The Hybrid Operculo-Insular Electrode: A New Electrode for Intracranial Investigation of Peri-Sylvian/Insular Refractory Epilepsy

BACKGROUND: Precise localization of an epileptic focus in the peri-Sylvian/insular area is a major challenge. The difficult access and the high density of blood vessels within the Sylvian fissure have lead to poor coverage of intra-Sylvianopercular and insular cortex by available electrodes. OBJECTIVE: To report the creation of a novel electrode designed to record epileptic activity from both the insular cortex and the hidden surfaces of the opercula.

METHODS: The hybrid operculo-insular electrode was fabricated by Ad-Tech Medical Instrument Corporation (Wisconsin, USA). It was used in combination with regular subdural and depth electrodes for long-term intracranial recordings. The hybrid electrode, which contains both a depth and a strip (opercular) component, is inserted after microsurgical opening of the Sylvian fissure. The depth component is implanted directly into the insular cortex. The opercular component has one or two double-sided recording contacts that face the hidden surfaces of the opercula.

RESULTS: The hybrid operculo-insular electrode was used in five patients. This method of invasive investigation allowed including (two patients) or excluding (three patients) the insula as part of the epileptic focus and the surgical resection. It also allowed extending the epileptogenic zone to include the hidden surface of the frontal operculum in one patient. There were no complications related to the insertion of this new electrode.

CONCLUSION: The new hybrid operculo-insular electrode can be used for intracranial investigation of peri-Sylvian/insular refractory epilepsy. It can contribute to increasing cortical coverage of this complex region and may allow better definition of the epileptic focus.

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