

## Postoperative Singultus: An Osteopathic Approach

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**Singultus, or hiccups, is a common medical condition. Despite exponential leaps in medicine, the pathophysiologic cause remains poorly defined. Persistent singultus has been associated with conditions such as pulmonary embolism and myocardial infarction. Singultus is also a well-known postoperative complication. The criterion standard of care for patients with singultus involves ruling out lethal pathologic causes, attempting physical stimulation with Valsava maneuvers or drinking water, and, if no relief has been achieved, administering drugs to ease the symptoms. The authors report a case of a man whose postoperative singultus was successfully managed with osteopathic manipulative treatment. This approach addresses many of the possible underlying neuromechanical causes of the aberrant reflex with minimal potential for adverse effects. Physicians should consider osteopathic manipulative treatment in the care of patients with singultus.**

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**S**ingultus, or hiccups, is caused by a spasmodic contraction of the diaphragm that produces an inhalation that is abruptly stopped by closure of the glottis.<sup>1</sup> Singultus is classified by the longevity of the episode: episodes lasting less than 48 hours are classified as a “bout,” episodes lasting from 48 hours to 1 month are classified as “persistent,” and episodes lasting longer than 1 month are classified as “intractable.”<sup>2</sup>

Although singultus is a common condition, the pathologic process or physiologic purpose is poorly understood. According to Lewis,<sup>3</sup> singultus has been documented dating back to the times of Hippocrates, Celsius, and Galen, who proposed everything from “inflammation of the liver” to “rigors” as the cause of the condition. The current physiologic model proposes a reflex arc with an afferent limb involving the vagus nerve, the phrenic nerve, and the sympathetic chain signaling to an uncertain central mediator and ending with an efferent limb involving the phrenic nerve and accessory connections to the glottis and inspiratory intercostal muscles.<sup>4</sup> Singultus is commonly noted in utero, suggesting that it may be a primitive reflex for programming fetal inspiratory muscles.<sup>3</sup>

Persistent singultus can be a sign of serious underlying causes including thoracic neoplasia, asthma, bronchitis, pneumonia, pleuritis, chest trauma, acute myocardial infarction, pericarditis, pulmonary embolism, metabolic derangement, postoperative complication, medication adverse effects, or a psychosomatic disorder.<sup>5</sup> Singultus is a well-known potential postoperative complication with many possible underlying causes, including phrenic nerve stretching during head positioning for intubation, physical irritation from intubation, mechanical ventilation, and gastric distention. Postoperative patients are also at higher risk

for the aforementioned causes of persistent singultus, including metabolic derangement, pulmonary embolism, and acute myocardial infarction.<sup>4,5</sup>

We report the case of a patient with postoperative singultus that resolved after osteopathic manipulative treatment (OMT). Our case demonstrates how OMT is an effective treatment option for such patients, particularly when pharmacologic treatment is not preferred.

## Report of Case

A 72-year-old man presented to the emergency department with difficulty breathing. He had undergone an open left rotator cuff repair 6 days before presentation and had had singultus since his surgical procedure. The patient had undergone general anesthesia and had a catheter placed on his left side for interscalene brachial plexus block before the operation. The catheter was removed 2 days later. The frequency of the patient's singultus had been increasing since admission to the emergency department, and the patient felt as though he could not catch his breath. He had attempted to abate his singultus by holding his breath and drinking cold water, which had not helped, so his wife brought him in for evaluation. Medical history was notable for Parkinson disease, hypertension, hyperlipidemia, arthritis, benign prostatic hypertrophy, and gastroesophageal reflux disease.

Aside from the singultus-induced shortness of breath and postoperative shoulder pain, the patient denied having fevers, chills, headaches, visual disturbances, coughing, chest pain or tightness, palpitations, dizziness, or leg swelling. He had undergone other surgical procedures, including bilateral inguinal hernia repairs, a hammertoe correction, bilateral blepharoplasty, bilateral cataract removal with lens replacement, and a transurethral resection of the prostate, without experiencing postoperative singultus or other complications. He denied alcohol, tobacco, or other illicit drug use. He was retired and living at home with his wife. Family history included a father with coronary artery disease who died

of end-stage renal disease and a mother with diabetes and hypertension who died of coronary artery disease.

