Assessing tremor severity with long-term tremor recordings

We have read the paper by Bain et al. with great interest. This excellent work will be of considerable benefit for future studies. Nevertheless we would like to draw attention to a fact that has been underestimated in this contribution. Bain et al. investigate the validity of a clinical rating scale and of short-term, upper-limb accelerometry by comparing the results to various measures of functional impairment, clearly demonstrating the superiority of the rating procedure over the neurophysiological approach. On the basis of our own results it seems most likely that one of the main reasons for the weak validity of accelerometry in their study is the short duration of the recordings, which do not take into account the marked diurnal variations of tremor severity, and the exceptional situation in a clinic laboratory.

In order to overcome these problems which are a general feature of short-term tremor quantification, we have developed a method for measuring tremor for up to 24 hours by recording the EMG of wrist extensors and flexors with a small portable tape recorder. During the recording period the outpatients are free to move around, and maintain their usual activities, allowing us to measure exactly that involuntary muscle activity which produces the daily living impairment. Having gained some experience with this technique, we appreciate such long-term recordings as a reliable tool for clinical studies. Moreover, our measure of tremor severity (which actually is the tremor-occurrence rate) seems to correlate better with a patient's self-rating of functional impairment than the doctor's clinical assessment.

We have investigated this issue in a preliminary manner by evaluating treatment effects in 15 parkinsonian patients with different premedications. The tremor severity was assessed before and after the change in medication, firstly by rating on a six-point scale, and secondly by a 10-hour tremor recording. In addition, the patients were asked to rate the effect on a scale consisting of five grades of improvement (2), slight improvement (1), no change (0), slight deterioration (1), and marked deterioration (2). When the changes in tremor occurrence rate and clinical rating, and the patient's self-ratings are correlated, the coefficients (Spearman's r) and p values are: doctor's rating—self-rating: r = 0.25, p = 0.37; doctor's rating—long-term EMG: r = 0.017, p = 0.95; self-rating—long-term EMG: r = 0.860, p < 0.001.

Although our setup is not directly comparable to the one used by Bain et al. (we studied parkinsonian patients instead of patients with essential tremor), furthermore, EMG and accelerometry might differ in their correlation with functional impairment. Our data allow the following conclusions: neurophysiological techniques do have a place in tremor quantification if they are applied for sufficiently long periods of observation. When used in this way, they not only avoid the abovementioned problems, but most importantly, the correlation with functional impairment seems to be higher than in any short-term method, including clinical rating.

ANDREAS BOOSE SYBILLE SPEIKER CHRISTOPH JENTGENS THOMAS WICKGERTHE ERICH SCHOLZ JOHANNES DICHGANS University of Tubingen, Department of Neurology, Hopper-Seyer-Strasse 2, 72076 Tubingen, Germany

Correspondence to: Dr Bose

Bain and Findley reply: We note the findings of Boose et al with considerable interest. Their technique of recording a parkinsonian tremor for prolonged periods of time (up to 10 hours) and their use of "tremor-occurrence rate" as an index of tremor severity provide a useful insight into the problems involved in assessing tremor severity. We agree entirely about the advantages of assessing patients during their normal activities rather than in an artificial laboratory environment, where patients may (at least initially) be unduly tense and anxious. Their point about diurnal variation of tremor is also well made, and in the case of parkinsonian tremor we have observed that further short-term fluctuations occur from burst to burst in EMG recordings and can be seen from minute to minute and hour to hour in patients' limbs (phenomena that led us to speculate that parkinsonian tremor may be a fractal process). We do, however, have some reservations about their approach. Firstly, the equipment is costly and not widely available. Secondly, the time involved in recording and analysing tremor recordings precludes its routine clinical use except in specialist departments. Thirdly, their measurement of tremor-occurrence rate was compared with a six-point clinical rating scale and a five-point patient self-rating scale, which are both clearly measures of impairment. These scales are not functional measures of disability or handicap in a conventional sense. Boose et al do not appear to have assessed disability formally. This is understandable because by choosing to study patients with parkinsonism rather than essential tremor other factors, namely bradykinesia, rigidity, and postural instability, would have influenced any measures obtained by an assessment of handicap or disability.

One factor that we have studied and consider to be critical in determining the impact of tremor upon upper limb function is "tremor suppressability", namely, the extent to which tremor amplitude can be suppressed while performing manual tasks and the period of time that this suppression can be maintained by the patient (the coefficients of amplitude and temporal suppression respectively). This point was nicely illustrated by Jager and King who describe a man with marked hereditary essential tremor who could nonetheless shoot deer with a rifle at a hundred yards. Any method that solely examines tremor-occurrence rate cannot account for variations in tremor suppressability nor the functional consequences of different types of tremor (for example rest, postural, and intention tremors).

Finally, Boose et al appear to have shown that patients are reliable witnesses, a fact that will be of great comfort to the humble and hard-pressed clinician.


NOTICES

The XIlth International Congress of Neuropathology will be held in Toronto, Ontario, Canada from 18–23 September 1994. This meeting will be conjoint with the American Association of Neuropathologists Annual Meeting and the Canadian Association of Neuropathologists Annual Meeting. For further information please contact Dr J J Gilbert, Victoria Hospital Research Institute, 375 South...
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A Boose, S Spieker, C Jentgens, T Klockgether, E Scholz and J Dichgans

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