**Title**

Pseudo-Subarachnoid Hemorrhage After Inadvertent Dural Puncture During Cervical Epidural Steroid Injection

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**Introduction**

A cervical epidural steroid injection (CESI) is a common procedure performed to treat chronic cervical intervertebral disc disease and cervical radiculopathy. Risks include but are not limited to infection, bleeding, nerve damage, and dural puncture. Subarachnoid hemorrhage (SAH) is a condition where blood in the subarachnoid space can manifest with symptoms including headache, respiratory depression, loss of consciousness, neurological deficits, and even death. There is some overlap between the symptoms of SAH and the cited complications of a CESI listed above. SAH has not been reported in the literature as a complication of a CESI. Inadvertent subarachnoid contrast during a CESI has been reported as a cause of Pseudo-Subarachnoid hemorrhage (PSAH). We present a case of PSAH after unintentional dural puncture and subsequent injection of contrast during CESI.

**Case Report**

An 84 year old female with chronic cervical radiculopathy was transferred to the Surgical Intensive Care Unit (SICU) with the diagnosis of diffuse SAH. On the morning of admission, the patient had received a CESI from an outside practitioner. Immediately after receiving the injection, she reported a sudden feeling of headache and paralysis in all her extremities. She became hypoxic which required BiPAP to keep oxygen saturations above 90%.

Due to her persistent symptoms in the SICU, a CT scan of her head was performed. The CT was read as diffuse SAH. A subsequent CT angiogram of her head showed no evidence of aneurysm. Over the course of 6 hours, the patient’s symptoms completely resolved including all neurologic deficits. After further discussion with the neurointerventional radiologist, it was concluded that this was a case of PSAH caused by intrathecal injection of contrast.

**Discussion**

PSAH is a condition in which there appears to be attenuation in the basal cisterns with displacement of cerebrospinal fluid (CSF) mimicking true subarachnoid hemorrhage1. The most common cause of this is cerebral edema following marked hypoxic-ischemic injury3. Other causes include pyogenic meningitis, spontaneous intracranial hypotension, venous sinus thrombosis, bilateral subdural hemorrhage, intrathecally administered contrast material, and leakage of high-dose intravenous contrast medium into the subarachnoid spaces3,4.

Literature search proposes that CSF studies can aid to rule out PSAH. There is debate regarding the utility of the Hounsfield units (HU) which helps to discriminate hyperintensity of SAH from PSAH5. In one study reviewing Hounsfield units, patients with PSAH had mean values ranging from 29 to 33 HU as compared to values of 60 to 70 HU typical of true SAH2. A misdiagnosis of SAH when PSAH is present can lead to the patient incurring risks from misdiagnosis as well as interventional procedures. The treatment of a true SAH includes interventions such as clipping or coiling of an intracranial aneurysm. In many instances, treatment also includes a lengthy ICU stay for hemodynamic stabilization and monitoring for vasospasm. Therefore, PSAH should cautiously be on the differential diagnosis if radiological findings are found after the completion of a neuraxial procedure in which contrast is used.

**References**

1. Agha A, Al-Hakami M. A Case Report of Pseudo-Subarachnoid Hemorrhage. *Maedica*. 2011 Jul;6(3):210-2.
2. Given CA 2nd, Burdette JH, Elster AD, Williams DW 3rd. Pseudo-subarachnoid hemorrhage: a potential imaging pitfall associated with diffuse cerebral edema. *AJNR Am J Neuroradiol*. 2003 Feb;24(2):254–6.
3. You JS, Park S, Park YS, Chung SP. Pseudo-subarachnoid hemorrhage. *Am J Emerg Med*. 2008 May;26(4):521.e1-2.
4. Lin CY, Lai PH, Fu JH, Wang PC, Pan HB. Pseudo-Subarachnoid Hemorrhage: A Potential Imaging Pitfall. *Can Assoc Radiol J*. 2014 Aug;65(3):225-231.
5. Avrahami E, Katz R, Rabin A, Friedman V. CT diagnosis of non-traumatic subarachnoid haemorrhage in patients with brain edema. *Eur J Radiol*. 1998 Oct;28(3):222-5.