Functional Hemispherectomy History

In 1938, McKenzie presented the first report of anatomical hemispherectomy for the treatment of refractory epilepsy at the annual meeting of the American Medical Association in San Francisco. The title of his report was quite simply, “The present status of a patient who had the right cerebral hemisphere removed.” [1].

In 1950, working in Johannesburg, South Africa, Krynauw reported on 12 patients with infantile hemiplegia who underwent hemispherectomy; seizure control was achieved in 10 of these patients, with improvement in function and behavior [2].

This pioneering work led to a wave of enthusiasm for the procedure. By 1961, a review of the literature of cerebral hemispherectomy revealed 269 reported cases, with an operative mortality of 6.6% [3].

Although the effectiveness of hemispherectomy was established, the high incidence of hydrocephalus and delayed mortality from superficial cerebral hemosiderosis in up to one-third of patients led to a rapid decline in the procedure [4] [5].

In the 1970s, Rasmussen recognized that the extent of resection and the residual surgical cavity were contributing factors to superficial cerebral hemosiderosis. Preservation of the frontal and occipital lobes and disconnecting them from the rest of the brain resulted in a “functional complete but anatomical subtotal hemispherectomy,” giving rise to the functional hemispherectomy, which protected against superficial cerebral hemosiderosis and delayed hydrocephalus, and to a resurgence for the disconnection procedure [6].

Subsequent modifications of the functional hemispherectomy have resulted in smaller craniotomies and the development of hemispherotomies, which have minimized the amount of brain tissue resected and operative time, thereby reducing operative morbidity and mortality while maintaining an equivalent rate of seizure control [7] [8] [9] [10] [11].

1)
McKenzie KG: The present status of a patient who had the right cerebral hemisphere removed. JAMA 111:168–183, 1938
2)
Krynauw RA: Infantile hemiplegia treated by removing one cerebral hemisphere. J Neurol Neurosurg Psychiatry 13:243–267, 1950
3)
White HH: Cerebral hemispherectomy in the treatment of infantile hemiplegia; review of the literature and report of two cases. Confin Neurol 21:1–50, 1961
4)
Oppenheimer DR, Griffith HB: Persistent intracranial bleeding as a complication of hemispherectomy. J Neurol Neurosurg Psychiatry 29:229–240, 1966
5)
Wilson PJ: Cerebral hemispherectomy for infantile hemiplegia. A report of 50 cases. Brain 93:147–180, 1970
6)
Rasmussen T: Hemispherectomy for seizures revisited. Can J Neurol Sci 10:71–78, 1983
7)
Delalande O, Bulteau C, Dellatolas G, Fohlen M, Jalin C, Buret V, et al: Vertical parasagittal hemispherotomy: surgical procedures and clinical long-term outcomes in a population of 83 children.

Neurosurgery 60 (2 Suppl 1):ONS19– ONS32, 2007
8)

Kovanda TJ, Rey-Dios R, Travnicek J, Cohen-Gadol AA: Modified periinsular hemispherotomy: operative anatomy and technical nuances. J Neurosurg Pediatr 13:332–338, 2014
9)

Schramm J: Hemispherectomy techniques. Neurosurg Clin N Am 13:113–134, ix, 2002
10)

Villemure JG, Mascott CR: Peri-insular hemispherotomy: surgical principles and anatomy. Neurosurgery 37:975–981, 1995
11)

Wen HT, Rhoton AL Jr, Marino R Jr: Anatomical landmarks for hemispherotomy and their clinical application. J Neurosurg 101:747–755, 2004