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**Imaging Characteristics of the Subdural Evacuating Port System, a New Bedside Therapy for Subacute/Chronic Subdural Hematoma**

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## TECHNICAL NOTE

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# Imaging Characteristics of the Subdural Evacuating Port System, a New Bedside Therapy for Subacute/Chronic Subdural Hematoma

**SUMMARY:** The Subdural Evacuating Port System is a new device intended to simplify the treatment of subacute/chronic subdural hematomas. The appearance of the winged canula positioned with its tip in the diploic space overlying the subdural space should allow the radiologist to identify it correctly. Its radiographic features are described here to help the radiologist comment on appropriate placement, and avoid mistaking it for a misplaced subdural drain.

**T**he Subdural Evacuating Port System (SEPS) is a new therapy (Medical Designs, LLC, Sioux Falls, SD) designed to treat subacute or chronic subdural hematomas.<sup>1,2</sup> It can be placed at the bedside and permits drainage of fluid during a period of hours to days. The purpose of this report is to describe the imaging characteristics of this device.

### Case Report

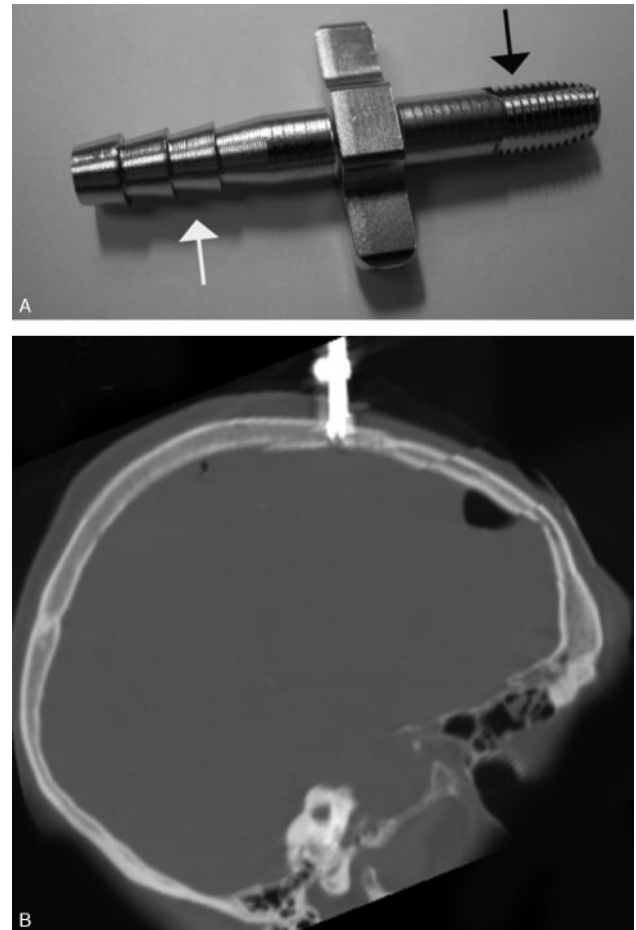
An 81-year-old man presented to our facility with 4 weeks of progressive gait instability and poor coordination of the left upper extremity. These symptoms began shortly after he fell on an icy pavement, striking his right parieto-occipital region. A head CT scan revealed a right convexity subdural hematoma with mass effect on the adjacent brain. The neurosurgical service was consulted, and they decide to treat the patient with the SEPS.

### Description of the Device

The SEPS consists of a stainless steel evacuating port, radiolucent silicone tubing, and a bulb suction device. It can be placed at the bedside by using a technique similar to that employed for the placement of a subarachnoid bolt used for intracranial pressure monitoring. After localizing the subdural collection by using superficial landmarks and making an appropriate skin incision, the surgeon places a single burr hole in the calvarium using a manual drill with a 5.8-mm drill bit. The dura is then opened and the metal evacuating port is manually screwed into the hole in the skull so that the tip is positioned in the diploic space, not extending beyond the inner table. The external portion of the evacuating port is then connected to the silicone tubing and bulb suction apparatus. Negative pressure ( $\leq 2.5$  cmHg) is applied by using a bulb for a variable time period, typically 24–48 hours, but until drainage of subdural fluid has ceased. The system is then removed and the skin sutured is closed.

