



<https://doi.org/10.1016/j.jemermed.2018.04.023>

## Clinical Communications: Adult

### CHEST PAIN AS A MANIFESTATION OF INTRACRANIAL HYPOTENSION: REPORT OF FOUR CASES

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□ **Abstract—Background:** Chest pain has not been recognized as a manifestation of intracranial hypotension secondary to cerebrospinal fluid leakage. **Case Report:** We report on 4 patients with intracranial hypotension diagnosed by the pattern of headaches, temporal proximity to dural puncture, magnetic resonance imaging findings, and resolution of symptoms after epidural blood patch who presented with chest pain. The chest pain was episodic, located in the sternal and interscapular region for the first 3 patients, with no radiation to any other region and no clear relationship to exertion. The fourth patient had episodic chest pain located in the subclavicular and suprascapular region. Two patients reported dyspnea with chest pain. Underlying coronary artery ischemia was excluded using a combination of the electrocardiogram and cardiac enzyme assays. The pain resolved after epidural blood patch treatment. **Why Should an Emergency Physician Be Aware of This?:** Clinicians should be aware of chest pain that can be seen with intracranial hypotension and cerebrospinal leakage to ensure appropriate diagnostic tests and treatment. © 2018 Elsevier Inc. All rights reserved.

□ **Keywords—**intracranial hypotension; chest pain; epidural blood patch; cerebrospinal fluid leak; headaches; coronary ischemia

#### INTRODUCTION

Intracranial hypotension is characterized by an orthostatic headache caused by low cerebrospinal fluid (CSF) pressure of spontaneous origin or secondary to cerebrospinal fluid leakage (1). The incidence of this disease is estimated to be 5/100,000/year, with peak occurrence in the fourth or fifth decade. However, misdiagnosis is common, and more likely the actual incidence is considerably greater (2–6). Women are more commonly affected than men, with the peak incidence seen around 40 years of age (7–11). The headache develops in temporal relation to the low CSF pressure or CSF leakage. The headache occurs within seconds of assuming an upright position and resolves quickly (within 1 min) after lying down. Alternatively, the relationship of headache with posture may be delayed, with worsening occurring after minutes or hours of being upright and partial or complete resolution occurring after minutes or hours of lying down. Posterior neck pain or stiffness, nausea, and vomiting are common and can be seen in approximately 50% of patients (3,9,12). Tinnitus and hypacusia, visual blurring or visual field defects, diplopia, facial numbness or pain, and facial weakness or spasm (facial nerve) are infrequently reported (3,9,12). Interscapular pain or, rarely, local back pain at the site of the cerebrospinal fluid leak has been reported (3,9,12). Radiculopathy at the level of the leak within the spinal neuraxis may occur in 6% of cases (13). The symptoms resolve after

RECEIVED: 31 January 2018;

ACCEPTED: 10 April 2018

normalization of CSF pressure. However, chest pain has not been recognized as a symptom of intracranial hypotension.

We report 4 patients with intracranial hypotension who presented with chest pain mimicking coronary ischemia in addition to orthostatic headaches. We used a standard questionnaire to inquire about characteristics of chest pain with emphasis on location, quality, frequency, duration, severity, radiation, associated symptoms, and relieving and aggravating factors (14).

## CASE REPORTS

### *Patient 1*

A 28-year-old man presented with sudden-onset headache that occurred during intercourse. He described it as sharp shooting pain and felt pressure on his head, rating it 9/10 intensity on the pain scale. The headache was accompanied by neck stiffness. The patient had nausea during the episode. The patient denied vomiting, photophobia, or phonophobia, any history of migraines, or family history of headaches. Magnetic resonance imaging and computed tomography angiogram of the head showed no abnormalities. The patient then had a lumbar puncture. The opening CSF pressure was 5 mm Hg by fluid-coupled measurements and 11.5 cm of H<sub>2</sub>O by fluid column method. After the procedure, the patient developed worsening of the headache. He described it as sharp and throbbing pain, associated with nausea and vomiting. Headache was worse in an upright position, with the severity of 8/10, which reduced to 5/10 in the supine position. The patient received hydrocodone-acetaminophen, naproxen sodium, morphine injection, and caffeine infusion for headache during the hospital stay, without any improvement in symptoms. The patient then underwent magnetic resonance imaging of the brain with gadolinium enhancement that demonstrated diffuse dural enhancement, the downward descent of cerebellar tonsils, and slit-like ventricles, confirming the diagnosis of intracranial hypotension related to CSF leakage.

The patient also developed sharp chest pain. He rated it as 7/10 in severity. The chest pain was episodic, located in the sternal and interscapular region (Figure 1), with no radiation to any other region. It was accompanied by dyspnea. The chest pain episodes could last for up to 6 h and be partially relieved by rest. The patient denied any previous history of chest pain. Electrocardiogram was done, which did not identify any ST-segment changes or T-wave abnormalities. Serum creatinine phosphokinase and troponin T levels were within normal ranges. A chest radiograph was unremarkable.

The patient underwent epidural blood patch using a left paramedian approach. An 18-gauge spinal needle

was inserted between spinous processes and laminae of L3 and L4 vertebrae under fluoroscopic guidance. The epidural space was identified with linear opacification of the posterior epidural space using radiopaque contrast injection (ISOVUE-M-200, Iopamidol; Bracco Diagnostics, Princeton, NJ). A total of 25 cc of autologous venous blood (with 4.5 cc of Iopamidol) was injected into the epidural space. The patient reported resolution of both headaches and chest pain after the procedure. The patient was evaluated 1 month after the procedure and did not report any recurrence of headache or chest pain.

### *Patient 2*

A 34-year-old woman presented with a 4-day history of progressive sharp headache that was located primarily in the occipital region that then became holocephalic, with increasing severity in the frontal region. Headache was associated with neck stiffness, nausea, vomiting, fever, and photophobia. The patient had a past medical history of complex regional pain syndrome, with below-the-knee amputation of the right lower extremity.

The patient underwent a lumbar puncture and was diagnosed with nonspecific viral meningitis. After lumbar puncture, she developed worsening of the headache, localized in the high cervical segment with extension into the occipital and frontal regions. Headache was accompanied by nausea, photophobia, and central chest pain. The headache was worse in an upright position, with severity rated as 10/10 that reduced to 5/10 in the supine position. The patient underwent magnetic resonance imaging of the brain with gadolinium enhancement that demonstrated protrusion of the cerebellar tonsillar through the foramen magnum, slit ventricles, and enhancement of the dura. The patient received oxycodone-acetaminophen, intravenous caffeine, tramadol, and butalbital-acetaminophen-caffeine, without any improvement in symptoms.

The chest pain was episodic and described as sharp and very severe. The chest pain was worse with movement, deep inspiration, and coughing, extending into the back–interscapular region (Figure 1) and was accompanied by dyspnea. There were no alleviating factors for the chest pain. The patient denied any complaints of similar chest pain in the past. Electrocardiogram did not identify any ST-segment changes or T-wave abnormalities. Creatinine phosphokinase and troponin T levels were within normal limits. A chest radiograph was unremarkable. Computed tomography angiogram of the chest excluded pulmonary embolism.

The patient underwent epidural blood patch using the left paramedian approach as described above. The patient reported improvement in severity of headaches during upright posture to 4/10 in severity, with a resolution of

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