PERSPECTIVES IN PSYCHOSURGERY

by

Heinz E. Lehmann, M.D.
Professor and Chairman
Department of Psychiatry
McGill University

Director of Medical Education and Research
Douglas Hospital
Montreal, Quebec

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Perspectives in Psychosurgery

"Minister to a mind diseased;
Pluck from the memory a rooted sorrow;
Raze out the written troubles of the
brain?"

Macbeth.

In the history of psychiatric treatment psychosurgery has played a curious role. Planned and tried first by Burckhardt (1890) with fair success, in only five patients - at a time when no other effective therapy for severe mental illness was known - psychosurgery afterwards remained forgotten for almost half a century. Rediscovered and introduced as prefrontal lobotomy by Moniz in 1936, it was soon popularized by Freeman and Watts (1944). The new treatment modality was at first hailed with enthusiasm as a major therapeutic breakthrough. Nevertheless, within a few years its reputation grew tarnished, and lobotomy became a very controversial issue, both on the psychiatric scene and in the public market place. Then, in the mid-fifties, the advent of the new drug treatments seemed to have eclipsed brain surgery for good as a therapeutic approach to psychiatric disorders.

However, during the last decade it has become evident that psychosurgery had only been dormant, not dead. Well known psychiatrists made statements like: "....psychosurgery has been given up by most psychiatrists prematurely...and its lessons cast aside too cavalierly..." (Brill, 1969) or "psychosurgery has survived as the treatment of choice for a small group of patients with certain specific psychopathological syndromes..." (Freyhan, 1969). In recent years, psychosurgery has, in fact, been staging an unspectacular but determined comeback with more sophisticated methods and, hopefully, more selective

indications and fewer traumatic failures than in its noisy heyday.

On the other hand, we have also recently heard and read furious - and apparently frightened - attacks on psychosurgery. These attacks, articulated most vociferously by the psychiatrist Breggin - and read into the Congressional Record by the Honorable Cornelius E. Gallagher (Feb. 24, 1972) - have been so highly charged with emotion that they have sometimes left all factual basis behind, abandoned logical reasoning and skipped into unpleasant demagogy. At one point, for instance, Breggin - without supporting evidence whatsoever - leaves us with the ugly innuendo that a certain neurosurgeon may have used racist criteria for the selection of his cases! Some of Breggin's arguments will be discussed more specifically further on in the paper; at this time, I should only like to express my regret that the large amount of information which this militant psychiatrist has obviously gathered on the topic of psychosurgery has not been presented in a more objective and less personal manner, because in its present form it is worthless as a scientific or clinical document.

In the time allotted to me I shall try to deal briefly with four aspects of the complex problems surrounding the role of psychosurgery in psychiatry. These aspects are:

1. the neurophysiological and clinical rationale for psychosurgical interventions, or its experimental and technical aspects;

2. the reasons for the emotions and other irrational attitudes which have been stirred up towards psychosurgery;

3. an examination of the ethical issues involved;

4. the specific clinical indications which I - and probably a considerable number of other psychiatrists with me - see as determining the possible application of any psychosurgical

interventions in psychiatric practice. Since my own training and experience has been entirely in the field of psychiatry, my perspective on the subject will naturally be that of a psychiatrist. My competence in neurophysiology is distinctly limited and, since I have never performed any transorbital lobotomy, it is completely lacking in neurosurgery!

Perhaps I should state at this point that I am a clinician and thus a pragmatist at heart. I am neither enthusiastically for nor belligerently against psychosurgery. As a clinical psychiatrist, I am convinced that lobotomies in the past have often been carried out on patients who were operated on too hastily and later had to suffer the consequences of the lack of knowledgeable care and discriminating diagnosis which unfortunately had characterized their selection. I am also convinced that in other cases psychosurgery has been wrongly withheld from patients who, because they did not receive psychosurgery, remained condemned to continued suffering and permanent invalidism.

Experimental and Technical Aspects.

