Sudden onset of unilateral facial flushing is a potentially ominous sign that warrants immediate investigation. Nurses must be able to distinguish between serious, life-threatening disorders and more benign causes. We describe sudden onset of unilateral facial flushing in a postoperative patient receiving a thoracic epidural anesthetic. We discuss the differential diagnoses for unilateral facial flushing and the pathophysiology of harlequin syndrome, a rare complication of epidural anesthesia.

**Differential Diagnosis**

The differential diagnosis for unilateral facial flushing includes a wide range of causes, from severe and life threatening to relatively benign processes. When an acute unilateral change occurs in a patient’s function or appearance, the nurse should first consider a neurovascular cause. Because such a cause may be immediately life threatening, neurovascular disease should be excluded before other potential causes are considered. According to case reports, unilateral facial flushing can be a sign of acute stroke, possibly due to failure of the autonomic nervous system. The neurovascular examination should include use of the National Institutes of Health Stroke Scale to rule out the possibility of an acute stroke. Any abnormal findings should be immediately reported to the patient’s health care provider.

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CASE REPORT

A 56-year-old woman underwent a bilateral lung transplant without the use of cardiopulmonary bypass for end-stage lung disease associated with chronic obstructive pulmonary disease. She had a history of anxiety, panic disorder, and gastroesophageal reflux disease. Her operative course was unremarkable; she received 1 unit of packed red blood cells, 3000 mL of crystalloid, and 500 mL of 5% albumin intraoperatively. After the surgery, she was transferred to the cardiothoracic vascular intensive care unit in stable condition. She was receiving a continuous infusion of propofol and remained intubated overnight. Vascular access consisted of a central venous catheter placed in the patient’s right internal jugular vein before surgery (9F, 2-lumen MAC central venous access catheter, Arrow International Inc).

By the morning of postoperative day 1, the patient’s hemodynamic status was stable; she had received minimal fluid boluses overnight and had been successfully weaned from all intravenous vasoactive medications. The acute pain service was consulted for placement of an epidural catheter and pain management. With the patient in the seated position and still receiving mechanical ventilation, an epidural catheter was placed without difficulty at the T7 level. The catheter was placed at 11 cm at the skin and threaded 5.5 cm into the epidural space. A basal infusion of 0.75% bupivacaine at 2 mL/h was started.

On postoperative day 2, the patient said the pain control was inadequate, and the pain service was asked to increase the basal rate of the epidural infusion from 2 mL/h to 3 mL/h with a patient-controlled analgesic dose of 1 mL. After adjustments, the patient reported improved pain control; however, she noted that relief was greater on the left side of her chest than on the right. The nurse noted a new onset of flushing on the right side of the patient’s face with a sharp demarcation down the midline (see Figure). The left side of the face appeared pale; the right side was red and warm to the touch. No swelling was detected. The results of a neurological examination were unremarkable. The patient had no miosis, ptosis, or cranial nerve dysfunction. No diplopia, nystagmus, or photophobia was noted.

A bedside ultrasound examination revealed a patent internal jugular vein without signs of thrombus or flow obstruction. The central venous catheter was aspirated without difficulty. After consultation with the acute pain service, the epidural catheter was pulled back to 9 cm, leaving 3 cm in the epidural space. The bupivacaine infusion was then stopped for 3 hours.

Overnight, the patient’s signs and symptoms resolved but returned with lessened severity once the bupivacaine infusion was resumed. The central venous catheter was removed 2 days later when the patient was transferred out of the ICU. Her remaining stay in the hospital was uneventful, and she was discharged home a week later.

Figure  Patient with harlequin syndrome.
After potentially life-threatening causes have been excluded, other conditions that should be considered include idiopathic hyperhidrosis,\textsuperscript{1,3} Frey syndrome,\textsuperscript{4,5} Horner syndrome,\textsuperscript{6} brain or thoracic tumors,\textsuperscript{1,7} and harlequin syndrome.\textsuperscript{8} Differential diagnoses for unilateral facial flushing with distinguishing features are shown in the Table.

**Discussion**

First described by Lance et al.,\textsuperscript{8} harlequin syndrome is characterized by unilateral flushing of the face with a sharp demarcation down the midline. The flushing may also be accompanied by sweating and is usually elicited by hot temperatures, emotional response, or strenuous exercise. Harlequin syndrome should not be confused with harlequin ichthyosis, a rare autosomal recessive skin disorder in newborns, although the latter is sometimes also referred to as harlequin syndrome.

Classically, harlequin syndrome is a disorder of the autonomic nervous system that is typically idiopathic, although it may be a manifestation of a number of nervous system disorders, including Guillain-Barré syndrome, Bradbury-Eggleston syndrome, and diabetic neuropathy.\textsuperscript{9} Whatever the proximate cause, a unilateral blockage of the sympathetic innervation of the face occurs, resulting in the inability of the facial vasculature to dilate in response to normal stimuli (eg, heat or emotion) that would typically result in facial flushing.\textsuperscript{10} Because the blocked transmission is unilateral, the lack of flushing and sweating is restricted to one side of the face while the other side becomes reddened as a normal response.

