OPEN ACCESS

Ong Sio LCL, et al. (2025): 16-19
Ameri J Reg Anes Pain Med 1(2): 100104
DOI: 10.71010/ajrapn.2025-e104

Case Report

American Journal of Regional Anesthesia & Pain Medicine

A Vanishing Subarachnoid Hemorrhage: A Case Report

Running Title: *Vanishing Subarachnoid Hemorrhage)*

Lady Christine L. Ong Sio, MD*, Raymond C. Yu, MD, Andres Perez, MD, Mohiuddin Hadi, MD, Alexander Bautista, MD, MBA, FASA

***Corresponding author:** Lady Christine L. Ong Sio, MD, University of Cincinnati, OH

Citation: Ong Sio LCL, Yu RC, Perez A, Hadi M, Bautista A (2025) A Vanishing Subarachnoid Hemorrhage: A Case Report. *Ameri J Reg Anes Pain Med*: AJRAPM-104.

Received Date: April 08, 2025; **Accepted Date:** May 15, 2025; **Published Date:** May 22, 2025

Abstract

Since its inception in the 1980's, an intrathecal drug delivery system (IDDS) has been a therapeutic cornerstone for refractory chronic pain and spasticity. An IDDS is a reasonably cost-effective treatment option. However, in cases of IDDS malfunction, quick clinical judgment is important to prevent consequences such as withdrawal symptoms and increased pain. We report the case of a woman who developed an altered mental status and a headache after undergoing a pump study to determine the cause of an IDDS malfunction.

Keywords: *intrathecal drug delivery system, chronic pain, subarachnoid hemorrhage.*

Introduction

With the significant healthcare burden and loss of productivity that chronic pain imposes, intrathecal drug delivery systems (IDDS) are reasonably cost-effective treatment options for suitable patients [1]. IDDS has expanded therapeutic options for patients with severe spasticity and dystonia who have failed conservative management and maximized oral medications [2].

An IDDS malfunction requires management. The patient may present with lack of efficacy or withdrawal symptoms that can be fatal. A normal functioning pump often yields clinical benefits if rates are increased, while a malfunctioning system may need surgical intervention [3]. Confirmation of any malfunction from the pump requires a pump study that often involves radiography to evaluate for catheter disconnection, catheter breakage, or rotor stalling. Further steps include aspiration of the catheter access port to evaluate for appropriate drug levels, ease of flow, or the injection of fluoroscopy or computed tomography (CT) imaging materials into the port to identify the problem or location of the catheter malfunction [3].

Case Description

A 64-year-old female was referred to the pain clinic with concerns about an opioid-based IDDS malfunction as she reported increased pain despite medication dosage adjustments. Her IDDS had been placed more than 3 years prior. She eventually underwent an IDDS study. 5mL iopamidol contrast dye was injected into the side port of the device and the dye was observed traveling through the catheter and into the intrathecal space under fluoroscopic guidance. A myelogram confirmed a patent catheter and no rotor stalling. Later in the day, she was seen in the emergency room with complaints of a headache and altered mental status. She had a Glasgow Coma Score of 14 with no neurologic deficits. A CT scan showed bilateral subarachnoid hemorrhages (SAH) with diffuse edema extending to the lateral ventricle, third ventricle, and basal cisterns with no midline shift (Figure 1). A CT angiogram of the head and neck did not demonstrate definite aneurysm. The neurosurgery service was consulted due to the presence of SAH and recommended observation.

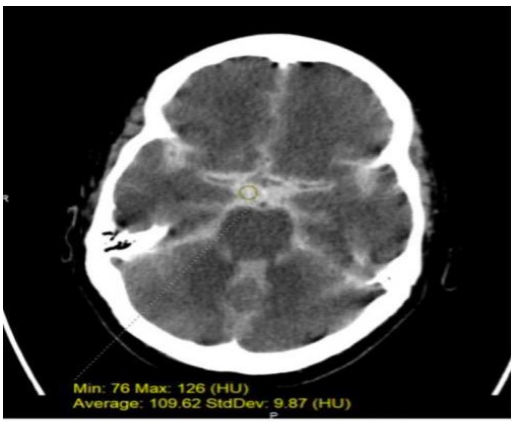

Figure 1: Computed tomography of the head without contrast at presentation, showing abnormal subarachnoid space hyper density with Hounsfield Units averaging 109.

On hospital day 2, her headache resolved without further interventions, and a repeat CT scan showed resolution of the SAH (see Figure 2). Upon further history taking, her altered mental status was potentially related to her failure to take her psychiatric medications at home. Her mental status improved upon resumption of her home medications.

