Ablative procedures for the treatment of Parkinson’s disease

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**Pallidotomy**

**Indications:** Non tremor dominant PD  
Levodopa induced dyskinesia

**Effect:**  
Rigidity  
Bradykineisa  
Dyskineia  
Tremors??

**Complications:**  
Weakness  
Visual field defects  
Speech problems  
Neuropsychological
Unilateral pallidotomies in Parkinson's disease: a randomised, single-blind, multicentre trial

Background
The results of several cohort studies suggest that patients with advanced Parkinson's disease would benefit from unilateral pallidotomy. We have assessed the efficacy of unilateral pallidotomy in a randomised, single-blind, multicentre trial.

Methods
We enrolled 37 patients with advanced Parkinson's disease who had, despite optimum pharmacological treatment, at least one of the following symptoms: severe response fluctuations, dyskinesias, painful dystonias, or bradykinesia. Patients were randomly assigned to unilateral pallidotomy within 1 month or to pallidotomy after the primary outcome assessment (6 months later). The primary outcome was the difference between the groups in median changes on the motor examination section of the unified Parkinson's disease rating scale (UPDRS 3) score done in the off phase. Secondary outcome measures included levodopa-induced dyskinesias (dyskinesia rating scale [DRS]) and extent of disability (UPDRS 2).

Findings
The median UPDRS 3 off score of the pallidotomy patients improved from 47 to 32.5, whereas that of control patients slightly worsened from 52.5 to 56.5 (p<0.001). In the on phase the median DRS score improved 50% in pallidotomy patients compared with no change in controls. The UPDRS 2 off score improved with a median of 7 in the pallidotomy group. Two treated patients had major adverse effects.

Interpretation
Unilateral pallidotomy is an effective treatment in patients with advanced Parkinson's disease, who have an unsatisfactory response to pharmacological treatment.

Stereotactic pallidotomy performed without using microelectrode guidance in patients with Parkinson's disease: surgical technique and 2-year results

Object
Pallidotomy for the treatment of medically refractory Parkinson's disease (PD) has enjoyed renewed popularity. However, the optimal surgical technique, lesion location, and long-term effectiveness of pallidotomy remain subjects of debate. In this article the authors describe their surgical technique for performing pallidotomy without using microelectrode guidance, and the clinical and radiological results of this procedure.

Methods
Patients were evaluated preoperatively by using a battery of validated clinical rating scales and magnetic resonance (MR) imaging of the brain. Individuals with severe treatment-refractory idiopathic PD who were believed to be good candidates for surgery underwent computerized tomography scanning and magnetic resonance imaging (MRI) to identify key structures. Lesion location and size were calculated from MR imaging sequences of the brain obtained within the first 24 hours after surgery and again 3 months later. Clinical examinations were conducted at 1, 3, 6, 12, and 24 months after surgery.

Seventy-five patients (mean age 61 years, range 38–79 years) underwent unilateral pallidotomy. Significant improvements were observed in the “off” period scores for the activities of daily living portion of the Unified Parkinson's Disease Rating Scale (UPDRS). The UPDRS motor score, total “on” time, levodopa-induced dyskinesias, and contralateral tremor these improvements were maintained 24 months postoperatively. The mean lesion volume measured on the immediate stereotactic macrostimulation was used to optimize lesion placement and to avoid injury to nearby structures. Lesion location and size were calculated from MR imaging sequences of the brain obtained within the first 24 hours after surgery and again 3 months later. Clinical examinations were conducted at 1, 3, 6, 12, and 24 months after surgery.

Conclusions
Pallidotomy performed without using microelectrode guidance is a safe and effective treatment for selected patients with medically refractory PD.

KEY WORDS • pallidotomy • Parkinson’s disease • stereotaxis
Unilateral and Bilateral Pallidotomy for Idiopathic Parkinson’s Disease: A Case Series of 115 Patients

