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# Intrathecal Baclofen Pump Replacement: The Importance of Planning Ahead: A Case Report

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## Keywords

Intrathecal Baclofen; Multiple Sclerosis; Spasticity

## Introduction

Intrathecal baclofen (ITB) therapy is an effective treatment for severe spasticity of both cerebral and spinal origin that was introduced by Penn and Kroin in 1985 [1,2,3].

The whole process requires careful selection of patients and a trial which consists of administering a bolus dose of ITB through a lumbar pucture. If the ITB trial is successful in reducing tone and agreed treatment goals are realistic and achievable, a pump implant is arranged. Subsequently the patients undergo regular follow-up at least 6 monthly for spasticity management review, dose titration and pump reservoir refill. Electronic pumps have a battery that depletes after 6-7 years, necessitating a pump replacement at that time. The catheter however does not need to be replaced during surgery if it is patent and there is no suspicion of malfunction [4,5].

There is no agreed consensus on the process used for pump replacement planning, which may not be straight forward particularly for patients affected by progressive neurological conditions whose spasticity or functional goals may change over time, or for high-risk surgical patients. To our knowledge, this is the first case report focusing on the management of this aspect of ITB therapy.

## Case Presentation

We report the case of a 77 year old lady with a background of multiple sclerosis diagnosed in 1973. She underwent ITB pump implantation (Medtronic SynchroMed® II) in January 2000 to treat lower limb spasticity and spasms after a successful ITB trial (50mcg). The starting ITB dose was 100mcg daily. Previously she was treated with oral antispasticity medications with a suboptimal response and side effects (drowsiness). Four days post implantation she developed hallucinations and flaccid paraparesis. The ITB dose was therefore reduced to 30mcg/day with good effect on her tone and spasms. In October 2000 the ITB dose was increased to 35mcg/day due to re-emergence of lower limb spasms; she remained well managed and stable on this dose for 3 years.

In December 2003, nearly 4 years into her ITB therapy, she presented with extreme flaccidity, raising concerns about a potential system malfunction but on further enquiry she reported having just started gabapentin for trigeminal neuralgia (TN). The ITB dose was therefore reduced to 23mcg/day with optimisation of her tone.

In 2004 the gabapentin was stopped on resolution of TN and the ITB dose was increased back to 35mcg/day with a good response. In 2006 she reported feeling weaker during transfers, therefore the ITB dose was reduced again to 23mcg/day.

In January 2007, prior to replacement and towards the end of battery life, it was decided to gradually reduce the ITB dose to assess the need for a pump replacement given the low dose of ITB. The dose was reduced gradually before the pump was filled with sodium chloride 0.9% to assess the need for replacement; at the time she was on gabapentin 300 mg three times daily. The patient remained free of spasticity for 8 months (until August 2007), when she restarted oral baclofen (up to 20mg three times daily) because of an increase in adductor and flexor spasms in concomitance with different factors (MS relapse, pressure sores, pyelonephritis). Moreover her TN had recurred and she was commenced on carbamazepine 100mg twice daily (gradually increased to 600mg daily). In November 2007 the ITB infusion was restarted (30mcg daily) and the oral medications were weaned, with a positive effect on transfers and increased alertness. In January 2009 she underwent uneventful ITB pump replacement surgery.

During the next 6 years (2009-2015) the ITB dose varied in the context of concomitant aggravating factors (UTI, pressure sores, TN) however the dose gradually increased up to a maximum of 70mcg/day.

In 2015 she underwent elective ITB pump replacement (Medtronic SynchroMed® II) however intra-operatively the catheter was found to be leaking with a small collection. She therefore also underwent catheter revision and the pump was restarted at her previously stable dose of 35mcg/day. The TN was treated during the same admission with focal glycerol injections with good effect. Since 2015 she has been stable and well mangaged on on 35mcg/day of ITB.

## Discussion

Some important learning points are emphasized by this case. First of all, this case highlights the importance of planning ahead before ITB pump replacement, which is particularly important in patients affected by progressive diseases whose spasticity or functional goals may change over time. We suggest it is prudent to start planning for pump replacement 12 months prior to the ERI (Elective Replacement Indicator). If a change in the patient's underlying spasticity and/or general condition has occurred and it is necessary to assess whether ITB therapy is still needed, the ITB dose may be gradually reduced when the ERI is greater than 4-6 months. Sometimes it may be helpful




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to completely withdraw the ITB and refill the pump with 0.9% sodium chloride to properly assess the need for ITB before arranging elective replacement.

It is also important to consider other options such as oral medication or intrathecal phenol if spasticity recurs and if patients are at high risk from, or do not wish to have, surgery. If the decision is made not to replace the pump, the ITB dose should be gradually reduced and discontinued to avoid withdrawal symptoms at pump end of battery life. Subsequently the ITB pump can be stopped and does not need to be removed unless the patient so desires [4].

An interesting observation is that our patient had a temporary remission of spasticity which lasted for several months after ITB was discontinued. Some cases of remission of spasticity induced by temporary ITB infusion have been reported [6]. Although the exact mechanism is unknown, we speculate that this could be related to reversible GABA B receptor changes induced by chronic administration of ITB [7]. Long-term effects of baclofen use on motor unit properties could play a role [8]. Our case suggests that after discontinuation of the ITB the patients should be monitored for potential recrudescence of spasticity, even if initially they appear to be well managed without any medication.

According to several studies [9], the ITB dosage tends to stabilize in the long term and tolerance is rarely observed, therefore, if fluctuations in spasticity presentation occur, it is always important to consider changes in concomitant medications in addition to aggravating factors (such as pressure sores, infection, fractures, bladder or bowel dysfunction), changes in the underlying neurological condition and potential system malfunction [4]. A significant proportional increase in ITB dose even when at a very low dose should raise suspicion of a catheter malfunction, which should be promptly investigated to avoid withdrawal symptoms. Illustrated by this case as even though 70mcg/day is a low dose of ITB it was double her previous stable dose and perhaps should have raised concern of catheter malfunction earlier. Different algorithms have been published for the investigation of potential catheter or pump malfunction [4]. In the suspicion of baclofen overdose it is always important to rule out the commencement of other medication that could affect spasticity as demonstrated by this case.

## Conclusion

This case report provides an opportunity to discuss the issues around planning of ITB pump replacement. We propose that consideration 12 months prior to the ERI is good practice and allows for discussion of whether pump replacement is in fact necessary and whether there are any signs of catheter malfunction.

If symptoms of over- or under-dosage occur, it is always important to consider changes in concomitant medications and/or ITB system malfunction.

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