Assessing Outcome of Stereotactic and Functional Neurosurgery for Clinical Audit

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Summary

Audit of all types of stereotactic and functional neurosurgery can be based on outcome described as a profile of changes in four parameters—symptoms/signs, overall disability, complications, and the success of surgery in eliminating neuropathology.

Keywords: Audit; disability; complications; prognosis; movement disorders; trigeminal neuralgia; extracranial pain brain gliomas.

Introduction

Doctors concerned with stereotactic and functional neurosurgery have an obligation to provide quality assurance of their clinical practice. This, an issue of great moment to authorities who fund health-care, is achieved best by audit of the outcome of management. For this purpose outcome may be described as a profile of changes in four parameters:

1) The symptoms/signs for which the patient is treated,
2) The underlying neuropathological process,
3) Overall disability, and
4) Adverse clinical changes.

This assessment is demonstrated with reference to consecutive patients treated by stereotactic and functional neurosurgery and assessed at the end of inpatient care.

Methods

For these patients, all of whom had operative treatment, the outcome was assessed as follows:

(S): The change in clinical features confined to the signs and symptoms for which operation was performed (e.g. for parkinsonism, the change in tremor contralateral to thalamotomy but disregarding other symptoms/signs or coexisting disease). Rating: improvement (complete +2, incomplete +1); no change (0); deterioration (any −1, marked −2); death (−9);

(P): An operation's achievement for the disease process being treated. Rating: process eliminated (completely +3, incompletely +2); other result (+1); no operation (0);

(A): Presence at discharge of clinical complications (however slight);

(D): Disability - as performance rated on Karnofsky scale, an 11 point scale ranging from 0 (death) to 100 (normal, no symptoms/signs of disease). This is based on activities of daily living and takes account of presenting and coexisting conditions, any postoperative discomfort, and iatrogenic complications.

Outcome was assessed at the end of inpatient episodes for the treatment of involuntary movement (N 129), trigeminal neuralgia (133), intractable extracranial pain (79), and brain glioma (62). Operations are listed in legends to Figs. 1-3.

Results

The outcome of surgery is shown for individual patients—Fig. 1 (thalamotomy for involuntary movement) and Fig. 2 (trigeminal neuralgia)—and is summarized in Fig. 3 for groups of patients treated for involuntary movement, trigeminal neuralgia, extracranial pain, and brain gliomas.

The technical result of surgery was coded as P +1 for all patients treated by rhizotomy and functional CNS ablations, P +3 for two patients with trigeminal neuralgia treated by microvascular decompression and, for glioma patients treated by stereotactic means (Fig. 3), P +1 for surgery limited to biopsy and P +2 for substantial though incomplete reduction of mass lesions (by cyst aspiration or open tumour excision).

Clinical complications evident at the end of inpatient management (A) were usually instances of localized analgesia (following radiofrequency trigeminal rhizotomy) or features signifying disorder in the vicinity of CNS ablations (for functional procedures) or at the site of gliomas subjected to surgery. Often
these adverse developments, especially if complicating functional operations, were mild, temporary, and would not have been evident if outcome had been assessed later at follow-up.

Adverse clinical changes (A) may coincide with improvements (S + 2, + 1) in symptoms/signs for which a patient is admitted and with improvement in disability rating on the Karnofsky scale (K-score) Figs. 1, 2. Note, too that changes in the symptoms/signs being treated (S + 2, + 1, −1) and iatrogenic complications (A) may be insufficient to cause changes in disability rating (K-score).

A general pattern of outcome was common to all three patient groups—involuntary movement, trigeminal neuralgia, extracranial pain—treated by functional neurosurgery Figs. 1–3). Usually there was improvement (S + 2, + 1) in the symptoms/signs for which operation was performed and improvement or no change in the disability rating (K-score); deterioration in S or in the K-score was rare. Adverse changes (A) were not uncommon but usually were mild and clinically acceptable.

For brain gliomas improvement in clinical features (S) and in disability (K-score) and the occurrence of complications were all more common after procedures coded P + 2 (reduction of mass lesion) than after those coded P + 1 (stereotactic biopsy only) – Fig. 3.

Discussion

This method of recording outcome is valuable for the audit of stereotactic and functional neurosurgery. It allows audit to deal with the quality of neurosurgical care rather than merely with its quantity (such as the numbers of patients treated for specified diagnoses). The four outcome parameters, S, P, A, D are easy to determine and are applicable to all neurosurgical conditions.