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Abstract: Lesioning of the internal pallidum is known to improve the symptoms of idiopathic Parkinson’s disease (PD) and alleviate dyskinesia and motor fluctuations related to levodopa therapy. The benefit obtained contralateral to a single lesion is insufficient in some cases when symptoms are bilaterally disabling. However, reports of unacceptably high rates of adverse effects after bilateral pallidotomy have limited its use in such cases. We report on the outcome of unilateral (UPVP) and bilateral (BPVP) posteroventral pallidotomy in a consecutive case series of 115 patients with PD in the United Kingdom and Australia. After 3 months, UPVP resulted in a 27% reduction in the off medication Part III (motor) Unified Parkinson’s Disease Rating Scale score and abolition of dyskinesia in 40% of cases. For BPVP, these figures were increased to 31% and 63%, respectively. Follow-up of a smaller group to 12 months found the motor scores to be worsening but benefit to dyskinesia and activities of daily living was maintained. Speech was adversely affected after BPVP, although the change was small in most cases. Unilateral and bilateral pallidotomy can be performed safely without microelectrode localisation. Bilateral pallidotomy appears to be more effective, particularly in reducing dyskinesia; in our experience, the side effects have not been as high as reported by other groups. © 2002 Movement Disorder Society

Key words: pallidotomy; bilateral; unilateral; Parkinson’s disease; outcome; complications

Thalamotomy
Thalamotomy

Indications in PD: Tremor dominant

Effects: Tremors
Rigidity
Bradykinesia

Complications: Weakness
Speech

Ain shams university (2006-2013)

- 114 Ablative procedure for 82 patients
- **age**: 42-79 mean 59
- **Sex**: 52 females and 30 males
- **disease duration**: 4-11 mean 7.5 years
- **Procedure**:
  - *Thalamotomy*
    - 46 patients (56%) total of 64 thalamotomies
    - Bilateral in 18 patients
    - Unilateral in 28
  - *Pallidotomy*
    - 36 patients (44%) patientstotal of 40 pallidotomies
    - bilaterally in 4
    - Unilateral in 30
    - Redo in 2 patients
Pallidotomy group

UPDRS ADL

Thalamotomy group

UPDRS ADL
### Complications

<table>
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<tr>
<th>Procedure</th>
<th>Percentage</th>
<th>Complications</th>
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| **Pallidotomy (15%)** | | 1 patient: Homonymous superior quadrantanopia  
1 patient: Transient dysarthria (bilateral)  
2 patients: Transient weakness  
2 patients: Small ICH less than 1cm |
| **Thalamotomy (10.8%)** | | 3 patients: transient HP  
1 patient: Worsening dysarthria (bilateral)  
1 patient: Transient confusion  
1 patient: ICH died |

**Can we lesion STN**

**Treatment of Advanced Parkinson's Disease by Subthalamicotomy: One-Year Results**

**Abstract:** We studied effects on parkinsonian features at 6 and 12 months in 32 patients who underwent unilateral ablation of subthalamic nucleus (STN). Microelectrode mapping was used, and a lesion was created in the STN using thermocoagulation and confirmed with magnetic resonance imaging. At 6 months postoperatively, improvements were seen in several areas: (1) Motor features were significantly improved in 20%, with no worsening in 25%, and worsened in 55% of patients. (2) UHDRS II and III scores, and BHI scores remained improved at 12 months. Daily dosage of levodopa requirement was reduced by 42%. Axial motor features, gait, postural stability, off period tremor, and motor fluctuation improved at 6 and 12 months but showed a decline in benefits at 18 months. Complications include 3 cases of hemiballism, of whom 2 patients recovered spontaneously but 1 died from aspiration pneumonia. One patient had asymptomatic hematomas, and 2 suffered transient postural instability. We conclude that unilateral subthalamicotomy for advanced Parkinson's disease may be a safe and effective procedure with minimal complications.

In advanced stage of Parkinson's disease (PD), many patients develop intolerable complications such as drug-induced psychosis, dyskinesias, or motor fluctuation that are difficult to manage. Several stereotactic targets have been investigated as potential therapeutic interventions in advanced PD patients to medical especially dyskinesias. However, PVP has its limitations, because bilateral surgery may produce serious speech disturbance. The current pathophysiological model of PD suggests that a hyperactive subthalamic nucleus (STN) is the main motor center of excessive inhibitory control of motor activity. 

**Keywords:** Parkinson's disease, subthalamicotomy; microelectrode; surgical ablative therapy; subthalamic nucleus; hemiballism.
Lesion Vs Stimulation

DBS over lesion:
- Reversibility of side effects
- Ability to treat bilaterally without the same incidence of side effects as associated with bilateral ablation therapy
- The potential for optimizing therapy during DBS programming sessions.

Lesion over DBS:
- Outcome is more sustained than DBS
- The potential problems with lead fractures, battery replacements, skin erosions, and infection

Thank you