Editorial

Unilateral pallidotomy for advanced Parkinson’s disease

In 1992, Latini reported the benefits of posteroventral pallidotomy (PVP) for the treatment of advanced idiopathic Parkinson’s disease when he re-visited a procedure first described by Leksell 30 years previously (Starr et al., 1998). The resurgence of interest was driven by the failure of medical management to successfully treat the increasing number of patients with the all too familiar long-term levodopa failure syndrome, characterized by dopa-induced dyskinesias and motor oscillations. Since then, a further 20 reasonably well-designed series on 700 patients have been published in peer-reviewed journals, with similar impressive results. A recent randomized controlled trial has confirmed highly significant benefits (Vitek et al., 1998). Critics of the procedure often cite the paper of Sutton et al. (1995) on five patients who did not show overall benefits apart from dyskinesia suppression. Two of the clinical descriptions given in this report, however, were not suggestive of idiopathic Parkinson’s disease.

The efficacy of unilateral PVP in selected patients with advanced idiopathic Parkinson’s disease is therefore no longer a matter of debate, but despite this many questions remain over the optimal lesion size and site, the necessity of intra-operative microelectrode recording, and the long-term benefits of the procedure. Two papers in this journal begin to address some of these issues. In this issue, the Toronto group (Gross et al., 1999) have correlated lesion location with patient outcome in a series of 33 patients, and the Vancouver group (Samii et al., 1997) report 2-year follow-up data on a cohort of 20 patients. Taken together, these papers also demonstrate the difficulties of comparing outcome data from different centres.

Lesion location continues to be the subject of considerable debate. It is perhaps surprising that it is not standard practice to report postoperative lesion characteristics. Accurate delivery of the lesion on target is a fundamental test of any surgeon and the procedure he or she chooses to use. It is obvious that a misplaced lesion will result in reduced benefit and an increased incidence of unwanted side effects, particularly if the lesion volume is large. Gross et al. (1999) show the distribution of lesion centres following pallidotomy (their Fig. 2), and provide an immediate assessment of the accuracy of their technique. It should also be noted that these lesions are 6–8 mm in diameter, which adds to the potential degree of error. By pooling group outcomes, the authors have demonstrated that lesions in the central third of the anteromedial to posterolateral extent of the PVP were associated with improvements in akinesia and postural instability, whereas lesions in the anteromedial third were more beneficial for rigidity and dyskinesia. This confirms similar results obtained with pallidal stimulation (Krack et al., 1998) and concurs with the concept of segregated but parallel organization of specific motor circuits. Akinesia may depend on ascending pallidothalamicofrontal pathways, whereas rigidity may require descending pallidoedunculopontine reticulospinal tracts. Dyskinesias may be related to dysequilibrium in the complex interplay between the striatopallidal and subthalamopallidal inputs, rather than to the mere tonic discharge rate of the pallidal neurones (Krack et al., 1998). In other words, pallidotomy results in no signal, which is better than a noisy signal. This may help to explain the so-called ‘pallidotomy paradox’ where both dyskinesias and akinesia are helped by the same lesion.

The lesion analysis method used by Gross et al. (1999) is not ideal for the individual patient as it relies on anatomical stereotactic coordinates and does not take into account variation in pallidal location or shape. Krauss et al. (1997) used an image-based method, which is potentially more useful when considering adverse outcomes. The Toronto group has previously reported highly significant cognitive deficits following unilateral PVP (Trepanier et al., 1998) and it would be interesting to correlate cognitive outcome with lesion location.

Long-term outcome data has thus far been rarely reported. Results from only 22 patients with 2 or more years follow-up are available (Fazzini et al., 1997; Lozano et al., 1995). Five of these patients were studied for 4 years (Fazzini et al., 1997). Persisting suppression of contralateral, but not ipsilateral, dyskinesia was demonstrated with maintained improvement in contralateral off-state bradykinesia and rigidity. The report in this issue by Samii et al. confirms that the most enduring effect of pallidotomy is the long-term relief of dyskinesia, which should be remembered when selecting patients for the procedure. However, the improvement in off-state parkinsonian symptoms had been lost. The reason for this difference is not obvious, but may reflect smaller lesion size or less accurate lesion placement. The Vancouver group, using CT imaging, without microelectrode recording and with a 1.5 mm exposed tip lesioning electrode, made three lesions at 80°C for 60 s along a 6-mm axis, 23 mm lateral to the midline. The Toronto
group used preoperative MR imaging, microelectrode recording with two to eight electrode passes, and a tentative target 21 mm lateral to the midline. A single lesion was made using a 3-mm exposed tip probe, for 60 s at 70, 80, and finally 90°C (Lozano et al., 1995). They may have operated on a different patient population in terms of age, degree of disability, L-dopa reversibility, and co-morbidity, and have interpreted the subjective components of the rating scales differently.

The application of PVP is now becoming widespread, with many centres beginning to perform the procedure. It remains to be seen what results are achieved from units without a proven track record in functional neurosurgery, with patients that are probably less well selected than those in the published trials. Further studies are essential to optimize the benefits and minimize the deficits. Published series so far have been small, inadequately followed-up, or from single centres, so that subtle differences in outcome have not been detectable. Collaborative work, preferably involving randomized-controlled trials on large numbers of patients, is vital to answer the outstanding questions. This is particularly significant as we begin to compare PVP with pallidal stimulation and subthalamic procedures. It is important that techniques are developed which are practical and affordable, particularly when provided in the setting of a state-funded healthcare service.

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References


