



# Deep Brain Stimulation efficacy in Parkinson's associated postural abnormalities

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**Objectives:** Camptocormia and Pisa syndrome (PS) are common and disabling features of Parkinson's disease (PD) consisting in abnormal trunk flexion worsened by sitting or standing position.

Camptocormia and PS are usually poorly responsive to dopaminergic therapies and Deep brain stimulation (DBS) has shown encouraging but still conflicting results.

This study aims to evaluate the effect of bilateral subthalamic DBS (STN-DBS) in PD patients with levodopa-resistant postural abnormalities.

**Methods:** All STN-DBS patients implanted at our Centre were retrospectively analyzed in order to evaluate postural abnormalities before surgery and after 1-year of stimulation.

Patients with a presurgical score  $\geq 2$  on UPDRS-III item-28 ("posture") in "On-condition" (after a challenge levodopa dose) were enrolled and item-28 scores before surgery and after 1 year of STN-DBS analyzed.

**Results:** Twenty-nine out of 216 PD patients treated with DBS at our Centre between 1998 and 2013 had a presurgical "On-condition" score  $\geq 2$  in UPDRS item-28 and were considered in this study.

Clinical/demographic data	Cohort (29 patients)
Gender (male / female)	17 / 12
Age at Parkinson's disease onset (years)	45,90 $\pm$ 7,26
mean $\pm$ SD (range)	(29 - 59)
Age at STN-DBS (years)	62,76 $\pm$ 7,57
mean $\pm$ SD (range)	(37 - 70)
Disease duration at STN-DBS (years)	17,24 $\pm$ 4,98
mean $\pm$ SD (range)	(8 - 26)
Motor fluctuation duration at STN-DBS (years)	8,24 $\pm$ 4,09
mean $\pm$ SD (range)	(2 - 18)
Pre-surgical UPDRS-I score	1,52 $\pm$ 1,51
mean $\pm$ SD (range)	(0 - 5,5)
Pre-surgical UPDRS-II OFF score	26,81 $\pm$ 7,01
mean $\pm$ SD (range)	(14 - 37)
Pre-surgical UPDRS-II ON score	10,83 $\pm$ 7,35
mean $\pm$ SD (range)	(0 - 29)
Pre-surgical UPDRS-III OFF score	57,52 $\pm$ 16,90
mean $\pm$ SD (range)	(18,5 - 95)
Pre-surgical UPDRS-III ON score	24,48 $\pm$ 10,83
mean $\pm$ SD (range)	(7,5 - 45,5)
Pre-surgical UPDRS-IV score	8,34 $\pm$ 3,21
mean $\pm$ SD (range)	(3 - 16)
Pre-surgical Hoehn and Yahr score	4,05 $\pm$ 0,90
mean $\pm$ SD (range)	(1,5 - 5)
Pre-surgical Schwab and England OFF score	35,36 $\pm$ 17,79
mean $\pm$ SD (range)	(10 - 80)
Pre-surgical Schwab and England ON score	77,59 $\pm$ 14,90
mean $\pm$ SD (range)	(50 - 100)