When Burckhardt performed his first five psychosurgical operations, he attempted to render assaultive patients quiet and manageable. Assuming that abnormal intensity of stimuli reaching the motor areas was responsible for the patient's condition, he at first severed the connections between motor and sensory areas in the parietal lobe. Later he did a frontal lobotomy on one patient and treated three more cases by temporal cortical excision. In the first case, he reached his goal of producing a quiet and cooperative patient only after four successive operations.

The story goes that more than 40 years later Moniz, who possibly was not aware of Burckhardt's earlier work, attended a

neurological congress in London, where he heard Jacobsen discuss some observations to the effect that a chimpanzee, who previously had been easily frustrated and subject to frequent temper trantrums, had become quiet and docile following a frontal lobotomy (cortical excision). Moniz returned to Portugal and with Lima performed his first 20 prefrontal lobotomies on mental patients. He seems to have held the somewhat simplistic notion that excessive and primitive emotions produced deviant behaviour, and if one could eliminate both manifestations by neurosurgical intervention, one could eliminate mental illness.

You know the rest of the story - how Moniz was partially successful and achieved clinical improvement in several of his patients, how Freeman and Watts developed their "standard lobotomy" procedures, to be followed by transorbital lobotomy,championed by Fiamberti and Freeman, (1949) and how since then, that is since 1936, many modifications of the original frontal lobotomies have been proposed. These psychosurgical innovations apply not only the scalpel, but also electrocoagulation (Grantham, 1951; McIntyre et al, 1954; Crow, 1963), thermolesions (Herner, 1961) and topical application of freezing solutions (Le Beau, 1954) or liquids which produce chemical destruction of brain tissue. (Moniz, 1949; Woringer, 1948). Lindstrom (1954) achieved the destruction of white matter by ultrasound and Knight (1965) by intracerebral implantation of multiple radioactive seeds. Crow (1963) has proposed to proceed progressively by means of electrodes, stereotaxically implanted in various areas of the brain, and then to observe for months the effects of stimulating the different implanted electrodes; when the most effective sites are established, they are electrocoagulated. Besides severing fronto-

thalamic connections - by open or closed methods - or producing discrete lesions in these areas, cortical undercutting has been successfully introduced by Scoville (1960), and cortical excisions ("topectomies" and "gyrectomies") have been undertaken by Pool (1949) and Penfield (1948).

Anatomical lesions have been placed in the frontal lobes by superior, medial, inferior, orbital, anterior or posterior cuts. More recently, psychosurgery has gained extensive experience with cingulotomies (Foltz and White, 1962; Brown and Lighthill, 1968; Ballantine and al, 1967; Bailey et al, 1971; Faillace et al, 1971); Apo, 1971), and in a few countries abroad hypothalamotomy (Balasubramaniam et al, 1970), thalamotomy (Andy, 1970; Poblete et al, 1970; Hassler and Dieckman, 1970;) and amygdalotomy (Balasubramaniam et al, 1970; Vaernet and Madsen, 1970; Mempel, 1971) are favored.

The pathophysiological rationale for psychosurgery is far from clear. We have a great deal of information on the functions of the frontal lobes and the limbic system in animals, and on the behavioral effects of lesions of these parts of the brain. Briefly, lesions of the frontal lobes in animals interfere minimally with their perception, their ability to learn and their memory - at least, as measured by the more commonly used tests. When finer and more complex measures are applied, e.g. delayed recall (Jacobsen, 1936) or discriminatory tasks of gradually increasing complexity (Pribram, 1960), it becomes evident that frontal lobe lesions increase an animal's distractibility (Malmo, 1942) and impair its capacity to change its behavioral set and to adapt quickly to altered stimulus conditions, thus resulting in increased perseveration of behaviour. (Milner, 1970)

There also seems to be general agreement on the non-cognitive effects of frontal lobe lesions or ablations: animals so affected become much more even-tempered, are less aggressive, less timid and show less frustration or pleasure. Resection of the rostral cingulum gyrus in the monkey produces behavioral changes to which Ward (1948) has referred as loss of "social consciousness", by which he means loss of some of the social fear and anxiety which would normally govern the animal's activity. All this amounts to a general leveling of all emotional manifestations. To achieve a similar overall effect of emotional "bleaching", associated with minimal encroachment on perceptual, intellectual and memory functions, in human patients is the principal aim of psychiatrists and neuro-surgeons who employ psychosurgery for the treatment of emotional and mental illness.

