ANESTHESIA CONSIDERATIONS IN STIFF PERSON SYNDROME

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Abstract

A 34 year old morbidly obese stiff person syndrome (SPS) patient was scheduled for a permanent catheter placement. SPS is a rare neurologic condition with a suspected autoimmune etiology. SPS most common manifestations are progressive, including severe muscle rigidity or stiffness affecting the spine and lower extremities more than other muscle groups. SPS have superimposed episodic muscle spasms that may resemble myotonic-like contractions and are precipitated by unexpected noises, tactile stimuli, or emotional stress. This case report describes a patient with SPS and morbid obesity, and his subsequent management perioperatively for a permanent catheter placement under monitored anesthesia care. Careful and methodical management of patients with SPS is strongly suggested given their sensitivity to inhalational anesthetics and neuromuscular blockers.

Key words: stiff person syndrome, inhalational anesthetics, monitored anesthesia care, neuromuscular blockers

Introduction

Stiff Person Syndrome (SPS) is a rare neurologic condition with a suspected autoimmune etiology. It is estimated to occur in less than one in a million people, is caused by involuntary action of the motor unit, and was first described by Moersch and Woltman in 1956[1]. Patients commonly present with progressive, severe muscle rigidity or stiffness, which tends to affect the spine and lower extremities more than other muscle groups[2]. In addition to rigidity, patients with SPS have superimposed episodic muscle spasms that occasionally may resemble myotonic-like contractions and are precipitated by unexpected noises, tactile stimuli, or emotional stress[1]. These manifestations occur in the absence of any other neurologic disease or underlying chronic pain syndrome that might produce prolonged muscle rigidity and spasms.

Although the cause of this disease has not been discovered, it has been postulated that the pathophysiology of SPS is created by antibodies against the 65kD isoform of glutamic acid decarboxylase (anti-GAD 65), the enzyme essential for the creation of gamma aminobutyric acid (GABA). High levels of anti-GAD 65 are found in the serum and/or cerebral spinal fluid of 85% of patients[3]. It is also associated with autoimmune diseases, particularly diabetes mellitus. By decreasing GABAergic input from inhibitory spinal interneurons and causing malfunction in GABAergic

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cortical neurons, this leads to the hyperexcitability of motor neurons and consequently progressive muscle rigidity and spasms[4,5]. SPS can be treated with one or a combination of several medications including diazepam, baclofen, gabapentin, clonazepam, dantrolene, and vigabatrin. Their beneficial effects are likely mediated by their action on the gamma-aminobutyric acid ($GABA_A$) receptor[6,7]. The use of these medications with certain general anesthetics causes concern amongst anesthesia providers because it has been shown that the combination causes delayed awakening and neuromuscular weakness in some SPS patients[8,9]. Though Lorish et al.[10] established criteria for diagnosis of SPS over two decades ago (Table 1), subsequent patients have demonstrated numerous other abnormalities not associated with the neuromuscular system. The case report presented involves a morbidly obese patient with SPS who underwent surgery for permanent catheter placement.

Table 1

Criteria for Diagnosis of Stiff Person Syndrome

1. Prodromes centered on swelling and stiffness of the axial musculature.
2. Slow progression to the point of affecting the musculature near the extremities, making voluntary movements and walking difficult.
3. Demonstrated deformity of the spinal column.
4. Intercurrent episodes of episodic spasms, precipitated by brusque movements, sudden noises, stress, or emotional events.
5. No deficits in either motor and sensory examination.
6. No deficits in intellect.

(Modified from Lorish TR, Thorsteinsson G, Howard FM: Stiff-man syndrome updated. *Mayo Clin Proc*; 1989, 64:629-636.)

Case Report

A 34 years old patient weighing 300 lbs. (136 Kg) and 157 cm in height (BMI= 55 kg/m^2) was scheduled for a permanent catheter placement. He was diagnosed with SPS based on his symptoms and was relatively asymptomatic in regards to his morbid obesity. He denied dyspnea, angina, or any other cardiopulmonary manifestations. Six months prior to the surgery, symptoms presented as muscle stiffness in his back and painful spasms in his lower extremities. A plasma anti-GAD antibody level was found to be 5,000 times higher than normal limits. The patient reported that when going through stressful situations, such as losing his job, he would develop symptoms. He was being treated with carisoprodol 250 mg daily, diazepam 10 mg BID, gabapentin 600 mg TID, and baclofen 30 mg daily. His symptoms were poorly controlled requiring IVIG therapy, one of the newer therapies in treating SPS. A monitored anesthesia care (MAC) anesthetic was planned for the procedure.

Carisoprodol, diazepam, gabapentin, and baclofen were given on the day of surgery. Electrolytes were within normal limits, and no other premedication was prescribed. Standard American Society of Anesthesiology monitors were used which included: temperature, blood pressure, heart rate, electrocardiogram, and end tidal CO2 assessment. Monitored anesthesia care was started by administering to the patient 60 mg of lidocaine, and a propofol drip at 200 mcg/kg/hr. Vital signs all stayed within a normal range, and there was no significant pulmonary ventilator depression noted. There were no surgical complications. The patient had mild discomfort during part of the procedure and was given 50 mcg of fentanyl in a bolus dose, twice. After completion of the procedure, the patient was followed closely in Post Anesthesia Care Unit for approximately one and a half hours without any events. His vital signs remained stable and then he was transferred back to a regular hospital floor and returned to the floor on continuous pulse oximetry to start IVIG therapy.

