

Cervical Sympathetic Block as a Treatment for Anxiety in Adolescents

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Background

Anxiety disorders are among the most prevalent mental health conditions affecting children, with recent data showing a 30% prevalence of anxiety and depression concerns in schools in the United States (Parker & Hurst, 2025). These disorders can significantly impact academic performance, social development, and overall quality of life. Current treatments, such as SSRIs, while effective, are associated with a range of side effects, including abdominal pain, sedation, and an increased likelihood of treatment discontinuation due to adverse effects (Mills & Strawn, 2020). Research suggests that autonomic dysregulation, specifically hyperactivity of the sympathetic nervous system (SNS), plays a central role in the pathophysiology of anxiety disorders. Research suggests that autonomic dysregulation, specifically hyperactivity of the sympathetic nervous system (SNS), plays a central role in the pathophysiology of anxiety disorders. One emerging intervention targeting SNS overactivity is the cervical sympathetic block (CSB) which involves injecting a local anesthetic near the cervical sympathetic ganglia to modulate sympathetic outflow (Lipov, et al., 2022). CSB has been used as a treatment for post-traumatic stress disorder (PTSD) and anxiety in adults, with studies demonstrating significant reductions in PTSD (Olmsted, et al., 2019) and anxiety symptoms following the intervention (Lynch, et al., 2023). Despite promising evidence in adult populations, the use of CSB in pediatric anxiety remains largely unexamined. Given the high prevalence of anxiety disorders in adolescents and the limitations of conventional treatments, investigating CSB as a potential therapeutic option is essential. Presented is the largest cohort to date in which CSB was utilized to treat anxiety in an adolescent population.

Cases

METHODS

38 adolescents aged from 10-18 years old, each with a diagnosis of anxiety, varying in severity, participated (N = 38). Refer to prior publication for CSB protocol (Lipov, et al., 2022). Pre- and post-treatment data was collected through validated measures using the Generalized Anxiety Disorder-7 (GAD-7). Post-treatment data was collected at 1, 3, 6, and 12 months. A change in GAD-7 score by 4 points is considered clinically significant (Toussaint et al., 2020; Kroenke et al., 2007). Patients are considered to be in full remission when they have mild or greater anxiety that is reduced to no anxiety; patients are considered to be in partial remission when patients have moderate or greater anxiety that is reduced to mild anxiety.

RESULTS

In total, out of 38 participating patients, 29 patients (78%) experienced a clinically significant reduction in anxiety symptoms, as measured by GAD-7 scores. Furthermore, 59% of participants achieved either partial or full remission of their anxiety symptoms following the intervention.

Severe anxiety: 18 patients had severe anxiety with an average GAD-7 baseline score of 18.5.

Following CSB, the average GAD-7 score decreased to 11.0, reflecting an average reduction of 7.5 points. 83% of patients experienced a clinically significant response with 22% in complete remission.

Moderate anxiety: 14 patients had moderate anxiety, with an average baseline score of 12.28.

Following CSB treatment, the average GAD-7 score decreased to 5.5, reflecting an average reduction of 6.78 points. A clinically significant response was observed in 79% of patients, with 64% achieving full remission.

Mild anxiety: 4 patients had mild anxiety, the average baseline score was 8.17. Following CSB treatment, the average GAD-7 score decreased to 2.83, representing an average reduction of 5.34 points. A clinically significant response was observed in 75% of patients, with 100% achieving full remission.

Severity Level	# Pts First Tx	Avg. Pre-Score	Avg. Post-Score	Avg Drop	% Drop	% CSR	% Full Remission	% Partial Remission
Mild anxiety	4	8.17	2.83	5.33	65%	75%	100%	-
Moderate anxiety	14	12.28	5.50	6.78	55%	79%	64%	21%
Severe anxiety	18	18.50	11.00	7.50	41%	83%	22%	39%
Total	36	15.02	8.04	6.98	46%	81%	47%	28%

Discussion

The overlapping symptoms of PTSD and GAD allow for the extrapolation that there may be a common underlying mechanism. Both disorders appear to involve a complex dysregulation of the norepinephrine (NE) system. Retrograde viral studies demonstrate second and third order synaptic connections from the stellate ganglion (SG) (C7) to the hypothalamus and amygdala (Westerhaus & Loewy, 2001). Based on evidence discussed previously by Dr. Lipov and colleagues, we believe that anxiety disorders and PTSD are centrally mediated, in large part by the amygdala. In Lipov's hypothesis, trauma and other factors can trigger increases in nerve growth factor (NGF) levels in the brain and, eventually, the SG. This increase initiates a cascade of sympathetic sprouting leading to persistently elevated brain NE, which results in the clinical conditions previously described. Reversal of the cascade occurs following application of local anesthetic to the SG, decreasing NGF, and thereby preventing further sprouting and encouraging pruning of previously created sympathetic synapses. This ultimately leads to the reduction of the brain NE, which results in improvement in GAD and PTSD symptoms (Lipov, et al., 2009).

Conclusion

CSB seems to be an effective method of treatment in the pediatric population. The treatment resulted in a decrease in GAD-7 scores of nearly twice the minimal clinically important difference for treating anxiety. Therefore, we believe CSBs should be explored as a treatment option for GAD or other anxiety disorders in children.

References

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