Patient perception of brain stimulation in the treatment of severe pediatric chronic pain

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Introduction

- **Severe chronic pain** is characterized by pain lasting ≥3 months, interfering with daily functioning (1)
- The **Intensive Pain Rehabilitation Program (IPRP)** at Alberta Children's Hospital is a 3-week, interdisciplinary day-treatment program that strives to return affected youth to normal daily activities.
- Scans of IPRP patients revealed a correlation between decreased activity in the dorsolateral prefrontal cortex (DLPFC) and improved functional outcomes, which is consistent with the DLPFC's role in pain modulation (2)
- In October 2020, open label **repetitive transcranial magnetic stimulation (rTMS)** was added to the IPRP to investigate whether stimulating the DLPFC could enhance patient outcomes

Background/Goals

We examined youth and parent perspectives of rTMS relative to other IPRP interventions, and the tolerability, and adverse events reported.

Methods

- Youth (n=6) aged 12-18 years (83% female) with severe chronic pain were recruited from the IPRP
- rTMS was applied every weekday for three weeks to the left DLPFC (x=-30, y=36, z=42) at 10 Hz.
- Participants were monitored for adverse events and tolerability using a Pediatric TMS Safety and Tolerability Measure on days 1, 6, and 11
- Youth and their parents ranked the three most and least helpful IPRP interventions before starting the IPRP (baseline) and at follow-up (end of program and 3-month follow-up). There was a total of 13 IPRP interventions to choose from.

Hypothesis

We hypothesized youth with severe chronic pain would demonstrate tolerability of rTMS, and families would perceive it as a helpful intervention, when combined with standard IPRP.

Results

- At baseline, youth predicted rTMS would be the most helpful IPRP intervention. However, from baseline to follow-up the proportion of youth ranking rTMS among the top 3 interventions decreased from 75% to 33%, making it the 4th most helpful among youth at follow-up.
- At baseline, only 25% of parents included brain stimulation in their top 3 interventions, while at follow-up, it was the 3rd most helpful intervention according to parents, with 50% of the ranking it among their top 3.
- Pre- and post-rTMS, 33-50% of patients reported mild to moderate headaches and neck pain, as compared to 17-33% of patients by week three.
- One person experienced severe nausea and neck pain on day one, post-rTMS.
- Tolerability was considered favorable among youth, with most comparing their experience to non-noxious activities, like watching TV.

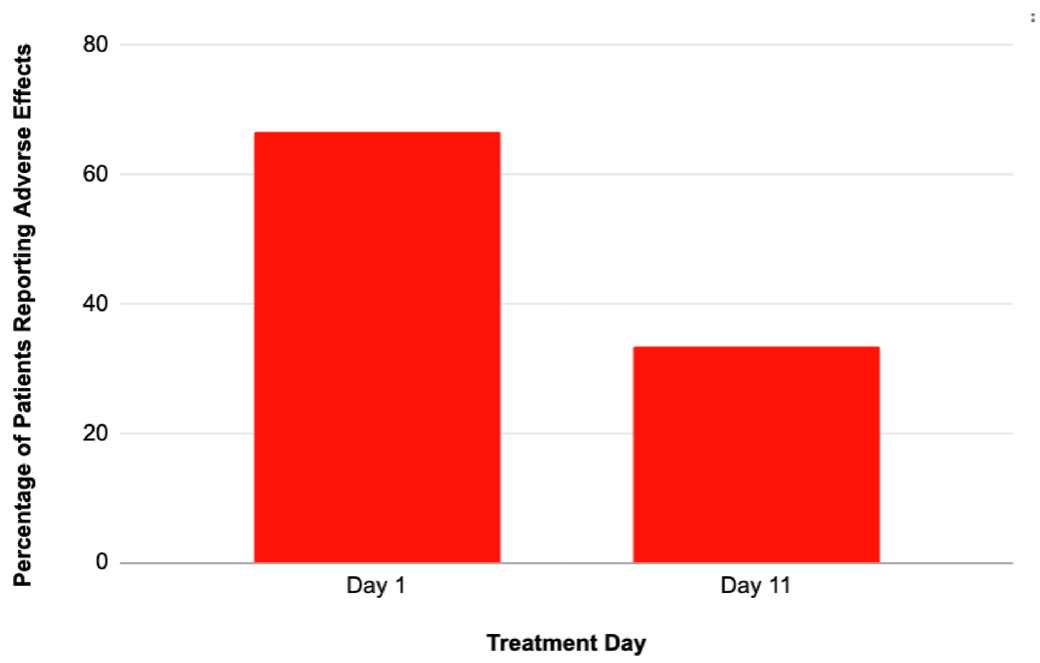

Figure 1. Percentage of patients reporting adverse effects post-rTMS session on days 1 and 11 of treatment.

Discussion

- Preliminary data revealed that despite having high expectations, youth viewed rTMS as less favorable, post-treatment. Meanwhile, the opposite trend was seen in parents, who had initially lower expectations, followed by favorable views of the treatment post-IPRP.
- As reported in previous studies, extreme adverse effects occur rarely, while mild to moderate adverse effects may also be experienced in some patients (3).
- Mild to moderate headaches were the most reported adverse effect, however past studies have also observed similar rates of this symptomology in patients receiving sham rTMS (4)
- Similar to previous studies, symptoms appeared to decrease between week one and week three of treatment (5)
- More research is needed to further evaluate rTMS' safety and tolerability for severe pediatric chronic pain.

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