Discussion

Treating a patient with SPS involves certain challenges for anesthesiologists. To date, there are a number of different anesthetics that have been performed on patients with SPS (Table 2). Our literature has reported that some patients undergoing general anesthesia with muscle relaxation have had weakness despite appropriate reversal of muscle relaxation and the need for postoperative mechanical ventilation for up to 48 hours[8]. It has also been postulated that prolonged neuromuscular blockade could be explained by the synergistic effects of baclofen preoperatively and volatile anesthetics via a $GABA_b$ receptor mediation or modulation. Though successful

Table 2
Anesthesia Management in Patients with SPS

Patient	Surgery	Drugs	Outcome
Female, 46 years old[8]	Repair of intrathecal baclofen pump	Sufentanil, Thiopental, Vecuronium, Neostigmine, and Glycopyrrolate	Muscle weakness (hypotonia) in the presence of a vigorous response to ulnar nerve stimulation Need of mechanical ventilation overnight Recovery of strength on postoperative day 2 Uneventful
	5 months later	Midazolam, Halothane, and no relaxant	
Male, 58 years old[11]	Thymectomy	Midazolam, Propofol, Remifentanil, Rocuronium, and Isoflurane (0.2%-0.4%)	Uneventful
Male, 76 years old[12]	Thymectomy	Fentanyl, Propofol, Sevoflurane (0.5%-1.7%), and Ropivicaine (0.25%, epidural)	Uneventful
Male, 74 years old[13]	ENT surgery	Propofol and Remifentanil	Uneventful
Female, 44 years old[16]	Double heart-valve replacement	Midazolam, Diazepam, Fentanyl, Etomidate, Pancuronium, Propofol, Remifentanil	Pain in arms and legs, and mild contractions in a forearm and lower limbs without spasms (7 hours after admission into critical care unit) Moderate pain and mild stiffness in legs (11 hours after admission into critical care unit) No further reference to muscular discomfort or contractions
Female, 40 years old[20]	Thymectomy	Fentanyl, Thiopental, Vecuronium, Isoflurane, and	Neuromuscular blocking recovery within normal range Temporary clinical improvement
	Appendectomy (6 weeks after)	Diazepam, Fentanyl, Thiopental, Vecuronium, Isoflurane, and Nitrous Oxide	
	Endoscopic nasal sinus surgery (1 year after)	Fentanyl, Propofol, and Vecuronium	
Female, 60 years old[22]	Respiratory failure, no surgery required	Midazolam, Propofol, and Atracurium	Uneventful

(Modified from Ferrandis R, Belda J, Llau JV, Belda C, Bahamonde JA: Anesthesia for cardiac surgery on a patient with stiff person syndrome. *J Cardiothorac Vasc Anesth*; 2005, 19:370-372.)

anesthetics have been reported with both inhalational anesthetics and neuromuscular blockers, reduced doses and conservative postoperative management appears to be prudent for the clinical anesthesiologist managing patients with SPS[11,12].

Cases have been performed successfully using total intravenous anesthesia (TIVA) with no muscle blockade alone or in combination with epidural anesthesia, and using a paravertebral block with conscious sedation for an inguinal hernia repair[12-14]. In the case presented, the patient was receiving a permanent catheter for treatment of his SPS with IVIG. By utilizing a propofol drip with fentanyl for sedation and breakthrough pain, a safe MAC anesthetic was provided without complications and a rapid recovery.

In recent years, patients with other co-morbidities have been identified with SPS whom underwent procedures requiring anesthetics in some capacity. A review of the literature indicates other co-morbidities found in patients with SPS including: cardiac valvular disease, breast cancer, colon adenocarcinoma, appendicitis, lymphoma, and thymoma[15-20]. There is even documentation of a patient who became pregnant two months after her diagnosis of SPS and was administered an epidural with a smooth delivery[21]. In the case presented, the patient presented with the potential challenge of being morbidly obesity, which can dramatically affect cardiopulmonary status, rate of desaturation, and potentially increase morbidity and mortality. However, by using monitored anesthesia care with avoidance of inhalational anesthetics, the patient was able to receive permanent catheter placement without any exacerbation of his SPS.

In summary, MAC with IV anesthetics can be used successfully in patients with SPS for minor procedures. For more complex cases, TIVA without muscle relaxants, or TIVA without muscle relaxants and regional anesthesia, or regional anesthesia with conscious sedation should be considered[12-14]. The use of these techniques avoids exposure of SPS patients to the risk of hypotonia and mechanical ventilation, which may result from the use of volatile anesthetics and neuromuscular blocking agents[8,9]. Because this is an extremely rare disease, a conservative approach with a careful laid out plan is warranted.

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