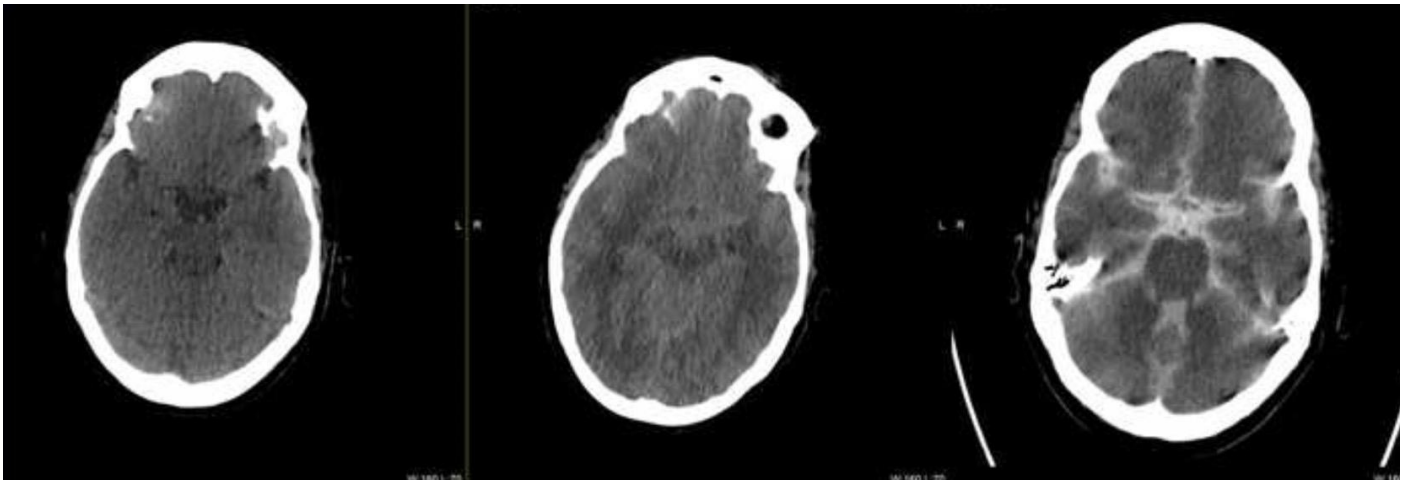

Figure 2: computed tomography of the head with serial follow up images, from newer to older: a) 48 hours, b) 24 hours, c) initial presentation.

Discussion

IDDS pump-related complications are very infrequent. Life-threatening complications of IDDS are often medication-related, i.e., overdose and withdrawal syndromes. However, infections, wound dehiscence, seroma formation, cerebrospinal fluid (CSF) leak, catheter-tip granuloma, and mechanical or hardware problems contribute to morbidity. A few case reports of subarachnoid hemorrhage after IDDS placement are found in the literature. One case reported a broken fragment of an intrathecal catheter that migrated into the pre-pontine cistern and caused venous bleeding. Another case hypothesized that trauma during the intrathecal insertion of the catheter could have resulted in hemorrhaging into the subarachnoid space with migration of blood intracranially, or possibly intracranial hypotension following the lumbar puncture, leading to SAH [4]. Although rare, SAH needs to be considered for patients who present with headache, confusion, and seizures, especially in the postoperative period.

The initial hypothesis that this patient's headache during the conduct of the dye study is rare but can be attributed to a change in CSF pressure [5]. Iopamidol is a water-soluble non-ionic contrast dye and is widely used for intravascular and intrathecal evaluation. The dye has intrinsic adverse effects that include headache, gastrointestinal upset, back, leg, and neck pain, and hypotension, and can interfere with subsequent imaging for up to 15 days [6]. This study highlights the importance of correlating the patient's history and examination with radiologic findings.

Differentiating the Hounsfield Units (HU) of contrast media versus blood can be utilized for correct diagnosis. Unclotted intravascular blood has a maximal range of 40-60 HU. Clotted blood has a slightly higher attenuation range of 45-100 HU but typically does not exceed 80 HU in density on CT scanners and acquisition techniques used at our institution [7]. The maximal HU of contrast media is usually more than 90 HU on brain CT [8]. Re-interpretation of our patient's initial CT imaging computing the HU of the suprasellar cistern densities revealed an average of 109 HU (figure 1) which clearly ruled out blood. A high-density HU does not exclude a mixture of blood and contrast which can be seen in intracerebral endovascular procedures with rupture and extravasation of dye [9]. Given the history of a recent IDDS study with contrast and no obvious cause for intracerebral SAH since the CT angiogram showed no aneurysm (figure 3), it can be inferred that the density seen on the imaging was subarachnoid contrast that had migrated from the thecal sac. Subsequent CT scans (figure 2) showed resolution of the densities, which is consistent with absorption of contrast dye by the body [9].