However, the effects of frontal lobe and limbic system lesions in humans are much less well understood, since it is, of course, not possible to assemble a sufficiently large sample of subjects with precisely placed lesions; much of the psychological work-up in humans had to depend on brain injuries which had occurred accidentally, or on surgically produced lesions which had not been placed stereotactically. A recent study by Faillace et al (1971) showed that bilateral cingulotomy produced a deficit in the performance of a non-verbal ordering test, and some of his patients also showed impairment on the Porteus maze test, one of the few tests which is quite regularly affected by frontal lobotomy. Most of the evaluations of cognitive effects of psychosurgery are of a global nature and are based on I.Q. tests or on work performance, both of which show little change post-operatively, as a rule.

Freeman (1972) has recently published his retrospective views on 35 years of psychosurgery and refers to many businessmen and professionals - including a psychiatrist and a clergyman - who have been able to carry on successfully, or even "increased their competence", after brain surgery.

Such specific psychopathological symptoms as hallucinations, delusions or social withdrawal seem to be little influenced by psychosurgery. There is hardly any evidence that specifically placed lesions produce specific psychological effects. Most psychiatrists and neurosurgeons accept today the assumption, probably first clearly stated by Kalinowsky and Hoch (1961), that lobotomy is a quantitative and not a qualitative procedure, and that the amount of brain tissue affected by the intervention, rather than its localisation, determines the final behavioral and personality effects. (Meyer and McLardy, 1949). However, it seems to have been well established too, that the lower and the more medial the lesions, the greater the emotional changes, and the higher and more lateral the cuts, the greater the cognitive impairment. (Hamlin, 1970). The ideal result of psychosurgery may be defined as an optimal attenuation of general emotional intensity, leading to a maximal reduction of dysphoric emotions and to minimal effects on cognitive and personality functioning.

In the early days of frontal lobotomies poor selection of patients and excessive destruction of brain tissue were responsible for many therapeutic failures - at least in terms of personality functioning, even if the patient's personal suffering had been relieved. These failures would post-operatively exhibit lack of concern and consideration for others, would be rude and tactless,

overeat and grow fat, do nothing but sit for hours on the toilet or in front of their TV set, and, in addition, would be incontinent, have epilectic seizures and occasional outbursts of rage.

Such caricatures of human beings had evolved because the potential for their drives and emotions, the primitive as well as the higher ones,which are responsible for the development of civilised behavior, had been reduced,by excessive or malplaced surgery, to a level where emotional concern for others - and with it tact, sensitivity, empathy and compassion - as well as concern for one's own behaviour and future --and with it existential selfawareness, modesty, spontaneity, imagination, creativity and striving for self-improvement -- were no longer operating, and the person's functioning was primarily directed by his biological pleasure principle.

Irrational Attitudes

When reports of these early psychosurgical failures reached the public, the horrified response to it was a typical mass reaction, that is, rapid and uncritical generalisation. This resulted in a fixed and irrational attitude toward all psychosurgery, resulting in a taboo, forbidding any meddling with what was thought to be the fundamental attributes of human beings. In Russia,this taboo was introduced into legislation, and lobotomies were outlawed in 1951. It appears that too many poor results with the early lobotomies in Russia were primarily responsible for making the procedure illegal, but the fundamental philosophy of Marxist society is probably also involved here.

One of the important objections to psychosurgery today is the fact that surgical changes, once produced, are irreversible.

