Scholars Journal of Medical Case Reports
Abbreviated Key Title: Sch J Med Case Rep
ISSN 2347-9507 (Print) | ISSN 2347-6559 (Online)
Journal homepage: https://saspublishers.com

OPEN ACCESS

Medicine

# Severe Camptocormia in Parkinson's Disease with Deep Brain Stimulation: A Rehabilitation and Orthotic Management Perspective: A Case Report

Elmajidi Meryem[1*], Ouider Kenza[1], Kouadssi M. Mehdi[1], Naciri M. Mehdi[1], Elhanafi Asma[1], Abdelfettah Younes[1]

[1]Department of Physical Medicine and Rehabilitation, University Hospital Mohamed VI, Faculty of Medicine and Pharmacy, Cadi Ayyad University, Marrakech, Morocco

**DOI:** https://doi.org/10.36347/sjmcr.2026.v14i05.033 | **Received:** 01.04.2026 | **Accepted:** 13.05.2026 | **Published:** 16.05.2026

***Corresponding author:** Elmajidi Meryem
Department of Physical Medicine and Rehabilitation, University Hospital Mohamed VI, Faculty of Medicine and Pharmacy, Cadi Ayyad University, Marrakech, Morocco

**Abstract** **Case Report**

Camptocormia is a disabling axial postural deformity that may occur in advanced Parkinson's disease and can significantly affect pain, gait, and functional independence. We report the case of a 57-year-old woman with Parkinson's disease who presented with severe anterior flexion of the trunk, chronic back pain, gait impairment, and functional limitation despite previous deep brain stimulation. Clinical and radiological assessment revealed marked sagittal imbalance, spinal deformity, and the presence of an implanted deep brain stimulation system. A rehabilitation program was prescribed, including postural correction, stretching, strengthening exercises, balance training, gait re-education, and spinal orthotic support. After 15 rehabilitation sessions, pain decreased from 7/10 to 5/10 on the visual analog scale. This case highlights the possible persistence of axial postural disorders despite deep brain stimulation and emphasizes the role of physical medicine and rehabilitation in the multidisciplinary management of camptocormia in Parkinson's disease.

**Keywords:** Camptocormia; Parkinson's disease; Deep brain stimulation; Physical medicine and rehabilitation; Rehabilitation; Spinal orthosis.

**Copyright © 2026 The Author(s):** This is an open-access article distributed under the terms of the Creative Commons Attribution **4.0 International License (CC BY-NC 4.0)** which permits unrestricted use, distribution, and reproduction in any medium for non-commercial use provided the original author and source are credited.

## Introduction

Camptocormia is a severe axial postural disorder characterized by involuntary forward flexion of the trunk, mainly during standing and walking [1,2]. In Parkinson's disease, it is considered a disabling complication related to multifactorial mechanisms, including abnormal postural control, axial dystonia, paraspinal muscle involvement, and degenerative spinal changes [2,3].

Despite advances in the treatment of Parkinson's disease, camptocormia remains difficult to manage. The response to deep brain stimulation is variable, particularly in chronic forms, and there is no universally established therapeutic approach [3,4]. Physical medicine and rehabilitation therefore has an important role in improving pain, posture, gait, and daily function. We report a case of severe camptocormia in Parkinson's disease with previous deep brain stimulation, managed through a rehabilitation and orthotic approach.

## Case Presentation

A 57-year-old woman was referred to our Department of Physical Medicine and Rehabilitation for severe anterior trunk flexion associated with chronic spinal pain, gait impairment, fatigue, and progressive functional limitation. She had been followed for Parkinson's disease for seven years and had no other relevant medical history. She was treated with levodopa-based therapy and had undergone deep brain stimulation five years before presentation for advanced Parkinson's disease characterized by severe motor fluctuations, dyskinesia, and disabling tremor despite optimized medical treatment.

According to the patient's history, the axial postural deformity developed after deep brain stimulation and progressively worsened over time. The condition was associated with spinal pain rated 7/10 on the visual analog scale, difficulty maintaining the standing position, impaired walking endurance, fatigue, frequent falls, and limitation of activities of daily living.

