

Surgical and neurological adverse effects of epilepsy surgery

Akademisk avhandling

Som för avläggande av medicine doktorsexamen vid Sahlgrenska akademien, Göteborgs universitet kommer att offentligen försvaras i Hjärtats aula, Sahlgrenska universitetssjukhuset, Vita stråket 12, 413 45 Göteborg, fredagen den 8 november 2019, klockan 13:00.

av Johan Bjellvi, leg. läkare

Fakultetsopponent:

Johan Bengzon, adjungerad professor

Avdelningen för neurokirurgi, Institutionen för kliniska vetenskaper, Lunds universitet

Avhandlingen baseras på följande delarbeten:

- I. Hedegård E, Bjellvi J, Edelvik A, Flink R, Rydenhag B, Malmgren K. Complications to invasive epilepsy surgery workup with subdural and depth electrodes: a prospective population-based observational study. *Journal of Neurology, Neurosurgery, and Psychiatry* 2014; 85: 716-720.
- II. Bjellvi J, Flink R, Rydenhag B, Malmgren K. Complications of epilepsy surgery in Sweden 1996-2010: a prospective, population-based study. *Journal of Neurosurgery* 2015; 122: 519-525.
- III. Bjellvi J, Edelvik A, Rydenhag B, Malmgren K. Risk factors for seizure worsening after epilepsy surgery in children and adults: a population-based register study. *Neurosurgery, in press.*
- IV. Bjellvi J, Cross JH, Rheims S, Ryvlin P, Sperling MR, Rydenhag B, Malmgren K. Complications in epilepsy surgery and invasive diagnostic procedures: a proposed protocol and feasibility study. *Manuscript.*

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Johan Bjellvi

Department of Clinical Neuroscience, Institute of Neuroscience and Physiology, Sahlgrenska Academy, University of Gothenburg, Sweden, 2019.

Abstract

The aim of this thesis was to study surgical and neurological complications of preoperative invasive investigations and epilepsy surgery procedures (Papers I-II) and seizure worsening after epilepsy surgery (Paper III). A further aim was to improve reporting of adverse effects related to invasive investigations and epilepsy surgery by proposing and evaluating an evidence-based protocol for monitoring complications (Paper IV).

Papers I-III were based on data from the prospective Swedish National Epilepsy Surgery Register. In Paper IV, a literature review of previous definitions and classifications of complications in epilepsy surgery was the starting point for a consensus-based proposal agreed within an international network of epilepsy surgery centers. The final protocol was clinically evaluated at three of the centers during a period of one year.

Complications were seen in 4.8% of 271 invasive EEG procedures, none of which were major. Subdural grids had the highest risk. Complications related to invasive investigations increased the risk for complications related to subsequent epilepsy surgery (Paper I). After 865 epilepsy surgery procedures, major complications were seen in 3.0%, and minor complications in 7.5%. Higher age at surgery was a risk factor for complications (Paper II). After 1407 epilepsy surgery procedures, increased seizure frequency occurred in 4.0% cases, and new-onset tonic-clonic seizures in 3.9%. Both outcomes were more common in reoperations. Lower age at surgery and extratemporal procedures were independent risk factors for increased seizure frequency, and preoperative neurologic deficits for new-onset tonic-clonic seizures (Paper III). The agreed protocol for complications was used for 90 procedures with a total of 18 complications (not differentiated into major or minor). Areas for future improvements of the protocol were identified (Paper IV).

Complications and seizure worsening are rare outcomes after epilepsy surgery. Robust data on negative outcomes are important in order for patients and parents to make informed decisions about epilepsy surgery. Prospective data collection with standardized protocols may improve reporting of adverse effects.

Keywords: Epilepsy surgery, invasive electrode procedures, intracranial EEG, complications, adverse events, risk, seizure worsening, multicenter study, register study, SNESUR.