The patient's medications included hydrochlorothiazide/triamterene (25-37.5 mg once daily) for hypertension and carbidopa/levodopa (25-100 mg 3 times daily) for Parkinson disease. After his operation, the patient had been prescribed tramadol hydrochloride (50 mg every 6 hours as needed for pain) and naproxen sodium (200 mg every 6 hours as needed for pain). The patient was initially prescribed narcotic pain medications after his operation but stopped taking them after he had visual hallucinations. He also reported an allergy to sulfonamide drugs.

Physical examination revealed a mildly distressed man sitting upright. His vital signs at the time were a temperature of 98.4°F, a pulse rate of 65/min, a respiratory rate of 16/min, and a blood pressure of 135/75 mm Hg. His oxygen saturation level while breathing room air was 98%. Findings from his head, eyes, ears, nose and throat, or HEENT, examination included a normocephalic and atraumatic head and a supple neck with a small bandage on the left side where the interscalene brachial plexus block had been placed. The patient's lung fields were clear to auscultation bilaterally, and cardiac auscultation revealed normal S<sub>1</sub> and S<sub>2</sub> sounds with no appreciable rubs, gallops, clicks, or murmurs. His abdomen was soft, nontender, and nondistended, and his left arm was still in the immobilizer from the orthopedic operation. Musculoskeletal examination revealed a bilateral hemidiaphragm restriction with asynchronous respiratory motion; inhibited firing of the left anterior, middle, and posterior scalenes; severe myofascial restriction of the thoracic outlet; C3-C5 spinal levels were flexed, rotated, and sidebent left; and his head was held grossly in left sidebending position secondary to positioning of the shoulder brace strap. Chest radiograph revealed no acute cardiopulmonary process and computed tomographic angiogram of the chest showed no evidence of pulmonary embolism. Blood cultures revealed no growth after 7 days, cardiac enzymes were negative, and electrocardiographic findings were unchanged from preoperative findings.

The patient was nervous about trying pharmaceutical intervention to alleviate singultus because he had a negative experience with narcotic pain medications. Because the results of the imaging studies and laboratory tests had ruled out a cardiopulmonary cause, the patient's singultus was ruled a likely postoperative complication secondary to the intubation and the phrenic nerve block. On the basis of these findings and the patient's preference to avoid medications, OMT appeared to be the best treatment option. After we explained the mechanical connections as well as risks and benefits of OMT to the patient and his wife, the patient agreed to receive OMT to address his somatic dysfunctions.

The patient could not tolerate lying down, so he was treated sitting upright. His surgical sling was left in place as to not disturb the healing surgical site. His respiratory diaphragm, restricted in excursion on the left and mildly on the right, was addressed using gentle direct myofascial release. Myofascial release was also applied to the surrounding ribs to help restore normal rib cage motion. Indirect myofascial release was applied to the thoracic inlet to ease restrictions in the first rib, clavicle, thoracic spine, scalene muscles, and sternocleidomastoid. Dysfunction of the cervical spine was treated using balanced ligamentous tension, with particular attention given to the C3-C5 spinal levels, where the phrenic nerve originates.<sup>6,7</sup> The patient tolerated the procedure well with no apparent complications. During treatment, the patient's singultus rate slowed down tremendously. At his outpatient follow-up with his primary care physician 2 days later, his singultus had completely resolved.

## Discussion

The criterion standard of care for patients with singultus is physical stimulation with Valsalva maneuvers or drinking cold water. If physical stimulation fails, the next step is pharmacologic intervention with chlorpromazine hydrochloride, baclofen, or metoclopramide.<sup>2</sup> If pharmacologic treatment fails, phrenic nerve block under ultrasound guidance may be attempted.<sup>4</sup> However, all of the

mentioned medications may cause extensive adverse effects. Osteopathic manipulative treatment can address underlying mechanical dysfunctions and help restore normal blood flow, improve respiratory motion, increase lymphatic drainage, and, for postoperative patients, help the body begin the return to the preoperative status. One case report<sup>8</sup> describes success in using OMT to manage singultus in a patient with stiff person syndrome and aminoacidopathy after multiple pharmaceutical interventions failed. However, additional research with a larger patient population is necessary to verify the effectiveness of OMT in the management of singultus, as well as to identify potential similarities in osteopathic structural examination findings to help maximize treatment efficacy.

## Conclusion

Osteopathic physicians should consider OMT as a possible first-line treatment for patients with singultus after life-threatening causes have been ruled out. Osteopathic manipulative treatment addresses many of the potential underlying structural causes of singultus with minimal risk for adverse effects to the patient.

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