



Neurosurgery for mental disorder

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The authors review contemporary indications for neurosurgical interventions in the management of chronic and refractory mental disorder, the procedures involved, their efficacy and known adverse effects. These data are presented within the context of a brief historical overview of the use of neurosurgery for mental disorder. In addition to a consideration of neurosurgical procedures that rely on the creation of putative therapeutic lesions, we also review two novel, non-destructive neurosurgical electro-stimulation treatments that may represent viable alternatives to conventional ablative neurosurgery: vagus nerve stimulation and deep brain stimulation.

In 1976, the World Health Organization defined psychosurgery as 'the selective surgical removal or destruction of nerve pathways for the purposes of influencing behaviour'. Implicit within this definition was the assumption that so-called 'psychosurgery' held as its primary purpose the modification of behaviour by its effects on psychological processes.

This definition emphasises important conceptual shifts, both in the manner in which psychological processes are now considered to be located within, and a product of, specific brain circuitry; and in the explicit focus on the alleviation of the symptoms of specific mental disorders.

The consistently low numbers of women in neurosurgery training programs and in the workplace results in a dearth of female role models for the mentoring of residents and junior faculty/practitioners. This lack of guidance contributes to perpetuation of barriers to women considering careers in neurosurgery, and to the lack of professional advancement experienced by women already in the field.

Although it would be hoped that successful neurosurgery for mental disorder might indeed result in significant behavioural change associated with altered symptom burden, the primary aim is to engender a release of adaptive behaviour, not a suppression of an 'undesirable' or 'unwanted' behavioural repertoire, as has been extensively documented following earlier psychosurgical approaches. A questionnaire survey of UK centres offering psychosurgery between 1974 and 1976, covering 431 patients, calculated that the yearly rate of leucotomy (a procedure that resulted in the widespread destruction of white matter connections between the frontal lobes and other brain areas) in the UK at that time was 3.4 operations per million population aged over 15.

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Depression was the most common indication, followed by anxiety, with 'violence' coming third. Within a relatively short period, there has been a dramatic reduction in rates of neurosurgery for mental disorder, a major change in both the selection of target sites and the techniques employed, and a contraction of the recognised indications for treatment. Neurosurgery has been practised for millennia. Psychosurgery, and subsequently neurosurgery for mental disorder, have always been contentious, particularly during the height of the antipsychiatry movement of the 1960s and '70s. Psychosurgery has been frequently portrayed in the popular arts as a punitive means of social control (One Flew over the Cuckoo's Nest and A Clockwork Orange, for example). Much of the hostility towards neurosurgery for mental disorder has resulted from the historical application of crude procedures, together with a lack of rigorous investigation regarding effectiveness and a lack of detailed assessment of adverse effects on personality and cognition. Provided the diagnosis is secure, there are few absolute contraindications to neurosurgery for mental disorder other than incapacity to provide informed consent. In all cases, such surgery can only be offered following careful and detailed consideration of the potential costs and benefits to the individual on a case-by-case basis. Where affective or obsessional symptoms are the product of active organic or degenerative brain disease, or where pervasive developmental disorder is likely, neurosurgery would not be considered.

In the foreseeable future, neurosurgery for mental disorder will remain a highly specialised treatment alternative for a small number of patients with severe and chronic treatment-refractory anxiety and depressive disorders. Ablative neurosurgery for mental disorder will never be validated by classical randomised controlled trials, but can be evaluated by careful prospective audit. Detailed pre- and post-operative assessments, including advanced neuropsychology and neuroimaging, will help us to evaluate neurosurgical procedures and their outcomes. Mechanisms of therapeutic action may be identified. The use of irreversible ablative treatments may diminish with the introduction of potentially less hazardous reversible interventions such as vagus nerve stimulation and deep brain stimulation. Substantive, robust, controlled and blinded trials involving vagus nerve stimulation and deep brain stimulation may be possible.

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