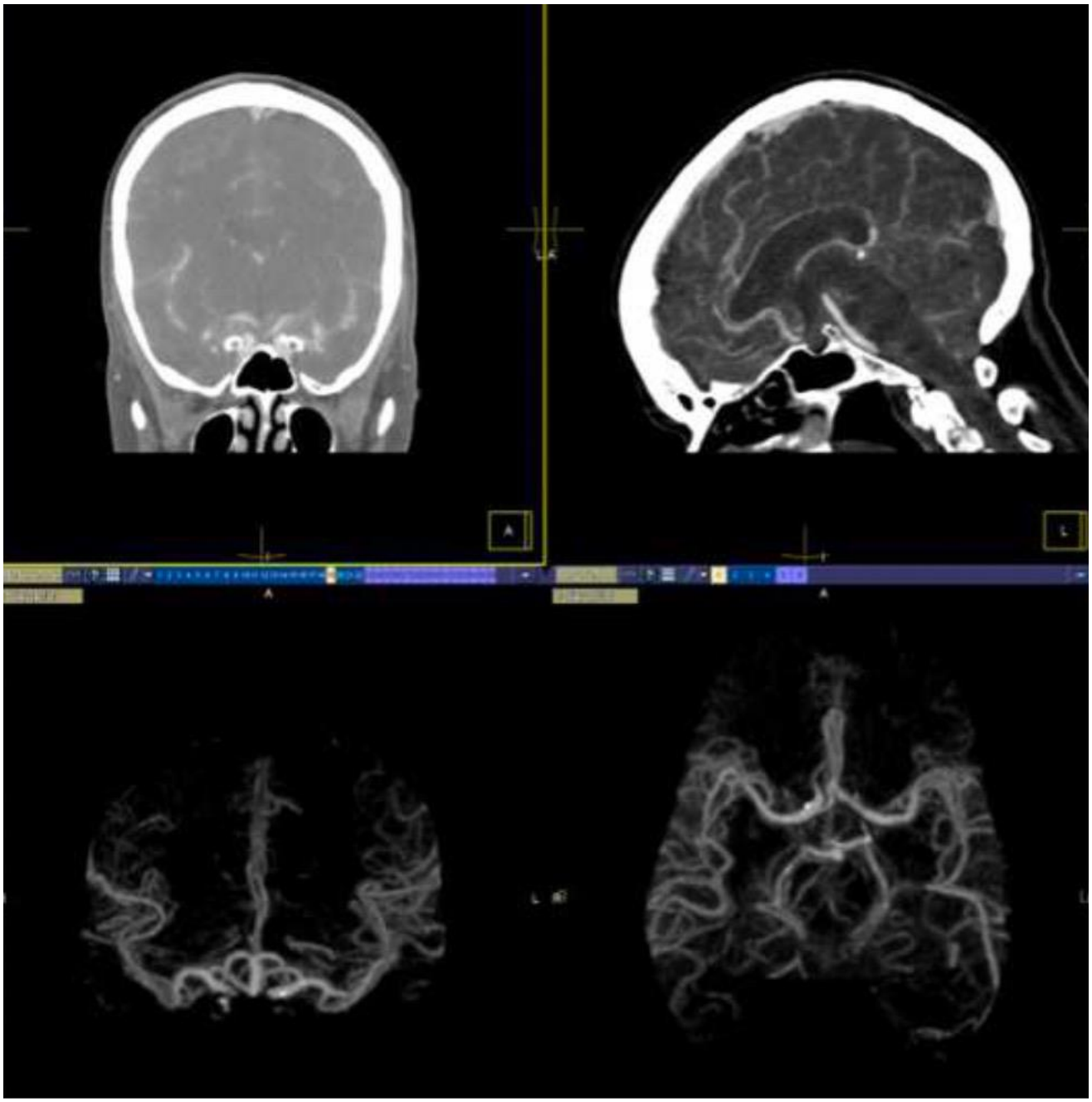

Figure 3: computed tomography angiogram of head and neck performed for initial suspicion of subarachnoid hemorrhage, which was negative for aneurysm or vascular malformation.

