1.5 contact hrs Nursing Continuing Professional Development

Intrathecal Baclofen Therapy and the Role of the Rehabilitation Nurse

Sylvia A. Duraski¹, MS, ANP-BC, CRRN, CBIS, SCRN

Abstract: Spasticity is a common problem encountered by those who have suffered a neurological injury either cerebral or spinal in origin. Multiple interventions are utilized to manage spasticity to decrease the pain and stiffness. These interventions can include an implanted device that delivers medication directly to the spinal cord. This clinical consultation reviews a patient case and the important information regarding the care of this individual with an intrathecal baclofen pump and important key points of education that all rehabilitation nurses need to know.

Keywords: spasticity; baclofen; intrathecal.

Clinical Case

A 75-year-old patient with a history of spastic paraplegia is admitted to an acute inpatient rehabilitation hospital following a fall. The patient suffered an acute displaced fracture of the left distal tibia/fibula. An open reduction internal fixation and intramedullary nailing was performed. Part of the patient's history included the fact that an intrathecal baclofen pump had been implanted several years earlier for the management of spasticity.

Definition of Spasticity

According to the National Institute of Neurological Disorders and Stroke, spasticity is defined as an upper motor neuron dysfunction where there is an abnormal increase in muscle tone resulting in stiffness or tightness that makes movement difficult and can result in discomfort or pain. Spasticity may occur in individuals with spinal cord injury, multiple sclerosis, cerebral palsy, stroke, brain or head trauma, amyotrophic lateral sclerosis, hereditary spastic paraplegias, and metabolic diseases (National Institute of Neurological Disorders and Stroke, 2023). According to a Cochrane systematic review reported in a 2022 review article, one third of all stroke and traumatic brain injury

Correspondence: Sylvia A. Duraski, MS, ANP-BC, CRRN, CBIS, SCRN, Northwestern Medicine Marianjoy Rehabilitation Hospital, 26 W 171 Roosevelt Road, Wheaton, IL 60187. E-mail: sylvia.duraski@nm.org

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Management of Spasticity

Although rehabilitation nurses are not responsible for ordering interventions for the management of spasticity, they have an important role in continuous assessment of the patient for muscle tightness or pain, as well as assisting with the administration of spasticity management interventions. Stretching and range of motion prior to activities or scheduled throughout the day can help improve function and make mobility or self-care of the person with spasticity easier to perform. However, in muscles with increased tone, the shortening of the muscles and connective tissues usually recurs unless the muscle stretch is maintained over time (Reebye et al., 2022). Rehabilitation nurses may assist in applying casts or splints fabricated in therapy to help maintain that prolonged stretch. If the spasticity is generalized, such as throughout the person's entire body, healthcare

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providers will order oral medication to manage or decrease the muscle tightness. Baclofen, tizanidine, clonidine, dantrolene, and benzodiazepines, such as valium, are commonly used to control spasticity. Unfortunately, at higher doses, these medications can cause sedation. Although persons with spasticity may find these medications helpful, the sedative effects are not well tolerated.

In 1992, Dr. Richard Penn, a Chicago neurosurgeon, published an article about 66 participants with severe spasticity of spinal cord origin who were treated with intrathecal baclofen. In that study, all but two participants responded to the medication with a 2-point decrease in their Ashworth spasticity scale score (a 4-point scale that measures spasticity) and/or spasm scale (a two-part scale that includes provider assessment and self- report) scores (Penn, 1992). Since then, intrathecal baclofen therapy has been used to manage spasticity if the patient does not respond to oral pharmacology or if oral medications have significant side effects.

Intrathecal Baclofen Pump Management

Intrathecal baclofen is administered by a subcutaneously implanted programmable drug delivery system with a reservoir (pump) and catheter directly to the spinal cord (Balaratnam & Stevenson, 2022). The pump delivers micrograms of medication, which is only 1% of the oral dose of milligrams resulting in much less somnolence from the medication. Baclofen is a gamma aminobutyric acid (GABA) analog that binds to the GABA-B receptors in the spinal cord to release excitatory neurotransmitters and decrease motor neuron firing thus decreasing muscle spasms (Balaratnam & Stevenson, 2022; Reebye et al., 2022). The intrathecal baclofen delivered in the pump is titrated based on the person's physical and verbal responses. As the intrathecal dose is increased, oral medications for spasticity are adjusted accordingly or discontinued altogether. The baclofen pump dose is adjusted through the skin using a computer tablet and a handheld programmer. Intrathecal baclofen doses can be delivered continuously over 24 hours (simple continuous dosing) or more during certain times of day when spasticity is worse (flex or bolus dosing). The pump is usually refilled between 2 and 6 months, depending upon the baclofen concentration (500 µg/ml or 2000 µg/ml) and daily dose. The higher concentration is used for those patients on higher daily doses. The baclofen pump is usually refilled by a physician or advanced practice provider using a refill kit that includes the correct concentration of baclofen, sterile supplies, and a 22-gauge noncoring needle inserted into the patient and pump. In some facilities, a registered nurse is trained to do refills and dose adjustments. This procedure can be performed in an inpatient setting or outpatient setting such as a clinic or doctor's office (Boster et al., 2016).

