark Bauman, MS, RN, CCRN, and Tammy Russo McCourt, BSN, RN, CCRN

**RUBY JACOBS**, age 84, arrives at the emergency department with a headache, which she says has gotten worse over the past week despite taking acetaminophen. Her past medical history includes atrial fibrillation managed with metoprolol 50 mg b.i.d. and warfarin 5 mg daily. She responds to voice but is oriented to name only. Her speech is slurred and she has difficulty finding the right words. She reports feeling "woozy and tired." Her daughter states that her mother had a "fainting spell" several weeks ago and has become confused and lethargic over the past few days.

A 12-lead electrocardiogram (ECG) shows atrial fibrillation with a ventricular rate of 62 beats/ minute. Blood pressure (BP) is 116/54 mm Hg; her standing BP, 102/50 mm Hg. Mrs. Jacobs's laboratory results are within normal ranges except for her International Normalized Ratio (INR) of 2.5, which is therapeutic for anticoagulation. Given her admitting symptoms and altered neurologic status, the physician orders a noncontrast computed tomography (CT) scan of the head, which shows a right-sided acute-on-chronic subdural hematoma (SDH) with a 2-mm midline shift. Mrs. Jacobs is transferred to the local trauma center for definitive management of her head bleed

In SDH, blood accumulates in the space between the dural and arachnoid membranes surrounding the brain. Bridging vessels that cross this space channel blood from the brain to the dural sinuses. Damage to these vessels commonly leads to subdural bleeding.

Frequently stemming from a traumatic event, SDH is one of the deadliest brain injuries. Among people older than age 65, falls are the most common mechanism. But other factors can contribute to SDH in older adults, including anticoagulant and antiplatelet medications to treat chronic medical conditions (such as atrial fibrillation. heart valve replacement, coronary artery disease, and deep vein thrombosis). A history of anticoagulant and antiplatelet therapy is especially significant for chronic SDH. One retrospective study found that among more than 200 patients admitted with chronic SDH, 39% were taking anticoagulants, antiplatelets. or a combination at the time of diagnosis.

#### Types of SDH

SDHs are categorized by the intervals between the precipitating event, symptom onset, and appearance of the blood in the subdural space, as shown on CT. An SDH may be acute, chronic, or acute on chronic.

With an acute SDH, bleeding fills

the subdural space rapidly, compressing brain tissue. This typically causes brain swelling, herniation, and eventually death. An estimated 50% of brain injuries and 60% of deaths in brain-injured patients result from acute SDHs; many survivors suffer severe neurologic disability.

*Chronic* SDH may follow a minor brain injury or certain procedures (such as lumbar puncture) or may arise spontaneously, especially in persons with cerebral atrophy. It may go unnoticed for weeks or months.

*Acute-on-chronic* SDH (Mrs. Jacobs's diagnosis) refers to chronic SDH that has been present for several weeks, with recent additional collection of hemorrhagic blood. Presenting signs and symptoms resemble those of an acute SDH.

Chronic SDH is primarily a disease of the elderly. Age-related atrophy reduces brain volume, which widens the subdural space and stretches the bridging vessels, making them more fragile and prone to rupture. Also, an atrophied brain tends to move more within the cranium, resulting in higher potential shearing forces on the bridging vessels even with relatively minor forces. Up to half of elderly persons who fall sustain brain injuries caused by indirect forces (tearing of the bridging vessels from brain motion) rather than direct head trauma. A widened subdural space from cerebral atrophy usually gives these hematomas room to expand without causing intracranial pressure to increase, while at the same time preventing pressure from rising high enough to cause tamponade of the bleeding vessels.

### Signs and symptoms of chronic SDH

Typically, chronic SDH is slow to develop and causes nonspecific signs and symptoms, whose severity varies with hematoma size, location, and thickness. Persistent Suspicion of chronic SDH is based on patient risk factors and history.



headache is a common complaint. Neurologic status changes (such as lethargy, confusion, gait and balance disturbances, recurrent falls, or seizures) usually prompt the victim to seek medical care.