The patient was still able to stand and initiate walking but required close supervision and intermittent human assistance for safety because of postural instability, freezing of gait, and frequent falls. Her clinical status was considered compatible with advanced Parkinson's disease, approximately Hoehn and Yahr stage 4, given the severe functional impairment, marked postural instability, freezing of gait, frequent falls, and preserved ability to stand and ambulate short distances under close supervision or with intermittent assistance.

Clinical examination revealed severe camptocormia in the standing position and during walking, with marked anterior flexion of the trunk, small-step gait, forward-leaning posture, freezing episodes, and increased risk of imbalance and falls. The deformity was slightly reducible in the supine position, suggesting a mixed mechanism involving both postural and structural components. On the lateral standing photograph, the anterior trunk flexion angle was clinically estimated at approximately 65°–70° relative to the vertical axis (Figure 1).

**Figure 1: Clinical appearance of severe camptocormia in the standing position, showing marked anterior flexion of the trunk and forward-leaning posture**

Radiographic assessment of the spine showed marked thoracolumbar postural deformity with sagittal imbalance. The implanted deep brain stimulation system was visualized, including the subcutaneous pulse generator and extension leads (Figure 2). These findings supported the diagnosis of severe camptocormia with associated spinal deformity in a patient with advanced Parkinson's disease and previous deep brain stimulation.

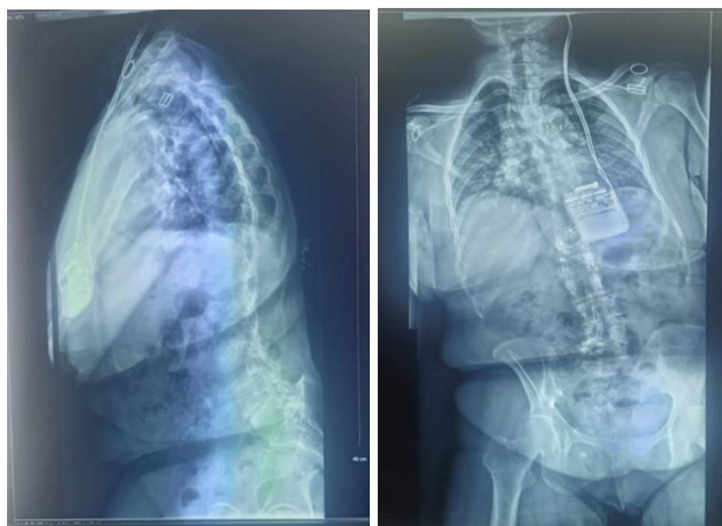

**Figure 2: Spinal radiographs showing thoracolumbar postural deformity and the implanted deep brain stimulation system, including the pulse generator and extension leads**

© 2026 Scholars Journal of Medical Case Reports | Published by SAS Publishers, India

A rehabilitation program was prescribed, preferably performed during the medication “ON” state to optimize motor performance and patient participation. The program included postural correction, spinal mobility exercises, stretching of the anterior muscle chains, strengthening of the trunk extensor muscles, manual therapy for paraspinal muscle relaxation, balance and proprioceptive training, gait re-education, rhythmic auditory cueing, sensory cueing strategies for freezing of gait, fall-prevention exercises, and floor-to-stand transfer training. A custom-made thoracolumbar spinal orthosis was also prescribed to provide external trunk support, improve standing tolerance, reduce mechanical stress, and help limit progression of the postural deformity.

After 15 rehabilitation sessions, the patient reported clinical improvement in spinal pain, with a decrease in the visual analog scale score from 7/10 to 5/10. She also reported better postural awareness, improved tolerance to standing, and subjective improvement in daily comfort. Objective postural correction with the orthosis could not be documented because the patient did not bring the orthosis to the follow-up visit.

## DISCUSSION

Camptocormia in Parkinson’s disease is a complex axial postural disorder rather than a simple spinal deformity. Its mechanisms are multifactorial and may include impaired postural control, axial dystonia, paraspinal muscle dysfunction, proprioceptive abnormalities, and degenerative spinal changes [1–3,5–7]. In our patient, the severe forward flexion of the trunk, slight reducibility in the supine position, and radiographic spinal deformity suggest a mixed mechanism combining a dynamic parkinsonian postural component and a more fixed musculoskeletal component. This explains why complete correction is difficult, especially in advanced and chronic forms.