### Imaging Characteristics

The SEPS can be distinguished radiographically from a typical, bolt-type intracranial pressure monitor. First, the SEPS evacuating port is larger, measuring 4.5 cm in length and 6 mm in tip width (Fig 1). It has metal wings, giving it the appearance of a cross on reformatted images (Fig 2). Second, the evacuating port consists entirely of stainless steel; typical in-



**Fig 1.** A, This image shows the metal device that is screwed into the burr hole. The threaded end (black arrow) is self-tapping. The notched tubing (white arrow) is then attached to the silicone tubing.

B, This reformat of the CT data shows the metal insertion portion of the device orientation perpendicular to the skull.

tracranial pressure monitors consist of a metal central core, with radiolucent wings to assist in placement. The SEPS is also easily distinguished from subdural catheters. The evacuating port is anchored into the diploic space and represents the most medial end of the device (Figs 3 and 4)—ie, there is no subdural catheter extending along the surface of the brain.

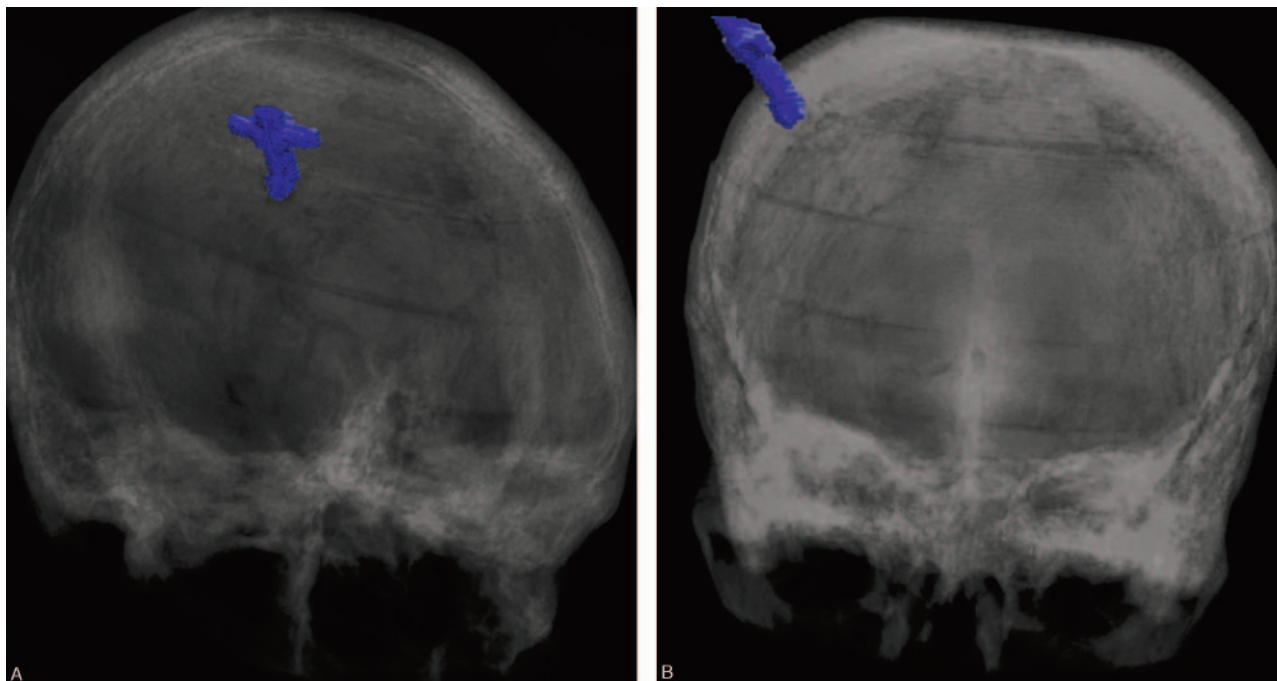
### Discussion

Although several surgical options exist for treatment of subacute and chronic subdural hematomas, recent studies