As chronic SDH expands and exerts more pressure on the brain, level of consciousness (LOC) deteriorates and focal neurologic deficits (such as hemiparesis or dysphasia) may arise. Often confused for stroke, these developments warrant emergency surgery.

### **Diagnosing chronic SDH**

Suspicion of chronic SDH is based on patient risk factors and history. A noncontrast-enhanced CT head scan provides a definitive diagnosis, determining SDH location, size, and thickness and measuring midline shift. Hematoma staging commonly hinges on density of blood in the subdural space and timing relative to the precipitating event.

### **Managing chronic SDH**

No established standard of care exists for chronic SDH management. Surgical options include percutaneous twist-drill craniostomy (TDC), operative burr-hole evacuation, and craniotomy. Debate surrounds not just the surgical approach but also the number of burr holes, saline irrigation of the cavity, postoperative drain use, and postprocedural patient position and mobility.

For elderly patients with significant comorbidities, a minimally invasive bedside TDC eliminates the need for general anesthesia. A recent meta-analysis found bedside TDC offers the same efficacy as operative burr-hole evacuation. Craniotomy (bone flap removal with replacement) remains the procedure of choice for congealed blood in the subdural space and recurring hematomas, estimated to occur in up to 25% of cases after less invasive management.

### **Bedside TDC**

Because many patients with chronic SDH are receiving anticoagulants or antiplatelet agents, laboratory studies (prothrombin time, partial thromboplastin time, INR, and a complete blood count) should be obtained and values normalized before TDC. Fresh frozen plasma. vitamin K, or prothrombin complex concentrate may be given to reverse warfarin; a platelet transfusion may be administered emergently to manage patients receiving antiplatelet drugs, such as aspirin or clopidogrel. Be aware that antiplatelet therapy impairs the function but not quantity of platelets. A platelet transfusion replenishes functional platelets and is an accepted reversal agent for antiplatelet agents, independent of the patient's platelet count. Newer anticoagulants, such as direct thrombin inhibitors and factor Xa inhibitors, are more problematic to reverse. They should be withdrawn immediately and institutional algorithms or treatment guidelines should be implemented.

Because TDC involves cannula-

tion of the subdural space, caregivers must adhere strictly to aseptic precautions, including scalp preparation, antibiotic prophylaxis, and sterile garb and draping. Most patients can be managed with local anesthesia, but procedural medications (including sedatives) may be needed to calm a confused or anxious patient. In this case, clinicians must adhere to facility policies and procedures for moderate sedation. Use of end-tidal carbon dioxide (ETCO<sub>2</sub>) monitoring may prove beneficial given the typical patient population and risks of sedation in the elderly.

To begin, the neurosurgeon makes a small incision through the scalp to expose the skull and, using a twist drill, takes an angled approach through the bone to access the subdural space. When the dural membrane is fully breached, old blood flows freely. Depending on the system used, either a ventricular catheter is advanced via the burr hole into the clot or a subdural evacuation system with closedsystem drainage is threaded in place.

If a ventricular catheter is being used, it is tunneled under the scalp to help prevent infection and dislodgment. Then it's connected to an external drainage system, which is lowered at least 20 cm below the patient's head to create the pressure gradient needed to promote drainage. To avoid wetting the air filter in the collection chamber, the collection system must be kept upright to maintain a functional drainage system.

Expect the physician to order a postprocedural head CT scan to confirm drain placement and exclude complications, such as brain laceration or epidural bleeding. Typically, the drain stays in place for 24 to 48 hours. Every hour, monitor drainage for amount and characteristics and perform a focused neurologic exam. Know that drainage cessation may indicate TDC complications include bleeding, infection, pneumocephaly, a bleed in the opposing brain hemisphere, and herniation.

