

**Resha Shrestha, MS**

Department of Neurosurgery  
Annapurna Neurological Institute and Allied Sciences  
Kathmandu, Nepal

**Pranaya Shrestha, MS**

Department of Neurosurgery  
Annapurna Neurological Institute and Allied Sciences  
Kathmandu, Nepal

**Pravesh Rajbhandari, MS**

Department of Neurosurgery  
Annapurna Neurological Institute and Allied Sciences  
Kathmandu, Nepal

**Samir Acharya, MS**

Department of Neurosurgery  
Annapurna Neurological Institute and Allied Sciences  
Kathmandu, Nepal

**Basant Pant, MD PhD**

Department of Neurosurgery  
Annapurna Neurological Institute and Allied Sciences  
Kathmandu, Nepal

**Address for correspondence:**

Resha Shrestha, MS  
Department of Neurosurgery  
Annapurna Neurological Institute and Allied Sciences  
Kathmandu, Nepal

**Email:** reshkums@hotmail.com

**Date submitted:** 21/3/18

**Date accepted:** 18/4/18

**P**arkinsons crisis also known as akinetic crisis in Parkinsons disease is usually a life threatening complication of Parkinsons disease and is a medical emergency of movement disorders. It has an annual incidence of 0.3 percent with a death rate of 15%.<sup>3,5</sup> It is characterized in most severe cases with total akinesia with dysphagia, hyperthermia, dysautonomia, increment of muscle enzymes and alteration in mental status. The clinical picture is similar to that of neuroleptic malignant syndrome, and the condition has also been termed as neuroleptic malignant-like syndrome, malignant syndrome or parkinsonism-hyperpyrexia.<sup>7</sup> Akinetic crisis can be aggravated by multiple factors like withdrawal of treatment, infections, trauma or gastrointestinal diseases<sup>4</sup> though the pathophysiology is unknown but it appears to be due to transient blockade of the dopamine system.

Casereport:

We present a case of 57 years old male (retired teacher) who presented with features of Parkinsons disease since last ten years. He started with left sided hemiparkinsonism with rigidity and tremor and gradually right side was also involved. He was a dopamine responder and was having dopamine (1200mg/day), trihexiphenidyl, Pramipexole and

## Deep Brain Stimulation of bilateral Subthalamic nucleus (STN) following pallidotomy with Parkinsons crisis: A case report

We present a case of 57 years old patient with Idiopathic Parkinsons disease (PD) who had right sided Globus Pallidus Internus (GPI) lesioning or pallidotomy as surgical treatment modality of PD. However this patient went into Parkinsons crisis postoperatively which is a rare form of complication. We had to admit in critical care for two weeks before he gradually improved and reached to preoperative state. This patient finally underwent deep brain stimulation (DBS) of bilateral Subthalamic nucleus (STN) and he has improved in terms of Unified Parkinson's Disease Rating Scale (UPDRS) score.

**Key words:** Pallidotomy, Parkinsons Crisis, STN DBS

antihypertensive. He was planned for staged pallidotomy and initially right sided Globus Pallidus Internus (GPI) pallidotomy was planned. We had to stop his dopamine for more than 24 hours before surgery due to technical issues. His preoperative Unified Parkinson's Disease Rating Scale (UPDRS) III score was 32/56. We did Right sided pallidotomy under local anesthesia with Cosman Radiofrequency probe with 0.75mm internal diameter and 3 mm exposed tip. Out final temperature was 70 degree centigrade for 60 seconds. The patient was extremely anxious following surgery and his improvement was not as we had expected earlier. He was ambulating and was discharged after removing the sutures. However on 11<sup>th</sup> postoperative day he again came to our hospital and this time he could neither mobilize by himself nor open his jaws. He could not feed by himself and there was severe akinesia of the whole system. His temperature was 103 degree Fahrenheit and there was urinary retention. His UPDRS III score was 52/56. We had to give nasogastric feeding and admit him in intensive care unit (ICU). All the baseline parameters were sent which was uneventful except for slightly high CP-NAC and features of urinary tract infection (UTI). There was isolation of citrobacter species