In addition to primary neurological causes, other reported causes of harlequin syndrome include mechanical disruption of the autonomic nervous system. Neuropraxia of the sympathetic innervation of the face occurs after internal jugular catheterization has been implicated as a cause of transient harlequin syndrome.\textsuperscript{11} Additionally, cases of harlequin syndrome associated with the administration of regional anesthetics, including extradural bupivacaine infusion,\textsuperscript{30} high thoracic paravertebral anesthesia\textsuperscript{12-14}, and asymmetrical epidural anesthesia\textsuperscript{15-17} have been reported.

Harlequin syndrome must be distinguished from Horner syndrome. Both are characterized by unilateral facial flushing, but Horner syndrome is accompanied by ocular phenomena, including ptosis and miosis.\textsuperscript{6} The preganglionic fibers responsible for the innervation of the vasomotor reflexes of the face arise from the upper thoracic branches at the level of T2-T3, whereas oculomotor branches arise at T1.\textsuperscript{13,14}

In all cases of harlequin syndrome related to asymmetric epidural anesthesia, investigators\textsuperscript{13,15,17} have theorized that a marked rostral distribution of the local anesthetic in a unilateral fashion resulted in blockade of sympathetic innervation of the face and the resulting harlequin syndrome. Local distribution of anesthetic in the epidural space is more likely to proceed cephalad when the drug is injected in a low thoracic site (T6-L1).\textsuperscript{18} Additionally, a patient’s body position at the time of injection or infusion may play a role, particularly in the unilateral distribution.\textsuperscript{12,14,16}

In our case, normal results on the neurological examination suggested that acute stroke was not responsible for the signs and symptoms in question. Because of the normal results, computed tomography of the head was not deemed necessary. The lack of ocular signs and symptoms eliminated Horner syndrome from the differential diagnosis for unilateral facial flushing includes a wide range of causes, from severe and life threatening to relatively benign processes.
sympathetic innervation of the face. Local anesthetic resulted in blockade of a marked unilateral rostral distribution of the asymmetric epidural anesthesia, most likely caused by asymmetric epidural anesthesia. In all cases of harlequin syndrome related to asymmetric epidural anesthesia, most likely harlequin syndrome in our patient. Insertion of the internal jugular catheter suggest that asymmetric epidural anesthesia was the most likely cause of harlequin syndrome associated with asymmetric epidural anesthesia. In most instances, harlequin syndrome is not harmful and no treatment is needed. Symptoms are usually transient and resolve after discontinuation of the epidural infusion. Although we are not aware of any reports of permanent damage related to harlequin syndrome, the total number of cases reported is quite small.

In some cases, placement of the epidural catheter may require adjustment, especially if the uneven distribution of the infusion interferes with proper pain control. In our case, temporary discontinuation led to a decrease in signs and symptoms and allowed the differential diagnosis to be narrowed. Thus, temporarily stopping the infusion may be useful for differential diagnosis, but continuation of epidural anesthesia in patients with harlequin syndrome has not been harmful.

For any patient with sudden onset of unilateral facial flushing, potentially serious neurological causes must be considered and eliminated before harlequin syndrome is diagnosed. Particular attention should be paid to the patient’s mean arterial pressure and coagulation status, because severely elevated mean arterial pressure and altered coagulation (likely in patients receiving aspirin, warfarin, heparin, or other anticoagulants) may predispose the patient to acute stroke. Therefore, a neurological assessment should be conducted as early as possible to ensure that there is no deviation from the patient’s normal function. An ophthalmological consultation should be considered to assess possible eye or vision involvement. Any abnormality should be further investigated, and computed tomography of the head should be considered in patients with abnormal findings on neurological assessment to determine if acute stroke is the cause of the symptoms.

Recent internal jugular cannulation may suggest a complication such as cervical neuropaxia; however, administration of epidural anesthetic should also be considered as a potential cause. Fortunately, harlequin syndrome is a relatively benign complication and is often easily corrected by discontinuing the anesthetic or adjusting placement of the epidural catheter. Education to reassure patients and their family members is important. Even though harlequin syndrome is benign, the symptoms may be highly disconcerting.

Implications for Nursing Practice

Nurses working in areas such as postanesthesia care units, surgical intensive care units, and cardiothoracic intensive care units where patients commonly receive epidural anesthetics should be aware of the potential for harlequin syndrome associated with asymmetric epidural anesthesia. In most instances, harlequin syndrome is not harmful and no treatment is needed. Symptoms are usually transient and resolve after discontinuation of the epidural infusion. Although we are not aware of any reports of permanent damage related to harlequin syndrome, the total number of cases reported is quite small.

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In all cases of harlequin syndrome related to asymmetric epidural anesthesia, most likely a marked unilateral rostral distribution of the local anesthetic resulted in blockade of sympathetic innervation of the face.
Harlequin Syndrome as a Complication of Epidural Anesthesia
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