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catheter clotting, which necessitates physician intervention (manual aspiration or catheter flushing with preservative-free normal saline solution) to restore flow. Serial CT scans aid in assessing drainage adequacy. Rarely, a chronic SDH may be evacuated fully via subdural catheter drainage. However, reducing its size may promote the natural absorption process.

### Patient positioning during drainage

Positioning during drainage is controversial. Because chronic SDHs rarely increase intracranial pressure, many neurosurgeons favor the supine position with the head of the bed flat to encourage drainage and brain reexpansion. Enforced bed rest in elderly patients may lead to pneumonia, deep venous thrombosis, and aspiration. A 2007 study suggested better outcomes (without a clinically significant rise in complications) are achieved with the supine position, but more recent studies contradict these findings. At our hospital, the practice is to maintain the supine, flat head-ofbed position except for meals (unless contraindicated). During this time, the subdural drain is clamped and the patient is permitted to sit in a high Fowler's position.

### **TDC complications**

Potential complications of TDC include bleeding, infection, pneumocephaly, a bleed in the opposing brain hemisphere, and herniation. Simple pneumocephaly (air in the subdural space) results from lack of counterpressure on the evacuated subdural space; typically, CSF fills the space over time and mitigates this effect. Tension pneumocephaly occurs when air enters the subdural space and creates pressure within the cranial vault. As air exerts pressure on surrounding brain structures, the patient's LOC may decline. Considered a medical emergency, tension pneumocephaly almost always warrants a craniotomy for decompression.

### **Nursing considerations**

Nursing care for a patient who will undergo a TDC include preparing the patient and family for the procedure, obtaining informed consent, and obtaining baseline laboratory values (with appropriate interventions taken to normalize values). Because many patients with chronic SDH have significant cardiac comorbidities, continuous ECG and pulse oximetry should be used. If the patient will receive moderate or procedural sedation, ETCO<sub>2</sub> monitoring should be considered.

Obtain a thorough neurologic baseline assessment for comparison with subsequent neurochecks. Although procedural pain usually can be managed with local anesthesia, many patients may experience anxiety and some may have underlying delirium, requiring judicious use of anxiolytics or antipsychotic agents. In this case, decrease sensory stimuli, such as by turning off overhead lights and minimizing noise. Placing a pressure-relieving mattress or an air cushion under the patient's sacrum is recommended, as mobility is limited while the drain is in place. If the patient is allowed to sit upright for meals, encourage him or her to use incentive spirometry and perform coughing and deep breathing during this time. Monitor and document drainage output, including volume and character, every hour; report changes to the neurosurgeon immediately.

Postoperatively, teach the patient and family about the need for serial CT head scans, the prospect of surgical intervention in the event of a worsening CT scan or neurologic exam, and the need for comprehensive evaluation by the rehabilitation team to assess for neurologic deficits after the procedure.

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#### Scenario continued

When Mrs. Jacobs arrives at the trauma center, the neurosurgeon reviews her CT scan. Based on her presenting symptoms and cardiac history, he decides to perform a bedside percutaneous TDC with drain insertion. Before the procedure, Mrs. Jacobs requires 6 units of fresh frozen plasma to normalize

her INR. Using moderate sedation, the neurosurgeon inserts the subdural drain without adverse events. Over the next 24 hours. 150 mL of liquefied blood is evacuated. Then the drain is removed. The CT scan shows significant reduction in the volume of blood removed.

During her hospital stay, Mrs. Jacobs has episodes of symptomatic bradycardia with heart rates in the 40s. A cardiology consult leads to medication revision to manage her chronic atrial fibrillation. Physical, speech, and occupational therapists evaluate her for functionality and recommend her for home discharge with outpatient physical therapy. 🖈

Visit www.AmericanNurseToday.com/ Archives.aspx for a chart on SDH categories and a list of selected references.

The authors are senior clinical nurses at the R Adams Cowley Shock Trauma Center at the University of Maryland Medical Center in Baltimore.

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