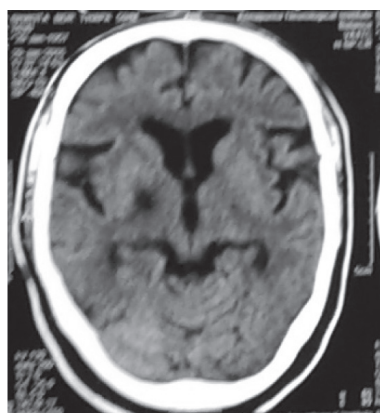


Figure 1: showing the postoperative CT scan in Parkinsons Crisis with Right sided pallidotomy

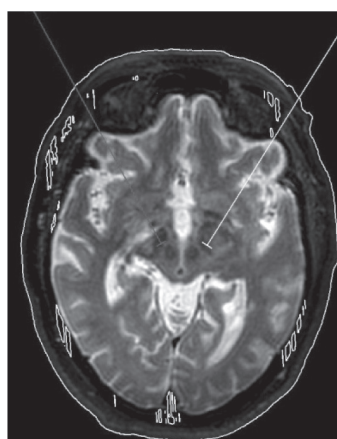


Figure 2: showing the intraoperative targeting of Bilateral STN DBS

responsive to Nitrofurantoin. We stopped all his antiparkinsons medicine except dopamine which was continued via nasogastric tube. We could not give subcutaneous apomorphine or intravenous amantadines due to unavailability in Nepal. We also started antibiotics and other supportive measures in ICU. The postoperative CT scan head showed the right pallidotomy status with no other complications like pneumocephalus or hemorrhage. He did not respond to dopamine for 10 days but gradually improved and was shifted outside ICU after two weeks. Gradual addition of other antiparkinsons medicine was also done and neuro-rehabilitation was also started. Finally he was discharged after 45 days of hospital admission. He could mobilize by himself but there was on/off phenomenon present. His conditions got better with time. We had advised for left sided Gpi pallidotomy as planned earlier but the patient decided to do bilateral STN DBS which is another surgical modality of Parkinsons disease. During his 15 months follow up with pallidotomy he again had on/off phenomenon with his UPDRS III score of 34/56. We did bilateral STN DBS in this patient

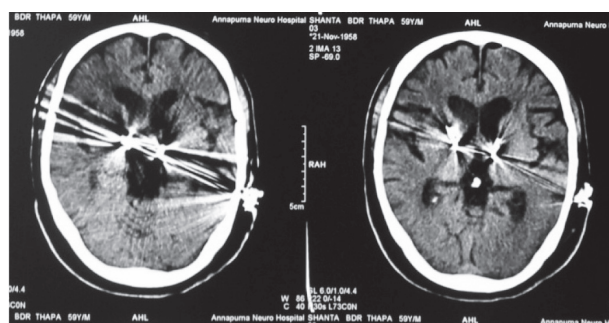


Figure 3: showing postoperative CT scan with artifact from bilateral STN DBS

after 15 months of pallidotomy and Parkinsons crisis with Brio Rechargeable IPG( St Jude, USA). Figure 2 shows intraoperative T2 weighted MRI with targeting of bilateral STN and figure 3 shows the postoperative CT scan head with the artifact of the DBS lead. There was no complications and he has improved in terms of his UPDRS III score of 12/56 with 70% improvement in terms of UPDRS score in one month follow up. Now his Implantable pulse generator(IPG) parameter is bipolar mode (-0+0) bilaterally with pulse width 62 us and frequency of 130 hz and 1.5mA of current. We need to continue neuromodulation in this patient until we get the best result again. The patient is satisfied and is on regular follow with his usual medications like dopamine(1200mg/day), Pramipexole and Trihexyphenidyl. Though we have not decreased the dose of his dopamine, the duration of on time is better and we plan to decrease the dose of dopamine in near future.

