

Successful patient selection and baclofen pump titration for spasticity: Ambulation in incomplete spinal cord injury



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Diagnosis/Setting

Setting: Tertiary Rehabilitation Hospital

Diagnosis: C2 AIS C → AIS D

Background

- Annual Incidence: 15 – 83 million individuals globally¹
- Spasticity = increased velocity-dependent resistance to passive stretch
 - Manifests as clonus, spasms, impaired muscle coactivation patterns
 - Graded using Modified Ashworth Scale
- Spasticity affects ~70% of individuals with SCI
- Ambulation is often a goal of incomplete SCI patients
- **Percent of functional ambulators per AIS grade one year post-injury¹:**
 - AIS A: 0%
 - AIS B: ~30%
 - Intact pinprick sensation = greater chance of functional recovery^{1,4}
 - AIS C: ~75%
 - AIS D: >90%
- Spasticity can be beneficial but can be painful or distressing^{1,2}
- Quality of gait can often suffer secondary to spasticity
- Intrathecal baclofen (ITB) can improve functional ambulation in the correct patient population

Intrathecal Baclofen (ITB)

- Mechanism: GABA_B agonist
- Often considered when patient is at maximum dose of oral medications or is not tolerating side effects (ex: sedation).
- Dosing:
 - Therapeutic dose on average: ~400mcg/24h period³
 - SCI typically require higher doses compared to MS, TBI^{2,3}
 - Starting dose chosen based on response to ITB trial
- May not provide significant improvement in ADL, though has been shown to improve gait fluidity³
- **Patient Considerations for ITB placement:**
 - Reliability
 - Body habitus
 - Response to oral medications
 - Response to ITB trial

ITB should be considered to improve lower extremity spasticity and quality of gait in incomplete spinal cord injury.

Case Description

- 18-year-old male, C2 AIS C → C2 AIS D
- Required maximum oral baclofen and tizanidine dosing for spasticity control
- Effective dosing of botulinum toxin complicated due to generalized spasticity
- ITB 50mcg test dose --> at peak with limited functional lower extremity strength
 - Initial dose: 90mcg/d
 - Current dose: 312.9mcg/d + 30mcg flex dose; off all oral antispasmodics
- Ambulating with 4-wheeled-walker with bilateral arm troughs for stability
- No significant increase in 6MWT or standing balance with physical therapy post-baclofen pump placement
- Gait fluidity significantly improved:
 - Decreased scissoring
 - Decreased lower extremity clonus with ambulation

Discussion

- Intact pinprick and light touch sensation is a good prognostic indicator in incomplete spinal cord injury
- ITB should be considered in patients experiencing significant adverse effects (ex: sedation) with oral antispasmodics.
- Patient selection is critical for ITB pump placement.
- ITB can allow for more effective dosing of botulinum toxin in cases of diffuse spasticity.
- Effect of ITB test dose can be unpredictable.
 - Standard 50mcg bolus dose can result in limited functional lower extremity strength at peak.
- ITB can improve gait fluidity though often does not result in objective functional improvement.^{2,3}
 - Often with subjective improvement in ADL's and transfers.³
- Further randomized, controlled studies in SCI populations are needed to elucidate adequate dosing regimens.

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References

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