This is stated or hinted at, as an awesome threat, over and over again in Breggin's recent polemic. And yet, ironically, it might have been the very irreversibility of surgically produced changes, which were naively thought to guarantee permanent therapeutic results, that accounted for the initial, widespread and uncritical enthusiasm for psychosurgery. Toward the end of the thirties, when Moniz published the first results of his prefrontal lobotomy, psychiatrists had already become very frustrated with the tantalizing successes achieved by the first two effective treatments for patients suffering from psychotic conditions - insulin coma and convulsive shock therapy. These treatments produced indeed often dramatic remissions; but more than half of the patients relapsed within the first two years, and there was nothing one could do to prevent these relapses. Today we have neuroleptic drugs and lithium, on whose prophylactic action we can usually rely in the continued management of patients suffering from recurrent schizophrenia or affective disorders; but these drugs were unknown then. Hope and luck was all we could rely on in those days, when we discharged a patient from the hospital. But psychosurgery held out the promise of irreversible changes and, perhaps, permanent cures! Alas, the uncritical choice of patients and the lack of experience with the surgical methods resulted in many permanent failures instead.

A simplistic notion of irreversibility, considered outside the context of the whole individual, can be very misleading. Breggin, for instance, apparently dismisses out of hand psychosurgery as an unacceptable procedure in children, even in those who are so severely disordered that they will almost certainly never be able to undergo any kind of educational and developmental process, if left in their

present state. He is equally uncompromising in the case of chronically anxious, depressed and painridden patients who have, as a result of these conditions, become heavily addicted to sedatives, narcotics and alcohol. But is the missing of essential cognitive and social learning at critical stages of a developing individual, or the establishment of a malignant drug dependence, not also an irreversible condition, which, in fact, may often be worse than the permanent loss of minute units of brain matter and the resulting reduction of destructive, violent impulses, morbid phantasies, or all-consuming anxiety and depression?

Breggin refers as "dangerous" to one of Scoville's (1969) statements, to the effect that several courses of electroconvulsive therapy may cause more diffuse brain damage than the newer fractional lobotomies. One wonders how much experience Breggin has had with multiple electroconvulsive therapy courses, because many experienced clinicians would probably agree with Scoville, particularly in the case of older patients. Breggin states categorically "the frontal lobes are integral to all of man's most sensitive, subtle and human qualities - love, empathy, creativity, abstract thinking and such." The references he gives for his apparent belief that all these imponderables are firmly located in the frontal lobes are short on direct experimental evidence, and nobody else has ever suggested that small and skillfully placed lesions in the frontal lobes or the cingulum would inevitably "kill" most or all of these human qualities, as Breggin does later on in his paper, when he equates lobotomy with partial suicide.

For activists of a certain political conviction it is dogma today that human drives must be preserved under any conditions,

lest the individual might accept peace of mind for himself at the risk of becoming a docile instrument of the establishment. Whether or not to fight against existing conditions - and, if necessary, to suffer while waging this fight - is, in this view, no longer left as a free choice to the individual, but to fight has become his inescapable duty. It seems that Breggin shares the irrational attitude of those who will not allow anyone to surrender some of his emotions, sentiments, drives and impulses, even if the individual himself desparately wishes to do so.

Ethical Aspects

Like many other medical problems, psychosurgery poses questions of ethics which must be carefully considered. This treatment is associated with some permanent loss and a certain risk: it produces permanent anatomical changes and may deprive the patient to some extent of a certain psychological potential for the rest of his life; it may also produce adverse physical effects - even death - and may result in undesirable personality changes. Under what conditions is such a treatment acceptable?

There are three fundamental conditions in our civilisation which justify exposing a person to loss and risk. One is determined by moral reasons. This type of reason is appropriate to the field of jurisdiction and penology, but has no place in medicine. No physician should have the right to subject his patient to any treatment for purely moral reasons - nor should he deprive a patient from treatment for reasons of private or political morality, although he has, of course, to act within the framework of the law. But to deprive a patient from psychosurgery, merely because of one's own moral philosophy, may be just as unacceptable in the framework of

medical ethics,as it would be to subject the patient to this treatment mainly for moral reasons.

