Medial thalamotomy

First introduced in the 1950s, thalamotomy is an invasive procedure, primarily effective for tremors such as those associated with Parkinson's disease (PD), where a selected portion of the thalamus is surgically destroyed (ablated).

The proton density MRI was demonstrated to be very useful to determine the safest trajectory and tentative target point. However, as a detailed functional localization of the thalamic subnuclei cannot be yet obtained by MRI, the final target should be decided on the basis of electrophysiological findings [1)].

Bilateral procedures are poorly tolerated because of increased complication and risk, including vision and speech problems. The positive effects on tremors are immediate. Other less destructive procedures are sometimes preferred, such as subthalamic deep brain stimulation (DBS), since this procedure can also improve tremors and other symptoms of PD.

Classification

Radiofrequency Thalamotomy

Gamma Knife thalamotomy.

Magnetic resonance guided focused ultrasound thalamotomy.

Stereotactic robot-assisted MRI-guided laser interstitial thermal therapy thalamotomy

Outcome

Thalamotomy outcome.

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69 patients suffering from chronic therapy-resistant neurogenic pain of peripheral and/or central origin underwent a stereotactic medial thalamotomy. Medial thalamic unit recordings were performed peroperatively, allowing the physiological confirmation of the electrode location and the recognition of a specific physiopathology. Thanks to these recordings, a concept was developed, based on the presence of an imbalance between medial (nucleus centralis lateralis mainly) and lateral (nucleus ventroposterior) thalamic nuclei, resulting in an over-inhibition of both by the reticular thalamic nucleus, and then in a paradoxical activation of pain-related cortical areas. The medial thalamotomy, re-actualized by new technical, anatomical and physiological data, offers a 50-100% relief to 67% of all patients with peripheral as well as central neurogenic pain, on all body localizations, without producing neurological deficits and without risk for the development of iatrogenic pain [2)].

1)
Kawashima Y, Chen HJ, Takahashi A, Hirato M, Ohye C. Application of magnetic resonance imaging in functional stereotactic thalamotomy for the evaluation of individual variations of the thalamus.

Stereotact Funct Neurosurg. 1992;58(1-4):33-8. PubMed PMID: 1439346.
2)

Jeanmonod D, Magnin M, Morel A. Chronic neurogenic pain and the medial thalamotomy. Schweiz Rundsch Med Prax. 1994 Jun 7;83(23):702-7. PMID: 8016511.