Title: Comparison of stereoelectroencephalography versus subdural electrodes for invasive epilepsy monitoring in pediatric patients: A meta-analysis

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Abstract:

Introduction: Stereoelectroencephalography (SEEG) and subdural explorations (SDE, including grids, strips, and depth electrodes) represent the two main techniques utilized in pre-operative evaluation of medically refractory epilepsy. During the past two decades, some studies have explored the comparative safety and effectiveness of these two modalities in pediatric patients.

Methods: We conducted a systematic review with meta-analysis following PRISMA guidelines. We performed literature search using MeSH terms published until June 30, 2022 in four electronic databases. The R statistical software version 3.5.3 and MedCalc Statistical Software version 19.2.3 were used to perform the meta-analysis.

Results: We included 16 studies with 780 pediatric patients who underwent SDE and 22 papers with 662 pediatric patients who underwent SEEG monitoring. Post-procedure complications were seen more frequently in SDE as compared to SEEG group. CSF leak was observed in 7.95% of patients (pooled prevalence; 95% CI: 3.3-14.38) in the SDE group as compared to a CSF leak prevalence of 0.62% (95% CI, 0.166-0.1613) in the SEEG group (Relative risk, RR, 56.82, $p = 0.0001$). Intracranial hemorrhages (ICHs) and infections were also observed more frequently in SDE group (RR, 2.212, $p = 0.004$; RR, 11.95, $p < 0.0001$). In the SDE group, ICH had a pooled prevalence of 4.88% (95% CI, 1.91-9.137) and infection had a pooled prevalence of 8.34% (95% CI 6.348-10.717). SEEG had an ICH prevalence of 3.54% (95% CI 2.184-5.402) and infection had a prevalence of 1.00% (95% CI 0.368-2.177). Among patients who underwent subsequent epilepsy surgery subsequently, the percentage of patients achieving seizure freedom (Engel class I) was similar between SDE and SEEG groups (SDE: 62.09%, 95% CI 51.03-72.55 versus SEEG: 64.91%, 95% CI 56.38-72.98, $p = 0.965$).

Conclusion: In a pooled analysis of pediatric patients, SEEG was associated with less adverse effects overall yet similar rates of seizure freedom compared to SDE.

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Non-expert summary: This was a meta-analysis of available studies comparing two modalities for pre-operative evaluation of medically refractory epilepsy in pediatric patients. SEEG was found to be a safer modality as compared to SDE.