Although the camptocormia appeared after deep brain stimulation, this temporal relationship should not be interpreted as evidence that DBS caused the deformity. Camptocormia is a known complication of Parkinson’s disease itself, particularly in advanced stages. The effect of DBS on axial postural deformities remains variable: improvement may occur in some patients, especially when the deformity is recent and flexible, whereas chronic or fixed deformities often respond poorly [4,8,9]. Therefore, in this case, DBS should be considered as part of previous treatment for advanced Parkinson’s disease, while the persistence and progression of camptocormia mainly reflect the difficulty of managing axial symptoms.

Parkinson’s disease remains a chronic progressive neurodegenerative disorder with no curative treatment. Current therapies, including levodopa and DBS, are mainly symptomatic and aim to improve motor symptoms, autonomy, and quality of life [10]. In this context, Physical Medicine and Rehabilitation has an essential role in accompanying the patient over time. The objective is not necessarily to cure the deformity, but to reduce pain, improve postural awareness, maintain walking ability, prevent falls, preserve independence in daily activities, and improve comfort and quality of life.

The rehabilitation program prescribed in our case was therefore based on a global functional approach. It included postural correction, spinal mobility exercises, stretching, strengthening of trunk extensor muscles, balance and proprioceptive training, gait re-education, fall-prevention exercises, floor-to-stand transfer training, and cueing strategies for freezing of gait. Performing rehabilitation during the medication “ON” state is important to optimize motor performance and patient participation. Physiotherapy has shown functional benefits in Parkinson’s disease, particularly for gait, balance, transfers, and freezing-related difficulties [11–13].

Orthotic management may be useful as a supportive treatment in selected patients with camptocormia. A custom-made thoracolumbar orthosis may help provide external trunk support, reduce mechanical stress, improve standing tolerance, and decrease pain. However, orthoses should be considered as supportive rather than curative, and their benefit depends on tolerance, adherence, correct fitting, and regular follow-up [14,15]. In our patient, after 15 rehabilitation sessions, spinal pain decreased from 7/10 to 5/10 on the visual analog scale, with subjective improvement in daily comfort and standing tolerance. The main limitation was the absence of objective assessment of postural correction with the orthosis, as the patient did not bring the brace to the follow-up visit. Future follow-up should include objective measures such as trunk flexion angle, Timed Up and Go test, 10-meter walk test, fall count, and quality-of-life assessment.

## CONCLUSION

Severe camptocormia in Parkinson’s disease may persist despite deep brain stimulation and remains difficult to treat. This case emphasizes that physical medicine and rehabilitation has a key role, not as a curative treatment, but as a patient-centered approach to reduce pain, improve safety, maintain function, and enhance quality of life through rehabilitation and orthotic support.

**Conflicts of Interest:** The authors have no conflicts of interest to declare.

**Patient Consent:** Written informed consent was obtained from the patient for the publication of this case report and the accompanying images.

