Mortality and Morbidity in Cryothalamectomy for Parkinsonism*
A Statistical Study of 2868 Consecutive Operations

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It is the purpose of this report to present a statistical analysis of morbidity and mortality in 2868 consecutive cryothalamectomies for tremor and rigidity of parkinsonism. Previous statistical evaluations have demonstrated that 85 to 90% of parkinsonian patients obtained significant relief from tremor, rigidity, and impaired movements by cryothalamectomy on our service.3,4 Although the disease often continues with respect to its other protean manifestations, postoperative patients generally manifest functional improvement concomitant with relief of tremor and rigidity.

Significant problems related to bradykinesia, balance, gait, speech, and mental functioning form an integral part of the parkinsonian syndrome in many instances. Preoperative evaluation of these functions, as well as careful assessment of tremor, rigidity, and impairment of alternating movements is necessary in order to appraise adequately the benefits of surgery and, particularly, the morbidity that can properly be attributed to the surgical procedure itself. One must also take into account the usual progression of parkinsonism when evaluating the long-term postoperative status especially in those areas of symptomatology not amenable to surgical procedures.

It is difficult to relate our own results to the findings of other workers, not only because of the problems associated with the proper equating of patient samples, but also because of the varied and continuously changing operative techniques. In addition, the small size of many of the series reported makes statistical evaluation particularly hazardous. Nevertheless, cognizance of operative complications encountered by others may be helpful in providing an appropriate perspective.

Mundinger and Riechert10,11 cited a mortality rate of 1.64 to 2.69%. In contrast, Spiegel and Wycis14 had two deaths in 30 patients operated upon, thus yielding a 6% mortality in this much smaller and therefore contrasting series; these same authors and their colleagues15 also reported one death in 33 cases of campotomy.

Bertrand and Martinez1 reported a 1.2% mortality in 250 cases, while a higher percentage occurred in the 170-patient series of Osacar, et al.,15 in which 15 patients died, yielding a 9% mortality. In our own study of 1001 consecutive cases of cryothalamectomy recently published,16 the over-all mortality was 1.3%. In our earlier experience with 1000 cases of chemopallidectomy and chemothalamectomy, the mortality rate was 2.3%.2,3 In a consecutive series of 154 patients, who were 70 years of age or older, operated upon at St. Barnabas Hospital,17 the mortality rate was 3%.

The morbidity rates cited in the literature vary from 5 to 20% for temporary abnormalities and from 2 to 6% for permanent abnormalities.4,10,15 Figures of 15 to 20% have been reported for dysarthria and dysphonia, especially in bilateral cases where the difficulty was temporary in some instances and permanent in others. Spiegel, et al.,15 reported one contralateral analgesia lasting 1 week and two transient hemiplegia in 33 cases of campotomy. However, there were also three with ocular paresis and 17 with considerable depression of consciousness or psychic changes. These latter symptoms were more common in older patients and lasted from 1 day to several months.

Markham and Rand9 performed 149 thalamic operations in 114 patients, with 1 death. They used alcohol to create the lesion in 142 and radioactive 99yttrium in seven, observing a 20.8% incidence of hemiparesis with 14.1%
showing abnormal movements. An "organic" mental syndrome was observed in 27.5% and dysarthria in 8% with an additional 2.7% showing dysphagia. Convulsions occurred in 2% and sensory loss in 2.7%. Incoordination was reported in 4.7%.

In 224 operations for 206 patients performed largely by electrocautery, with a few being done by means of a 6×5 mm surgical loop, Laitinen reported one death, whereas psychiatric deterioration occurred in 20. Three had prolonged unconsciousness while two had hemiparesis; the duration and extent were not given. Eight patients had choreiform movements, one lasting as long as 2 years. Balance was impaired in nine and speech was impaired in seven, while one had convulsions.

In the second symposium on Parkinson's disease held in 1963, Gillingham, et al., 5,6 discussed bilateral surgery in 60 cases. There was no early mortality, but four died after 3 months. There was no paralysis. Three cases of postoperative hemiballismus were noted. Voice volume was decreased in 24, temporarily only in one, whereas dysarthria occurred in 29 patients and eight of these were temporary. Psychiatric complications occurred in 15 patients. In reviewing the immediate postoperative sequelae for 1001 cryothalamectomies, 16 we found that the two most common complications were 1) balance and 2) speech or language difficulties, with approximately a 13% incidence in each. Mental changes occurred in 8.5%, with unusual lethargy in another 1.4%; hemiparesis was noted in 2.4%. In the report from our own department previously referred to47 concerning 154 patients 70 years of age or older, the incidence of postoperative confusion was 24.6%, balance problems 34.5%, speech and language difficulties 11.2%, and hemiplegia or hemiparesis 4.8%.

It is of interest to interpret these surgical data in light of the report by Hoehn and Yahr, who studied the natural course of the disease in 802 parkinsonian patients who did not undergo surgery. Of these nonsurgical patients, 25% died within 5 years of the initial examination, 67% had died or become severely disabled between the 5th and 9th years, and 80% died or were severely disabled during the 10th to 14th years. They found evidence that Parkinson's disease shortens life substantially. The mortality in parkinsonian patients was three times that of matched controls and deaths occurred frequently from bronchopneumonia and urinary infections; medical treatment produced no change whatsoever.

Material and Methods

The present report covers all cases of parkinsonism undergoing cryothalamectomy in the Neurosurgical Department of St. Barnabas Hospital, New York, from the beginning of 1963 through 1966. During this period, 2868 patients were so treated. The study was designed to assess those sequelae of surgery properly designated as complications. Included were all patients in whom death or complication occurred during hospitalization, no matter how long the interval following operation. Thus, the mortality group includes patients who died anywhere from 1 to 263 days postoperatively, and the morbidity group includes all patients who suffered any complication whatsoever while still in the hospital, the longest interval from operation to discharge being 194 days.

There were, in addition, two patients who had complications after recovering from the cryothalamectomy but who died as a result of surgical procedures for other conditions not related directly to Parkinson's disease. One patient died from pulmonary embolization and coronary occlusion following transurethral prostatectomy done 17 days after cryothalamectomy. The diagnosis was verified at autopsy, and an uncomplicated cryogenic lesion was found in the brain. Another died from probable fat embolization following surgical insertion of a femoral prosthesis for fracture. The orthopedic operation had been performed 9 days after cryothalamectomy. An autopsy was not permitted. The figures in the accompanying tables are supplemented by data taken from our 1001 case reports16 on morbidity related to language and speech, gait and balance, and mental functioning since exact figures were not available for the larger series here presented.

Results

General. Of the 2868 patients followed up to 9 months after cryothalamectomy, 44 (1.5%) died and 133 (4.6%) suffered from major morbidity. Table 1 gives the details for both mortality and morbidity for the years 1963