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 release 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
the use of oral (especially sedative) antispasticity medica-
tions and improving ambulation [1].

Patients who meet the selection criteria for intrathe-
cal 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 con-
tinuous administration of baclofen directly to the cere-
brospinal fluid. As the intrathecal dose of baclofen is ap-
proximately 1% of the oral equivalent, systemic side ef-
ficts 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 pa-
tient, 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 ba-
clofen 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 neces-
sary); epilepsy; lumbar-peritoneal or ventriculo-perito-
neal shunts; malnutrition; need for magnetic resonance
imaging (for example with use of disease-modifying ther-
apieties); and ambulation.

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

**Intrathecal Baclofen for Ambulatory Patients**

Intrathecal baclofen is still considered by some to be a
‘last resort’ and traditionally has been reserved for wheel-
chair 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 build-
ning for the use of intrathecal baclofen in ambulatory pa-
tients [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 ba-
clofen 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 lon-
ger term, maintaining productivity and preventing spas-
ticity complications might be expected to be cost effective.

**Our Experience**

At the National Hospital for Neurology and Neurosur-
gery, 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 ben-
efits 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**

VL Stevenson has received honoraria from Almirall, Bayer and Medtronic.

Writing assistance was provided by Content Ed Net (Madrid, Spain), with funding from Laboratorios Almirall, SA (Barcelona, Spain).

**References**