Pain physicians frequently utilize radiologic imaging for the evaluation and treatment of chronic pain. It is imperative that providers possess the knowledge and ability to interpret these images. Collaboration with radiologists and neurosurgeons is also important. Reliance solely on radiologic readings without correlation to a patient's history and examination may lead to misdiagnosis.

The evaluation of an established implanted pump typically occurs in response to clinically detected changes in the effect of the drug being administered or the unexpected discovery of a high volume of the drug in the pump reservoir during a refill procedure. Diagnosis of the underlying issues can be very challenging, and patients with a recurrence or worsening of pretreatment symptoms despite previous successful therapy require a thorough evaluation of the infusion system for proper clinical management. Patients with normal functioning infusion systems often respond to increased drug infusion rates, whereas patients with a malfunctioning system often need surgical intervention. In some cases, drug concentration or programming errors can be caught and corrected with the resumption of clinical benefit.

Traditional evaluation algorithms include first using minimally invasive strategies such as radiographic imaging for obvious catheter breaks or disconnections and rotor studies under fluoroscopy [11]. If no abnormality is found, aspiration of the catheter access port (CAP) to evaluate for appropriate drug levels and ease of flow, or the injection of fluoroscopy or computed tomography (CT) imaging materials into the CAP may reveal the problem [7,11]. The more recently described technique of CAP injection along with CT imaging also is an option to evaluate for subdurally placed catheters and to identify the location of the catheter malfunction.

Author Contributions:
LCOS, RCY, AP: These authors helped with research, literature review, manuscript writing, and editing of final manuscript.
MH, AB: These authors helped with manuscript writing, revision, and editing of final manuscript.

Declaration of interests: None
Financial Disclosures: None

HIPAA Authorization:
All patient protected health information has been de-identified. As the case report is devoid of patient identifiable information, it is exempt from IRB review requirements as per our institution's policy. The patient has signed a medical information release giving permission for Images and records.

References

1. Sommer B, Karageorgos N, AlSharif M, Stubbe H, Hans FJ. Long-term outcome and adverse events of intrathecal opioid therapy for nonmalignant pain syndrome. *Pain Pract*. 2020;20(1):8-15. doi:10.1111/papr.12818
2. Awaad Y, Rizk T, Siddiqui I, Roosen N, McIntosh K, Waines GM. Complications of intrathecal baclofen pump: prevention and cure. *ISRN Neurol*. 2012;2012:575168. doi:10.5402/2012/57516.
3. Yowtak J, Cato K, Williams H, et al. Indium 111 diethylenetriamine pentaacetic acid scintigraphy in the identification and management of intrathecal pump malfunction. *PM R*. 2013;5(1):32-38. doi:10.1016/j.pmrj.2012.07.010.
4. Broadhurst H, Thumbikat P, Romanowski CA, Nair KP. Subarachnoid haemorrhage: an unusual complication of implantation of an intrathecal baclofen pump [published correction appears in Spinal Cord Ser Cases. 2016 Jul 21;2:16019]. *Spinal Cord Ser Cases*. 2015;1:15019. Published 2015 Oct 8. doi:10.1038/scsandc.2015.19.
5. Wang YF, Fuh JL, Lirng JF, Chang FC, Wang SJ. Spontaneous intracranial hypotension with isolated cortical vein thrombosis and subarachnoid haemorrhage. Cephalalgia. 2007;27(12):1413-7.
6. Kleefield J, Chirico-Post J, Levine HL, Srinivasan MK, Harris JM, 3rd, Rommel AJ, et al. Iopamidol in lumbar myelography. Surg Neurol. 1983;20(2):165-70
7. Oh MS, Kwon JE, Kim KJ, et al. Subarachnoid hemorrhage mimicking leakage of contrast media after coronary angiography. *Kor Circ J*. 2012;42(3):197-200. doi:10.4070/kcj.2012.42.3.197
8. Pokersnik JA, Liu L, Simon EL. Contrast-induced encephalopathy presenting as acute subarachnoid hemorrhage. *Am J Emerg Med*. 2018;36(6):1122.e3-1122.e4. doi:10.1016/j.ajem.2018.03.005
9. Yoon W, Seo JJ, Kim JK, Cho KH, Park JG, Kang HK. Contrast enhancement and contrast extravasation on computed tomography after intra-arterial thrombolysis in patients with acute ischemic stroke. *Stroke*. 2004;35(4):876-881. doi:10.1161/01.STR.0000120726.69501.74.