The second condition, which may justify exposing a person to certain losses or hazards, is the need to establish behavioral control of certain individuals in the interest of protecting others. Medical quarantine is an example, where loss of liberty is imposed on certain individuals for the protection of the health of others. One might conceive that a lobotomy be considered for a chronic patient who is so dangerously violent and destructive that all other controlling methods would be less acceptable or more hazardous for him, e.g. continuous physical restraint or massive chemical sedation. However, there must be good evidence that the patient might not also, within a reasonable time, respond to other treatments,or even improve spontaneously.

The third, the most important and essentially therapeutic reason for subjecting a person to a hazardous medical or surgical treatment, is his own desire that such a treatment be carried out on him, in order to relieve his suffering, or - under certain circumstances - prevent future suffering. Three conditions will have to be fulfilled to justify acceding to a patient's wishes for this reason:

1. the treatment must offer a reasonable chance of producing objective or subjective improvement of the patient's state of health and well being, i.e. it must at least be probable that the patient's personal suffering be relieved by it;

2. there must be no other treatment that offers equal probability of success at less risk;

3. the patient must have freely consented to the treatment, after having been fully informed about all its possible consequences.

A question may sometimes arise about a patient's capacity and freedom to make a decision regarding his own consent. It is true that a confused or demented patient could not give informed consent; and a person threatened with sanctions, if he does not accept a specific treatment, could not give free consent. However, today psychosurgery is rarely indicated for demented or confused patients, and if so, it should only be considered for the protection of others, under the conditions that were discussed above. As for a person's freedom to make a choice - this question would have to be carefully studied, and individual cases might even have to be examined by a board of consultants,in order to arrive at a fair and clear decision.

As an example, the argument that a severely depressed patient is incapable of making a free and rational decision about accepting a treatment which is associated with certain risks, might apply to patients who have been depressed for some weeks or months and have not yet been exposed to all other possible treatment modalities. But the same argument becomes irrelevant, if applied to patients who have been suffering for years from continuous depression and anxiety, which could not be relieved by any other treatment.

On the other hand, in the hypothetical case of a convicted, habitual criminal who is being offered the chance of undergoing psychosurgery, in the hope that following it he might be able to live a life that would not bring him constantly into conflict with the law, it would probably be wise to appoint a committee of consultants - consisting of both medical and legal experts - who would have to make sure that the convict is under no external pressure whatsoever, when he makes his decision to have the operation. It is not sufficient

to generalize superficially and patronizingly, as Breggin seems to have done, that no depressed patient and no convicted person is ever capable of making a free decision about psychosurgery. (Breggin claims to have explained this further in one of his novels.)

There remains a grey area, as, for instance, in the case of very disturbed children who by law cannot give consent, but to whom psychosurgery might offer a chance to develop more normally, and to live eventually a more acceptable life, than under any other condition. I feel, since the therapeutic effects of psychosurgery in such cases are so poorly established at the present state of our knowledge, that only desperately ill patients of this kind should be considered for brain surgery, and only after consultation with at least two child psychiatrists.

Clinical Indications.

Although many thousands of patients have been lobotomized - 50,000 in the U.S. alone, according to Breggin - there has never been a prospective, properly designed, controlled study of the effectiveness of psychosurgery. In the early 'fifties the Committee on Therapy of the American Psychiatric Association was preparing the protocol for a major study, to compare the effects of intensive, psychoanalytically oriented psychotherapy versus frontal lobotomy in schizophrenics. The two very different treatments had in common that both were claimed to produce lasting results, in contrast to the only other treatments that were then available, insulin coma and electroconvulsive shock, which were so often followed by relapses. However, at precisely that time, the discovery of the neuroleptic drugs provided an unexpected new concept of managing chronic mental

illness, i.e. maintenance pharmacotherapy, which, though it too was not capable of producing lasting results in the sense of cure, could at least prevent relapses. The project 'lobotomy versus psychotherapy' in the treatment of psychoses was dropped at that time and never revived.

