

Intraoperative radiography during DBS utilizing CT scan and Fluoroscopy: Differences in radiation doses received by patients. Preliminary results from a Prospective non-randomized study

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Introduction

Deep brain stimulation surgery involves intraoperative radiological verification of the lead placements as a routine practice. Two commonly employed techniques are compared in this study to measure the amount of radiation received by patients during DBS surgery.

Methods

Patients undergoing DBS surgery were explained about the study with prior approvals from Institutional Regulatory Board for placement of radiation badges to measure the amount of radiation received by the patients during the procedure. Two badges were placed: one on thyroid region of neck and another in the orbito-meatal line in front of the ear. DBS procedure followed the standard operative protocol. At the end of the procedure the badges were removed and sent for dosimetry readings.

Results

There were 11 cases of Parkinson's disease, 3 tremor and 2 dystonia. The target was subthalamic nucleus in 9, VIM of thalamus in 4 and GPi in 3. Leads were placed bilateral in 5 and unilateral in 11 cases. The mean dose or radiation recorded with O-arm was 1337.6 mRem and with C-arm 1101 mRem ($P=0.1$, t-test). The radiation received by the badge on thyroid was 156.4 with O-arm compared to 1318 mRem with C-arm ($P=0.002$). The other recordings noted were not significantly different. On multivariate analysis the radiation received at the thyroid region was the significant variable observed ($P=0.004$; Odd's ratio: 1.005; 0.999-1.010).

Conclusions

The mean value of radiation was not significantly different between the two methods. With O-arm the neck/thyroid badge recorded significantly low dose and may be safer.

Learning Objectives

Understand the differences in radiation exposure with O-Arm and C-arm during DBS surgery

Infer the advantages from the two techniques.