Rehabilitation Nursing Care

Rehabilitation nurses caring for persons with intrathecal baclofen pumps should be knowledgeable about the potential complications that may occur. Both overdose and underdose complications may occur.

Overdose symptoms can be caused by an error in refilling the pump with a higher concentration or taking too much oral baclofen along with the intrathecal baclofen. Treatment usually involves maintaining the airway, breathing and circulation, reducing the dose, or stopping the intrathecal pump altogether (Saulino et al., 2016). Symptoms of overdose include the following:

- drowsiness,
- lightheadedness,
- dizziness,
- slow/shallow breathing,
- seizures,
- loss of consciousness, and
- hypothermia.

Symptoms of underdosing or withdrawal include the following:

- worsening spasticity,
- pruritis,
- hypotension,
- paresthesias,
- high fever,
- altered mental status,
- multisystem organ failure, and
- seizures.

Often times these symptoms can be confused with a severe infection, autonomic dysreflexia, or neuroleptic malignant syndrome (Saulino et al., 2016). Underdose symptoms could result from urinary tract infections, large wounds, ingrown toenails, ingrown hair, constipation, fracture, ileus, gallstones or some other noxious stimuli, a pump motor stall if the patient recently underwent a magnetic resonance imaging, catheter problem, or the patient forgetting to have intrathecal pump refilled on the scheduled date. If a patient with a baclofen pump is scheduled for a magnetic resonance imaging, the pump needs to be checked to ensure it is no longer stalled. This can be done simply by interrogating the pump using the computer tablet and handheld programmer. Treatment for mild withdrawal

Key Practice Points

- Although rehabilitation nurses are not responsible for ordering baclofen pumps, they have an important role in assessing the patient for muscle tightness and also assisting with administration of spasticity management techniques.
- Rehabilitation nurses should be knowledgeable of both overdose or underdose symptoms.
- Patient and family education by the rehabilitation nurse about the baclofen pump and its complications is essential.

symptoms includes treating the noxious stimuli or giving oral baclofen until symptoms resolve or diminish while figuring out the cause. It is important to have oral baclofen available for PRN use if the patient is either in the hospital or at home. Severe withdrawal symptoms may require intravenous benzodiazepine, cryptoheptadine, or bolus baclofen via lumbar puncture (Saulino et al., 2016).

Patient and family education should include the signs and symptoms of underdosage or overdosage. Another important education component is for patients to not miss appointments for refills to avoid empty reservoirs and potential withdrawal (Boster et al., 2016). Persons with baclofen pumps should be given a written printout with the low reservoir alarm date anytime the pump dose is adjusted or a refill is performed. By doing this, the chances decrease that a refill date is missed. An alarm will sound every hour when the reservoir in the pump is low. The low reservoir alarm volume is recommended to be set at 2.0 ml, but a provider can set it at a higher amount if the patient is consistently missing appointments. If the pump reservoir is empty, an alarm will sound every 10 minutes. This is the critical alarm. Any time either alarm is heard, it is an urgent matter, and the pump should be refilled as soon as possible. If this alarm is heard, the pump manager should be contacted immediately.

The patient in this clinical case complained of increasing tightness and more difficulty walking during the inpatient stay. Nursing staff voiced concerns that the intrathecal baclofen pump was not working properly. They quickly notified the advanced practice registered nurse (APRN) who normally followed the patient. The APRN assessed the patient and found a slight increase in spasticity. Because the patient had no other causes for increased spasticity, it was determined that the increase was due to the recent fracture and surgery. The case was discussed with physical and occupational therapy, and it was decided that the spasticity was truly limiting the patient's mobility and progress. A small intrathecal baclofen pump dose increase was made. This assisted the patient with mobility and did not cause a delay in discharge to home. The APRN followed up with the patient 4 weeks after discharge and was able to make further adjustments as the patient's spasticity was improving as the fracture was healing.

As is true in rehabilitation, the entire team worked together to problem solve and address the patient's needs. Similar to other devices that patients may be wearing or have implanted, rehabilitation nurses must understand how intrathecal baclofen pumps work. Knowledge of the pump and its effect on the patient's mobility and self-care provides valuable input to the team in managing spasticity and the person's function.

Conflicts of Interest

The author declares no conflict of interest.

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