

Surgical Treatment of Holmes Tremor:
Case Report, Systematic Review, and Meta-Analysis

WSSFN 2025 Interim Meeting. Abstract 0042

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How to Cite: Rodrigues J, Carvalho Laube K, Martins Correia M, Pires Canela Dos Santos E, Cury R, Gilberto Carlotti RC, et al. Surgical Treatment of Holmes Tremor: Case Report, Systematic Review, and Meta-Analysis: WSSFN 2025 Interim Meeting. Abstract 0042. NeuroTarget 2025;19(2):20-1.

Abstract

Introduction: Holmes Tremor (HT) is a rare, disabling, low-frequency tremor typically arising from brainstem lesions. Pharmacological treatments often fail to provide sufficient relief, leading to the use of surgical strategies, particularly deep brain stimulation (DBS) and lesional procedures. This study presents a rare case report of HT in a patient who underwent both lesional treatment and subsequent DBS. Additionally, it offers the first meta-analysis directly comparing the outcomes of lesional procedures and DBS in the treatment of HT.

Clinical description: A systematic review and meta-analysis were conducted following PRISMA guidelines, encompassing studies from five databases published between 1992–2024. The primary outcome was tremor improvement following DBS or lesional surgery, assessed through standardized tremor rating scales such as the Fahn-Tolosa-Marin Tremor Rating Scale (FTM-TRS) and the Unified Parkinson's Disease Rating Scale (UPDRS) motor subscore for tremor. Meta-regression was performed to explore potential predictors of surgical response. Additionally, we report a rare clinical case of HT managed with a staged approach—initial posterior subthalamic area (PSA) lesioning followed nine months later by DBS targeting both the ventral intermediate nucleus (VIM) and PSA -illustrating decision-making, and surgical outcomes.

Discussion: The meta-analysis included eleven studies comprising a total of 168 patients (96 DBS, 72 lesion), showing an overall tremor improvement of 70.2%. DBS resulted in a higher mean reduction in tremor scores (mean difference: 3.95 points; 95% CI: 2.91–5.00) compared to lesional procedures (mean difference: 2.18 points; 95% CI: 0.24–4.12), despite substantial heterogeneity. Older age and longer tremor duration were significantly associated with less favorable outcomes. The reported case illustrates the practical challenges in treating HT, showing that lesion alone yielded

partial benefit, while subsequent DBS provided significant additional improvement.

Figure 1: Forest Lesion

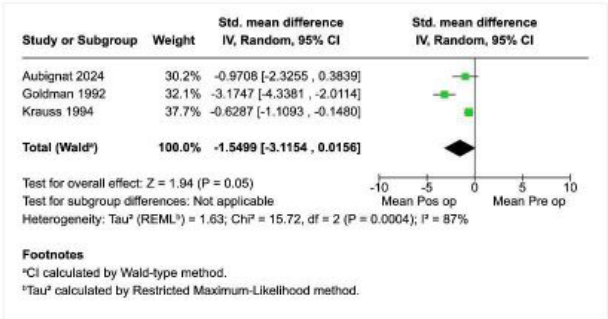
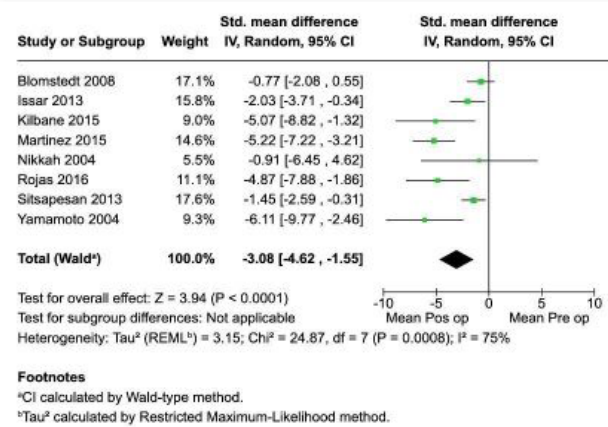


Figure 2: Forest DBS



Conclusions: Both DBS and lesional procedures are effective treatment options for HT. DBS may offer superior tremor control, however lesional interventions remains an important option, especially in resource-limited settings or when DBS

is not feasible. Our case underscores the utility of a personalized, stepwise surgical approach to optimize outcomes in this challenging conditions.

References

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