

Peri-electrode cystic cavity : a rare development following deep brain stimulation

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Introduction

Deep brain stimulation (DBS) is an established treatment for various neurological disorders. While DBS is generally considered safe and effective, complications such as infection, hardware related issues and perielectrode cyst formation can occur. We present a case of a 59-year-old female patient that developed a perielectrode cyst after DBS surgery for Parkinson's disease (PD). A routine postoperative MRI revealed the presence of a cyst surrounding the left DBS electrode.

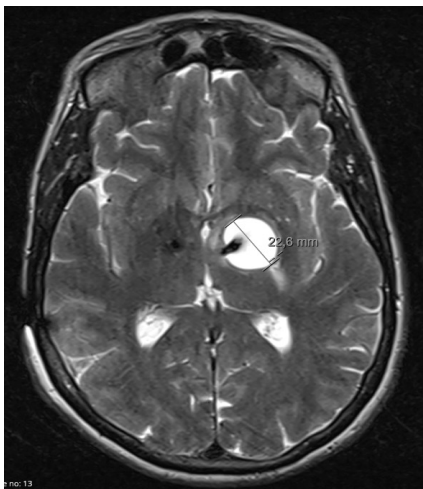


Figure 1 – Axial T2 weighted image of perielectrode cyst

Discussion

Perielectrode cyst formation following DBS surgery is a rare complication. It can lead to significant increasing symptoms and clinical deterioration in patients. In previously reported cases the clinical presentation of perielectrode cyst is variable. Some patients remain asymptomatic while others present with an acute onset or progressive clinical symptoms. (3) The exact pathophysiology of the cyst formation is unclear. In a retrospective report of complications after DBS placement, only 0.9% of patients developed a perielectrode cyst. (2-6) In these cases they suggested that the cyst develops as a second stage of perilesional edema. (7) However, perilesional edema is usually present in the first 4 to 120 days. Mostly, perilesional edema is transient and resolves in 1 to 2 months. (6) In the previous reported patients the mean time for developing symptomatic cysts was 6.2 months. So, the link between perilesional edema and cysts is not definitive. Different other causes have been suggested such as micro-hemorrhages, mechanical trauma, an inappropriate immune reaction, or CSF tracking along the electrode. Different treatment strategies have been suggested for perilesional cysts. In symptomatic cases treatment with corticosteroids has resulted in cyst regression. In the majority of reported cases the hardware was removed for progressive neurological deficits or to rule out infection. (1;2) Similar to our patient a few asymptomatic patients have been followed and a spontaneous regression of the cysts was observed.

Coordinates Immediately postoperative		Coordinates after cyst development	
Target		Target	
Lateral left	9.12mm	Lateral left	3.33mm
Posterior	2.79mm	Posterior	2.72mm
Inferior	6.17mm	Inferior	3.41mm
Angulation		Angulation	
Lateral left	22.15°	Lateral left	21.27°
Anterior	37.42°	Anterior	33.67°

Case report

A 59 year old woman with a 13 year history of Parkinson's disease (PD) and LRRK2 mutation was treated with a bilateral subthalamic nucleus deep brain stimulation at our clinic. She was selected for DBS screening because of disabling peak dose dyskinesias and motor fluctuations. The standard multi-disciplinary screening examinations were performed. UPDRS III in ON is 1, in OFF 30. During the cognitive examination, she scored 29/30 on the Montreal Cognitive Assessment. After this evaluation, she was selected for treatment with bilateral subthalamic nucleus (STN)-DBS surgery. The patient underwent uncomplicated bilateral STN-DBS under general anesthesia. The correct placement of the electrodes was verified with the fusion of the pre-operative imaging and the perioperative O-arm 3D scan. The immediate postoperative cerebral CT showed ruled out hemorrhage or other acute lesions. She tolerated the surgery well and was discharged home after an uneventful postoperative course. Postoperatively the patient had a clear clinical improvement and an important dose reduction of the levodopa was obtained (1500mg/24h vs. 250mg/24h). Three months postoperatively a routine cerebral MRI was performed. This revealed the presence of a cystic structure, measuring approximately 2.6mm, surrounding the distal part of the left STN electrode.

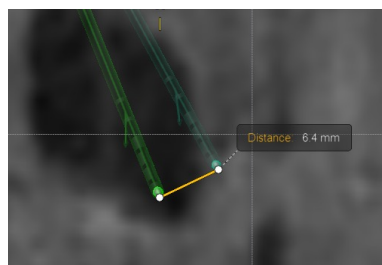


Figure 2 – Lead displacement on coronal MRI T1 weighted image (BrainLab)

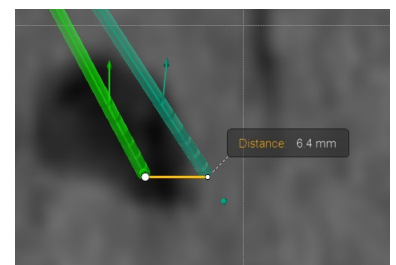


Figure 3 – displacement on coronal MRI T1 weighted image (BrainLab)

Conclusion

Perielectrode cyst formation is a rare and potentially dangerous complication after DBS surgery. Since routine imaging is not commonly performed, perielectrode cysts are probably undiagnosed and unreported. Symptoms are most commonly progressive, but a sudden onset has been reported. Although most reported cases have been treated by hardware removal, observation with serial imaging is possible since spontaneous regression of the cyst has been described. Close patient follow up and multi-disciplinary collaboration is essential.

References

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