## Discussion:

An operational definition for acute akinesia (parkinsonism-hyperpyrexia syndrome) in PD is a sudden worsening in UPDRS scores by  $\geq 20$  points along with transient lack of response to dopaminergic medications at the usual doses or rescue medications for  $\geq 3$  days.<sup>6</sup> The patients usually do not respond for days or weeks to the nasogastric administration of anti-parkinsonian drugs or to subcutaneous apomorphine, and they mostly have normal levodopa kinetics.<sup>3,2</sup> Our patient meets this criteria with and he did not respond to nasogastric administration of dopamine therapy for more than two weeks.

This case of Parkinsons crisis may be due to prolonged withdrawal of the dopamine before surgery that is more than 24 hours. He also developed urinary tract infection at the same time which may have also contributed for his akinesia as mentioned in literature about the withdrawal of medicine or infections.<sup>3</sup> We could not find any cases of akinetic crisis following pallidotomy but we believe that it is a kind of stress or surgery and it may lead to crisis. There

is a recent case report on survivors of malignant STN-DBS withdrawal syndrome from lack of early detection of low IPG(Implantable Pulse generator) status and delay in replacement. <sup>4</sup>But in our case STN DBS has improved the patient's condition following recovery from akinetic crisis and pallidotomy.

The pathophysiological mechanism of akinetic crisis is unclear but the dopamine system during akinetic crisis appears to be transiently blocked from the treatments that usually give patients rapid motor benefit. Valterri et al have shown nearly absent striatal dopamine transporter binding bilaterally in dopaminergic imaging in SPECT.<sup>8</sup>The complete loss of striatal dopamine transporter binding has been termed as the 'burst striatum' <sup>1</sup> and, from an imaging point of view, is the end stage of PD.

### Conclusion:

It is a well known fact that STN DBS is an established surgical treatment of Parkinson's disease but we believe that this is the first case of STN DBS following recovery from akinetic crisis and pallidotomy.

### References:

1. Eggers C, Kahraman D, Fink GR, Schmidt M, Timmermann L: Akinetic-rigid and tremor-dominant Parkinson's disease patients show different patterns of FP-CIT single photon emission computed tomography. **Mov Disord** 26:416–423, 2011
2. Onofrj M, Bonanni L, Cossu G, Manca D, Stocchi F, Thomas A: Emergencies in parkinsonism: akinetic crisis, life-threatening dyskinesias, and polyneuropathy during L-Dopa gel treatment. **Parkinsonism Relat Disord** 15 (suppl 3):S233–S236, 2009
3. Onofrj M, Thomas A: Acute akinesia in Parkinson disease. **Neurology** 64:1162–1169, 2005
4. RoopaRajan, Syam Krishnan, Krishna Kumar Kesavapisharady, Asha Kishore. Malignant Subthalamic Nucleus-Deep Brain Stimulation Withdrawal Syndrome in Parkinson's Disease. **Clinical Practice/Movement Disorders** 3:288-291, 2016
5. Takubo H, Harada T, Hashimoto T, Inaba Y, Kanazawa I, Kuno S, Mizuno Y, Mizuta E, Murata M, Nagatsu T, Nakamura S, Yanagisawa N, Narabayashi H: A collaborative study on the malignant syndrome in Parkinson's disease and related disorders. **Parkinsonism RelatDisord** 9 (suppl 1):S31–S41, 2003
6. Thomas A, Iacono D, Luciano AL, Armellino K, Onofrj M: Acute akinesia or akinetic crisis in Parkinson's disease. **NeuroSci** 24:219–2202003
7. Toru M, Matsuda O, Makiguchi K, Sugano K: Neuroleptic malignant syndrome-like state following a withdrawal of antiparkinsonian drugs. **J Nerv Ment Dis** 169:324–327, 1981
8. ValtteriKaasinen, Juho Jouts, Tommi Noponen, Markku Päivärint. Akinetic Crisis in Parkinson's Disease Is Associated with a Severe Loss of Striatal Dopamine Transporter Function: A Report of Two Cases. **Case Rep Neuro** 16:275–280, 2014