Guglielmi Detachable Coil (GDC)

The Guglielmi Detachable Coil is a block of platinum coil commonly used in intracranial non-invasive surgery for the occlusion of intracranial aneurysms. It was invented by Italian interventional neuroradiologist Dr. Guido Guglielmi in 1990 and was gradually introduced in the later 1990s as an alternative to surgical clipping, which requires invasive surgery. In September 1995, the Guglielmi Detachable Coil (GDC) system received formal approval from the Food and Drug Administration (FDA) for the treatment of surgically high-risk intracranial aneurysms.

The peculiarities of this coil lie in its physical as well as its electrolytical properties: the material is a high Shape-memory alloy, allowing it to easily bend and regain its original coil shape. It is also highly sensitive to low currents, which allows the GDC to detach from the catheter that carries it, thus receiving the name “detachable coil”. The long-term efficacy of GDC coils and similar coils in the treatment of cerebral aneurysms is still being studied.

Since its inception, endovascular coil technology has grown substantially as multiple manufacturers entered the market with an ever-increasing number of new products. Practitioners are now inundated with a choice of coils that vary on the basis of factors such as size, composition, stiffness, and detachment mechanism. The seasoned interventionalist had the benefit of evolving with this technology and, therefore, is likely to understand many of the practical nuances of coil development; for more junior practitioners, who did not experience the ongoing changes in technology [1)].

Since the emergence of the Guglielmi detachable coil in the late 1980s and early 1990s, the treatment of intracranial aneurysms has entered an endovascular era which has served as a crucial adjunct to the gold standard of microsurgical clipping. The International Subarachnoid Aneurysm Trial (ISAT) and International Study of Unruptured Intracranial Aneurysms (ISUIA) have established the exponential increase in utility of endovascular procedures for aneurysms treatment. Results of the ISAT showed that 1-yr disability or death occurred in 30.9% of patients treated via clipping vs only in 23.5% of patients in the coiling group [2)]

Immunohistochemical analysis

Gross examination revealed no adhesion between the aneurysm wall and the surrounding brain tissue. Histologic and immunohistochemical analyses demonstrated that the cavity of the aneurysm was filled with homogeneous collagenous fibrous tissue, while the neck was completely covered by a dense collagenous neointima and a smooth muscle cell layer. The unique histologic results of this case may contribute to a better understanding of the long-term evolution of the healing process in intracranial aneurysms successfully treated with the GDC [3)].

1)
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2)

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3)
Yuki I, Spitzer D, Guglielmi G, Duckwiler G, Fujimoto M, Takao H, Jahan R, Tateshima S, Murayama Y, Vinuela F. Immunohistochemical analysis of a ruptured basilar top aneurysm autopsied 22 years after embolization with Guglielmi detachable coils. J Neurointerv Surg. 2014 Jul 25. pii: neurintsurg-2014-011260. doi: 10.1136/neurintsurg-2014-011260.rep. [Epub ahead of print] PubMed PMID: 25063696.