Intrathecal Baclofen in Multiple Sclerosis

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Key Words

Ambulation · Intrathecal baclofen · Multiple sclerosis · Spasticity

Introduction

Many patients with severe multiple sclerosis (MS)-related spasticity have an inadequate response or poor tolerability to oral antispasticity medications. Before taking the decision to escalate therapy, it is important to review the trigger factors for spasticity (bladder, bowel, skin) and optimize the physical management program. If escalation therapy is still required, options to consider include:

- THC:CBD oromucosal spray (Sativex®)
- Chemical neurolysis or botulinum toxin (for focal spasticity only)
- Intrathecal baclofen
- Intrathecal phenol
- Surgery (neurological or orthopedic).

This review examines the use of intrathecal baclofen.

Intrathecal Baclofen

Baclofen is an analogue of the inhibitory neurotransmitter gamma aminobutyric acid (GABA) which binds to receptors on primary afferent neurons, inhibiting the re-

lease of excitatory neurotransmitter and allowing the muscle to relax and change its length (stretch). As GABA receptors are concentrated at the dorsal horn of laminae 1–4, an intrathecal infusion method delivers baclofen directly to the site of action.

Use of intrathecal baclofen requires a coordinated approach by an experienced multidisciplinary team including a neurologist or rehabilitation physician, neurosurgeon, physiotherapists, nurses, and occupational therapists. The process involves careful patient selection (spasticity assessment and measures), a trial of baclofen either through a lumbar puncture bolus or a temporary intrathecal catheter, the implant procedure, discharge planning and long-term follow-up (dose titration and pump refill, 24-hour help line). To be considered a candidate for intrathecal baclofen therapy, the patient and his/her family and healthcare team must establish and agree on realistic, appropriate and achievable therapeutic goals. In turn, the patient/caregiver must agree with the treatment goals and take responsibility for obtaining refills and other follow-up care on schedule.

The advantages and disadvantages of intrathecal baclofen are summarized in table 1. Some established treatment goals of intrathecal baclofen are to facilitate patient transfers, relieve pain, enable sitting, permit the use of standing equipment, improve perineal access and reduce sleep disturbances. More recent goals include improving patients' cognitive function by reducing or discontinuing

Table 1. Advantages and disadvantages of intrathecal baclofen

Advantages	Disadvantages
Extremely effective	Surgical procedure
Flexible dosing	Risk of complications, including infection and catheter malfunctions
No systemic side effects (particularly CNS)	Risk of overdosing – refill error
Consistent treatment	Risk of potentially life-threatening withdrawal (e.g. missed refill appointment)
No drug interactions	Limited battery life requiring further surgical procedure
Allows reduction of oral medications	Minimal effect on upper limbs
	May compromise walking in patients dependent on spasticity for mobility
	Body image issues

the use of oral (especially sedative) antispasticity medications and improving ambulation [1].

Patients who meet the selection criteria for intrathecal baclofen undergo a surgical implant procedure. The pump and catheter are placed under the skin, usually on the patient's lower abdomen. A needle is inserted into the intrathecal space below the spinal cord, usually at L2–L3, and the catheter is advanced to about T10–T11. The catheter is then connected to the programmable pump. The infusion system allows for accurate and continuous administration of baclofen directly to the cerebrospinal fluid. As the intrathecal dose of baclofen is approximately 1% of the oral equivalent, systemic side effects are mainly avoided. The pump can be programmed noninvasively to deliver a range of infusion rates and dosing patterns. This allows the physician to tailor the dosage to the individual needs and lifestyle of the patient, a particularly important feature for patients who rely on a degree of spasticity for function such as walking or transferring.

Contraindications to use of intrathecal baclofen are a known allergy to baclofen; patients must have used baclofen orally before being considered for pump insertion. Other contraindications include significant concomitant sepsis (but not chronic pressure sores) and psychological issues such as needle phobia, lack of commitment and body image issues. Patients with precarious ambulation are best assessed on a case-by-case basis.

Conditions not precluding use of intrathecal baclofen include pregnancy or potential pregnancy; methicillin-resistant *Staphylococcus aureus* (MRSA) colonization; spinal fusion (a cervical approach can be used if necessary); epilepsy; lumbar-peritoneal or ventriculo-peritoneal shunts; malnutrition; need for magnetic resonance imaging (for example with use of disease-modifying therapies); and ambulation.

Intrathecal Baclofen for Ambulatory Patients

Intrathecal baclofen is still considered by some to be a 'last resort' and traditionally has been reserved for wheelchair users. At the time of referral to specialist services, however, many patients will have suffered with severe spasticity for years, can no longer use their legs and may have developed contractures. As the focus of modern medicine shifts more towards prevention, a case is building for the use of intrathecal baclofen in ambulatory patients [2].

In brief, 'walking' patients are more likely to be in work and therefore especially keen to avoid medications that impact on cognitive function. Moreover, intrathecal baclofen provides a predictable 24-hour response and may improve sleep. From a physical perspective, intrathecal baclofen can facilitate maintenance of muscle strength and prevent soft tissue changes, thereby preventing the development of abnormal motor patterns. Over the longer term, maintaining productivity and preventing spasticity complications might be expected to be cost effective.

Our Experience

At the National Hospital for Neurology and Neurosurgery, UCLH NHS Trust in London, UK, 71 MS patients (68 predominant wheelchair users; 3 ambulatory) have been treated with intrathecal baclofen. The mean time from MS diagnosis to implantation was 19.9 years and mean time with the pump was 4.4 (0–18) years. The benefits of intrathecal baclofen on spasticity (Ashworth scale), spasms (Penn scale) and visual analogue scales scores for pain, stiffness and comfort were found to be sustainable over a 5-year evaluation period, with no development of tolerance. Patients' range of movement either improved

or remained stable during treatment and the vast majority of patients (67/71) discontinued all oral antispasticity medications. The most frequent complication was catheter dysfunction requiring replacement (n = 10). All three walking patients maintained their ambulation [3].

In our experience, intrathecal baclofen is an effective treatment option for MS patients with severe refractory spasticity and has the potential to improve function and quality of life in a wider range of patients, including those who are still ambulatory.

Disclosures/Conflict of Interest

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