## REFERENCES

1. Azher SN, Jankovic J. Camptocormia: pathogenesis, classification, and response to therapy. Neurology. 2005 Aug 9;65(3):355–9. doi: 10.1212/01.wnl.0000171857.09079.9f PubMed PMID : 16087897.
2. Srivanitchapoom P, Hallett M. Camptocormia in Parkinson’s disease : definition, epidemiology, pathogenesis and treatment modalities. J Neurol Neurosurg Psychiatry. 2016 Jan ;87(1):75–85. doi:10.1136/jnnp-2014-310049 PubMed PMID : 25896683 ; PubMed Central PMCID : PMC5582594.
3. Margraf NG, Wrede A, Deuschl G, Schulz-Schaeffer WJ. Pathophysiological Concepts and Treatment of Camptocormia. J Parkinsons Dis. 2016 Jun 16;6(3):485–501. doi:10.3233/JPD-160836 PubMed PMID: 27314757; PubMed Central PMCID : PMC5008234.
4. Lizarraga KJ, Fasano A. Effects of Deep Brain Stimulation on Postural Trunk Deformities : A Systematic Review. Mov Disord Clin Pract. 2019 Nov;6(8):627–38. doi:10.1002/mdc3.12829 PubMed PMID : 31745470 ; PubMed Central PMCID: PMC6856457.
5. Tiple D, Fabbrini G, Colosimo C, Ottaviani D, Camerota F, Defazio G, et al. Camptocormia in Parkinson disease : an epidemiological and clinical study. J Neurol Neurosurg Psychiatry. 2009 Feb;80(2):145–8. doi:10.1136/jnnp.2008.150011 PubMed PMID : 18931011.
6. Finsterer J, Strobl W. Presentation, etiology, diagnosis, and management of camptocormia. Eur Neurol. 2010;64(1):1–8. doi:10.1159/000314897 PubMed PMID : 20634620.
7. Ali F, Matsumoto JY, Hassan A. Camptocormia : Etiology, diagnosis, and treatment response. Neurol Clin Pract. 2018 Jun;8(3):240–8. doi:10.1212/CPJ.0000000000000453 PubMed PMID: 30105164; PubMed Central PMCID: PMC6075991.
8. Spindler P, Alzoobi Y, Kühn AA, Faust K, Schneider GH, Vajkoczy P. Deep brain stimulation for Parkinson’s disease-related postural abnormalities: a systematic review and meta-analysis. Neurosurg Rev. 2022 Oct;45(5):3083–92. doi:10.1007/s10143-022-01830-3 PubMed PMID: 35790655; PubMed Central PMCID: PMC9492622.
9. Lai Y, Song Y, Huang P, Wang T, Wang L, Pan Y, et al. Subthalamic Stimulation for Camptocormia in Parkinson’s Disease: Association of Volume of Tissue Activated and Structural Connectivity with Clinical Effectiveness. J Parkinsons Dis. 11(1):199–210. doi:10.3233/JPD-202259 PubMed PMID: 33325395; PubMed Central PMCID: PMC7990421.
10. Armstrong MJ, Okun MS. Diagnosis and Treatment of Parkinson Disease: A Review. JAMA. 2020 Feb 11;323(6):548–60. doi :10.1001/jama.2019.22360 PubMed PMID: 32044947.
11. Tomlinson CL, Patel S, Meek C, Herd CP, Clarke CE, Stowe R, et al. Physiotherapy intervention in Parkinson’s disease: systematic review and meta-analysis. BMJ. 2012 Aug 6 ;345: e5004. doi:10.1136/bmj.e5004 PubMed PMID: 22867913; PubMed Central PMCID: PMC3412755.
12. Radder DLM, Lígia Silva de Lima A, Domingos J, Keus SHJ, van Nimwegen M, Bloem BR, et al. Physiotherapy in Parkinson’s Disease: A Meta-Analysis of Present Treatment Modalities. Neurorehabil Neural Repair. 2020 Oct;34(10):871–80. doi:10.1177/1545968320952799 PubMed PMID: 32917125; PubMed Central PMCID : PMC7564288.
13. Ginis P, Nackaerts E, Nieuwboer A, Heremans E. Cueing for people with Parkinson’s disease with freezing of gait: A narrative review of the state-of-the-art and novel perspectives. Ann Phys Rehabil Med. 2018 Nov;61(6):407–13. doi: 10.1016/j.rehab.2017.08.002 PubMed PMID : 28890341.
14. de Sèze MP, Creuzé A, de Sèze M, Mazaux JM. An orthosis and physiotherapy programme for camptocormia: a prospective case study. J Rehabil Med. 2008 Oct;40(9):761–5. doi:10.2340/16501977-0252 PubMed PMID : 18843430.
15. Ye BK, Kim HS, Kim YW. Correction of Camptocormia Using a Cruciform Anterior Spinal Hyperextension Brace and Back Extensor Strengthening Exercise in a Patient With Parkinson Disease. Ann Rehabil Med. 2015 Feb ;39(1):128–32. doi:10.5535/arm.2015.39.1.128 PubMed PMID: 25750882; PubMed Central PMCID: PMC4351484.