

Temporoparietooccipital and parietooccipital disconnection in patients with intractable epilepsy

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Abstract

Objective: To assess the surgical techniques and surgical outcomes of temporoparietooccipital and parietooccipital disconnection. **Methods:** The authors conducted a retrospective review of clinical, neuropsychological, EEG, imaging data in 16 patients with intractable epilepsy who underwent temporoparietooccipital and parietooccipital disconnection between April 2008 and October 2011. Of the 16 cases, 12 were males and 4 were females. The age of seizure onset was from 0.1 to 27 years (average 6.6) and disease duration of 0.1 to 18 years (average 7.5). The surgery was performed between the age of 3 and 37 years (average 14.1). Nine patients underwent temporoparietooccipital disconnection, 5 patients parietooccipital disconnection and 2 patient parietooccipital disconnection and temporal lobectomy. **Results:** After a mean follow-up of 1.6 years (range 0.5–3.9 years), 13 patients (81%) were seizure free, 1 patient had Engel Class II seizure outcome and 2 patient had Engel class III outcome. Two patients exhibited severe brain swelling and one patients had second resective operation with good recovery. None of the patients developed new motor deficits postoperatively and there was no mortality.

Conclusion: Temporoparietooccipital and parietooccipital is a safety and effective epilepsy surgery procedure for patients with epileptic zone localization to the posterior quadrant on one side. The results of surgical disconnection for posterior quadrant epilepsy have yielded excellent seizure outcomes in 81% of the patients, with no mortality or major morbidity.

INTRODUCTION

There are two main operative procedures for the treatment of epilepsy, resective and disconnective surgery. Resective surgery involves lesionectomy, corticectomy, lobectomy, and anatomical hemispherectomy. Disconnective surgery includes multiple subpial transection, bipolar electrocoagulation on functional cortexes (BEFC)^{1,2}, corpus callosotomy, and modified functional hemispherectomy by disconnection. Disconnective surgery constituted more than 60% of the total operations indicating its importance in pediatric epilepsy surgery.^{3,4} Functional disconnection of the temporoparietooccipital (TPO) or parietooccipital (PO) lobes to treat intractable epilepsy constitutes less than 5% of epilepsy surgeries. We describe the largest reported group of epilepsy surgery undergoing TPO and PO disconnection. We report preoperative and postoperative electroclinical, and imaging status in these patients and assess factors predictive of surgical outcome.

METHODS AND RESULTS

Patients

We retrospectively reviewed the data of 16 patients with epilepsy who underwent TPO and PO disconnection at Beijing Sanbo Brain Hospital between Oct 2008 and Oct 2011. There were 12 males and 4 females, with a mean age of seizure onset of 7.5 years old (range 0.1 -18) and mean age at surgery of 14.1 years old (range 3–37). Epilepsy is the first manifestation of the condition in all patients. None of them had an epilepsy family history.

Presurgical evaluation

All patients in this study underwent a comprehensive evaluation including detailed history and neurological examination, long-term video-electroencephalogram (VEEG) monitoring, and magnetic resonance imaging (MRI). One patient underwent fluorodeoxyglucose positron emission tomography (FDG-PET) scan.

Magnetoencephalography (MEG) was performed in 12 patients.⁵ Preoperative and postoperative neuropsychological test were assessed by a psychologist. The patients over the age of 14 were administered Wechsler Adult Intelligence Scale (WAIS), 6-13 year-old patients were administered the Wechsler Intelligence Scale for children-revised (WISC-R), and 4-6 year-old were administered the Wechsler Preschool and Primary Scales of Intelligence (WPPSI). The preoperative assessment was performed within one month before surgery and the postoperative assessment was performed 6-45 months after surgery.

Surgery and surgical outcome

MRI was abnormal in all patients. MRI before surgery revealed unilateral posterior quadrant (temporal and/or parietal, occipital lobes) lesion in 11 patients and bilateral posterior quadrant lesions in 5 patients. MEG revealed unilateral posterior quadrant abnormal discharge in 11 patients and bilateral posterior quadrant discharge in one patient. All data were discussed at a multidisciplinary conference. Surgery was conducted according to the outcome of the conference. The surgical methods include TPO and PO disconnection. Surgical procedures were directed by neuro-navigation system. Nine patients underwent TPO disconnection, 5 patients PO disconnection and 2 patient PO disconnection and temporal lobotomy. Patients were assessed after surgery in 3 months, 6 months, 1 year, then annually. After a mean follow-up of 1.6 years (range 0.5–3.9 years), 13 patients (81%) were seizure free, one patient had Engel Class II seizure outcome and 2 patient had Engel class III outcome. Mean intelligence quotient (IQ) before surgery was 82 ± 12 , and was 83 ± 11 at the time of postoperative assessment. There was no statistic difference ($P=0.165$). Two patients exhibited severe brain swelling and one of the 2 patients had second resective operation and recovered beneficently. None of the patients developed new motor deficits postoperatively and there was no death.

DISCUSSION

This series of 16 patients undergoing TPO lobes and PO lobes disconnection represents about 1.8% of all surgery (912 cases) operated by the Sanbo Brain Hospital for intractable epilepsy from Apr 2008 to Oct 2011. TPO lobes and PO lobes disconnection is indicated when the epileptogenic zone encompasses large areas of

the temporal and/or parietal, occipital lobes and spares the central and frontal areas. In this series, the preoperative investigations aiming at localizing the epileptogenic zone were concordant between the imaging, EEG, clinical evaluations, which was around the posterior quadrant unilaterally.

There are a few studies that focus on TPO and PO disconnection.⁶ Mohamed *et al*⁷ reported 16 children who underwent TPO surgery, including 4 with no definite epileptogenic lesion and 8 with generalized electroclinical manifestations. After a mean follow-up of 52 months, 9 children (56%) are seizure-free and 5 (31%) experienced seizure reduction of greater than 50%. Daniel *et al*⁸ reported 13 patients with disconnection surgery. Three technical variants were utilized, anatomical posterior quadrantectomy, functional posterior quadrantectomy, and periinsular posterior quadrantectomy. After a median follow-up period of 6 years, 12/13 patients had Engel's Class I seizure outcome.

In our practice, the considerations guiding the choice of the surgical methods between disconnection and resection are: Multilobar anatomical resection would be done in following symptomatic epilepsy caused by AVM, malignant tumor. For all the other static etiologies, a disconnective surgery would be an alternative option. As shown in this case series, the morbidity with this surgical approach is low and the results are excellent. In conclusion, TPO and PO disconnection are thus safe and effective surgery procedure for patients with epileptic zone localization to the posterior quadrant on one side.

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