FIGURE 1: NUMBER OF PATIENTS IMPROVING IN TERMS OF ABNORMAL POSTURE BEFORE AND AFTER DBS

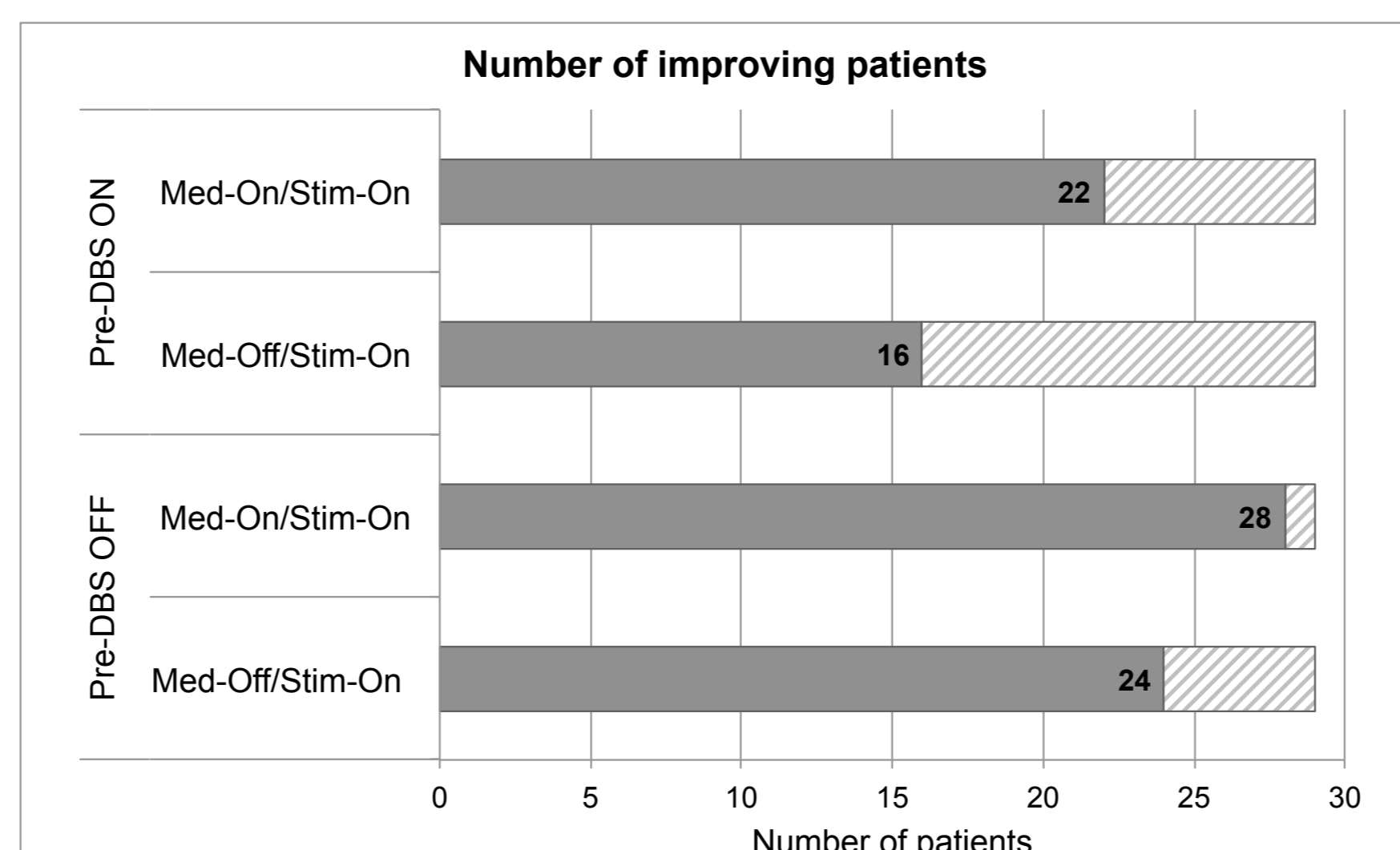


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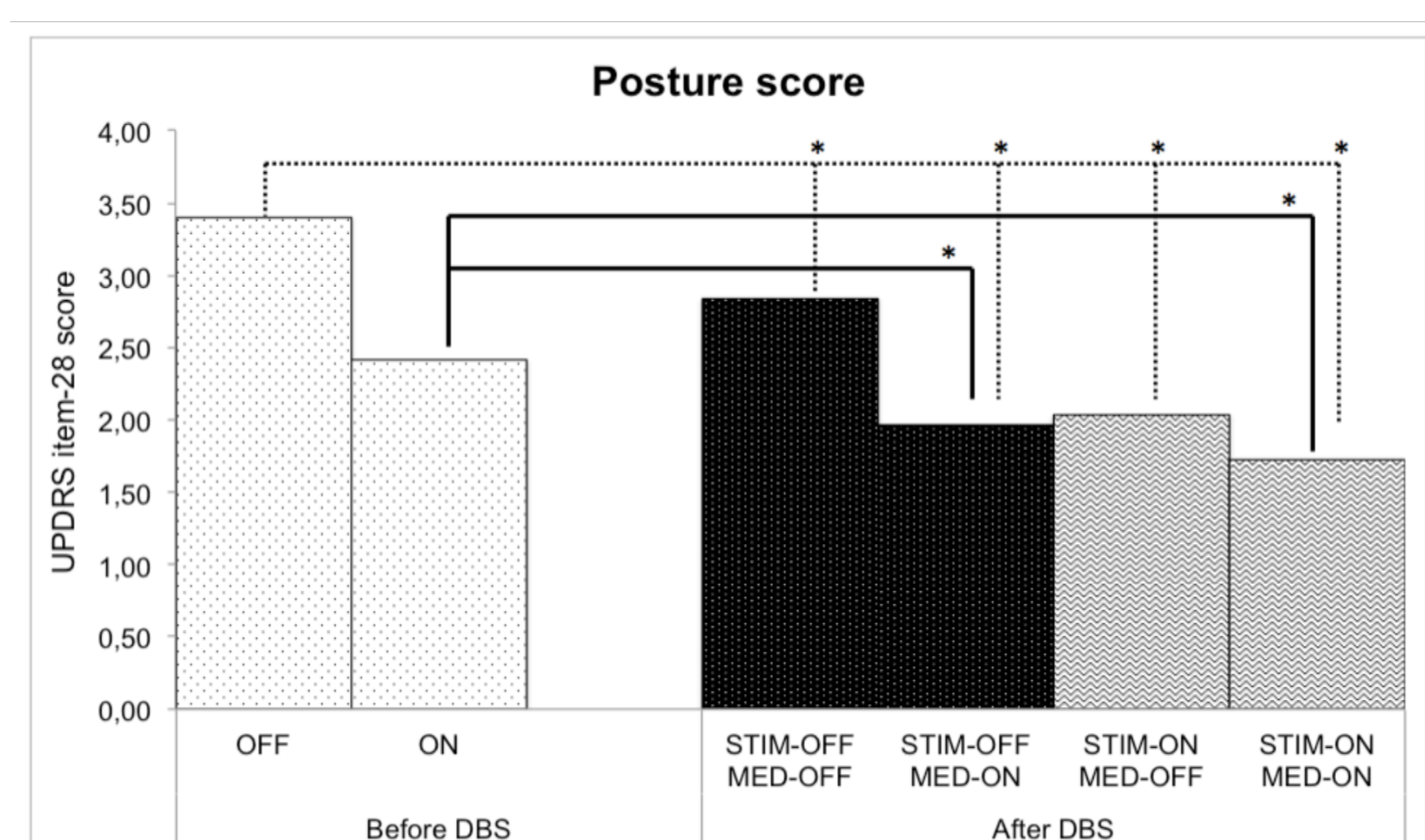


FIGURE 2: UPDRS ITEM-28 COMPARISON PRE AND AFTER DBS

\* significant difference between baseline and post-treatment score

Comparing the average item-28 score in "On-condition" before surgery and after 1 year of STN-DBS in Med-On/Stim-On, a significant improvement was observed ( $2.41 \pm 0.61$  vs.  $1.72 \pm 0.74$ ;  $p:0.001$ ), with 75.9% of patients improving, 10.3% maintaining and 13.8% worsening their UPDRS "posture" score.

Evaluating the effect of stimulation alone, a significant improvement was observed in 24/29 patients compared to pre-surgical "Off-condition" (pre-surgical Off vs. Med-Off/Stim-On), and in 16/29 compared to pre-surgical "On-condition" (pre-surgical On vs. Med-Off/Stim-On).

Dividing patients in two subgroups, trunk flexion improving (TFI) and trunk flexion not improving (TFNI), no significant differences were observed in terms of pre and post-DBS Levodopa Equivalent Daily Dose. 18/22 TFI patients received dopamine-agonists at baseline and 4 of them discontinued after surgery, while 5/7 TFNI subjects received dopamine-agonists at baseline and no one discontinued.

TFNI were younger at PD onset than TFI patients (TFI  $47.68 \pm 6.36$  vs. TFNI  $40.29 \pm 7.48$ ;  $p:0.024$ ) and no inter-group differences were observed in terms of presurgical UPDRS-III score. No significant difference in terms of stimulation settings was observed between TFI and TFNI group.

## Discussion and conclusion

No specific therapeutic options are available for the treatment of postural abnormalities in PD. These results confirm previous data on the efficacy of STN-DBS in the improvement of camptocormia and Pisa syndrome in most parkinsonian patients, suggesting that these conditions should not be considered a contraindication to the surgical treatment when patients meet all other eligibility criteria.