ANESTHESIA CONSIDERATIONS IN STIFF PERSON SYNDROME
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AND ALAN DAVID KAYE***

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. Patients commonly present with progressive, severe muscle rigidity or stiffness, which tends to affect the spine and lower extremities more than other muscle groups. 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. 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. 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. 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\textsubscript{A}) receptor. 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. Though Lorish et al. 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

<table>
<thead>
<tr>
<th>Criteria for Diagnosis of Stiff Person Syndrome</th>
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</thead>
<tbody>
<tr>
<td>1. Prodromes centered on swelling and stiffness of the axial</td>
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<tr>
<td>musculature.</td>
</tr>
<tr>
<td>2. Slow progression to the point of affecting the musculature</td>
</tr>
<tr>
<td>near the extremities, making voluntary movements and walking</td>
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<tr>
<td>difficult.</td>
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<tr>
<td>3. Demonstrated deformity of the spinal column.</td>
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<tr>
<td>4. Intercurrent episodes of episodic spasms, precipitated by</td>
</tr>
<tr>
<td>brusque movements, sudden noises, stress, or emotional</td>
</tr>
<tr>
<td>events.</td>
</tr>
<tr>
<td>5. No deficits in either motor and sensory examination.</td>
</tr>
<tr>
<td>6. No deficits in intellect.</td>
</tr>
</tbody>
</table>

(Modified from Lorish TR, Thorsteinsson G, Howard FM: Stiff-man

Case Report

A 34 years old patient weighing 300 lbs. (136 Kg) and 157 cm in height (BMI= 55 kg/m\textsuperscript{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. 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\textsubscript{b}
receptor mediation or modulation. Though successful
### Anesthesia Considerations in Stiff Person Syndrome

#### Table 2
Anesthesia Management in Patients with SPS

<table>
<thead>
<tr>
<th>Patient</th>
<th>Surgery</th>
<th>Drugs</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female, 46 years old&lt;sup&gt;4&lt;/sup&gt;</td>
<td>Repair of intrathecal baclofen pump</td>
<td>Sufentanil, Thiopental, Vecuronium, Neostigmine, and Glycopyrrolate</td>
<td>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</td>
</tr>
<tr>
<td></td>
<td>5 months later</td>
<td>Midazolam, Halothane, and no relaxant</td>
<td></td>
</tr>
<tr>
<td>Male, 58 years old&lt;sup&gt;11&lt;/sup&gt;</td>
<td>Thymectomy</td>
<td>Midazolam, Propofol, Remifentanil, Rocuronium, and Isoflurane (0.2%-0.4%)</td>
<td>Uneventful</td>
</tr>
<tr>
<td>Male, 76 years old&lt;sup&gt;12&lt;/sup&gt;</td>
<td>Thymectomy</td>
<td>Fentanyl, Propofol, Sevoflurane (0.5%-1.7%), and Ropivicaine (0.25%, epidural)</td>
<td>Uneventful</td>
</tr>
<tr>
<td>Male, 74 years old&lt;sup&gt;13&lt;/sup&gt;</td>
<td>ENT surgery</td>
<td>Propofol and Remifentanil</td>
<td>Uneventful</td>
</tr>
<tr>
<td>Female, 44 years old&lt;sup&gt;16&lt;/sup&gt;</td>
<td>Double heart-valve replacement</td>
<td>Midazolam, Diazepam, Fentanyl, Etomidate, Pancuronium, Propofol, Remifentanil</td>
<td>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</td>
</tr>
<tr>
<td>Female, 40 years old&lt;sup&gt;20&lt;/sup&gt;</td>
<td>Thymectomy Appendectomy (6 weeks after) Endoscopic nasal sinus surgery (1 year after)</td>
<td>Fentanyl, Thiopental, Vecuronium, Isoflurane, and Diazepam, Fentanyl, Thiopental, Vecuronium, Isoflurane, and Nitrous Oxide</td>
<td>Neuromuscular blocking recovery within normal range Temporary clinical improvement</td>
</tr>
<tr>
<td>Female, 60 years old&lt;sup&gt;22&lt;/sup&gt;</td>
<td>Respiratory failure, no surgery required</td>
<td>Midazolam, Propofol, and Atracurium</td>
<td>Uneventful</td>
</tr>
</tbody>
</table>

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\textsuperscript{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\textsuperscript{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\textsuperscript{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\textsuperscript{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\textsuperscript{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\textsuperscript{8,9}. Because this is an extremely rare disease, a conservative approach with a careful laid out plan is warranted.
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References