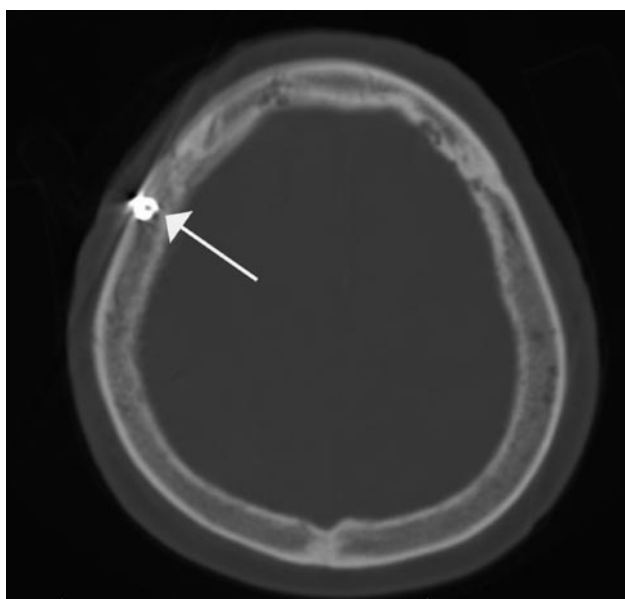
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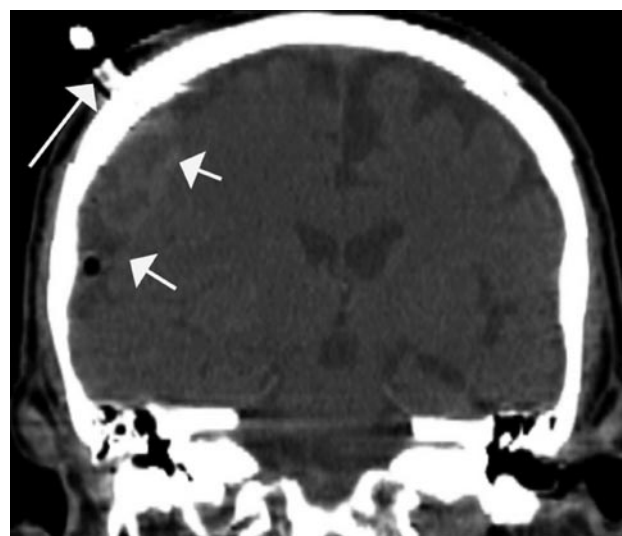


**Fig 2.** Oblique (A) and A-P (B) views, reformatted from CT data on a 3D workstation (Vitrea), demonstrate the winged canula and its relationship to the skull.



**Fig 3.** The bone image from that same study shows the tip of the device positioned in the diploic space of the right calvaria (arrow).

suggest that optimal management involves twist-drill catheter placement and drainage via a closed external drainage system.<sup>3</sup> This procedure can be performed either in the operative theater or at the bedside. The drainage system typically consists of a radiopaque catheter placed in the subdural compartment, which is connected to a Jackson-Pratt-type suction reservoir via a radiolucent connector tube. The SEPS is a new approach to treatment of subdural hematomas. The decision to use the SEPS may be based on several potential advantages over twist-drill catheter placement and drainage. The SEPS introduces mild, uniform negative pressure throughout the subdural space without direct contact with the brain, cortical or bridging vessels, or vascularized hema-



**Fig 4.** The reformatted 2D image demonstrates the relationships of the subdural hematoma (short arrows) and the device positioned in the skull (long arrow).

toma membranes. The risk of catheter-related parenchymal injury and iatrogenic hemorrhage are theoretically reduced. It is likely that radiologists practicing at neurosurgical centers will see an increasing number of CT scans after placement of this system. The system has unique imaging characteristics that distinguish it from bolt-type intracranial pressure monitors, as well as subdural catheters. It is important to be able to recognize the SEPS and comment on its appropriate placement.

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