Some investigators have attempted to compare results of lobotomies retrospectively with matched controls who had not been operated on. (Robin, 1958; Vosburg, 1962; McKenzie and Kaczamowski, 1964.) These studies reported, on the whole, not very favourable results, but the patient material of the studies was so inhomogeneous, that their reliability and meaningfulness must be seriously questioned. More recently, Tan, Marks and Marset (1971) have compared 24 patients who had undergone a bimedial leucotomy, for general anxiety with severe obsessions, with 13 matched controls who had not been operated, over a five year period following treatment, and found that the leucotomy patients did significantly better than the controls.

It has been suggested that the therapeutic results of psychosurgery might be placebo effects, partially attributable to the intensive care and attention such patients receive. But this possibility seems to be very remote, since there are many cases on record where improvement occurred only after two or three brain operations, whereas placebo effects have a tendency to diminish with repetition. Livingston (1953) actually performed first stage control operations on four patients by making the usual skin incision, removing only bone buttons and giving post-operative care similar to that received by the fully operated patients. None of the four patients showed any improvement whatsoever, and cingulotomies had to be completed on all of them within one to three months.

Since psychosurgery has so often been performed on chronic patients in whom every other treatment had failed, such patients could legitimately serve as their own controls and make placebo controls unnecessary. No psychiatrist today doubts the effectiveness of psychosurgery, although opinions remain divided regarding the clinical acceptibility of this procedure. Nevertheless, it is probably fair to say that the majority of practicing psychiatrists admit the usefulness of psychosurgical interventions when certain clinical indications and strictly specified conditions are observed.

What are these indications and conditions? They are, in my opinion, the presence of symptoms of severe, disabling anxiety and tension, depression or obsessive-compulsive psychopathology. In addition, the following conditions must prevail:

1. an uninterrupted course of illness, characterized by the above manifestations, over a period of at least two years;

2. exhaustive and unsuccessful attempts with all other known major treatment methods during this period;

3. an adequate premorbid personality.

The effective symptoms should have been present continuously, because otherwise one can not satisfactorily rule out the possibility of spontaneous temporary, or even permanent, remissions. An exception to this rule might be considered; if patients with frequently relapsing and disabling depressions - at least two a year - have proved refractory to competently supervised lithium therapy which has been continuously administered for at least one year.

Adequate attempts with every other major therapy should have proved unsuccessful, because an irreversible treatment like psycho-

surgery should not be used under other conditions. In concrete terms this would mean that, at different times, anxiolytic drugs should have been prescribed - and been unsuccessful - in doses up to the equivalent of 100 mg of chlordiazepoxide a day for at least two months, or neuroleptics in doses up to the equivalent of 1000 mg of chlorpromazine a day for at least three months, or antidepressants up to the equivalent of 250 mg of imipramine a day for a minimum of six weeks. At least two courses of electroconvulsive therapy should have been administered - with up to 15 treatments in each course - without any significant result, or with improvement not lasting longer than a few days. Last, but not least, a minimum of six months of psychotherapy, conducted by a highly qualified senior therapist, should also have proved unsuccessful.

An adequate premorbid personality should be a prerequisite for psychosurgery, since it is now well established that many of the worst failures of this treatment method have occurred in patients who had inadequate premorbid personalities, with poor interpersonal and work adjustments.

It would no longer appear justified to subject schizophrenic patients to psychosurgery, since the great majority of them respond so well to pharmacotherapy. Only the exceptional schizophrenic, who remains refractory to drug therapy for six months or longer and in addition exhibits unusual tension, anxiety or violent behavior, might be considered for brain surgery. It is true that excellent results may be obtained with psychosurgery in acute schizophrenics, but these are also the patients who respond best to pharmacotherapy.

It is probably not justified to perform brain surgery on a schizophrenic patient mainly for the reason that he might afterwards

not require drug maintenance, which would render his follow-up care more convenient and economical. Convenience and economy are definitely no indications for psychosurgery, as I see it.

There might also be special cases, as, for instance, a dangerous paranoid whose delusions are successfully suppressed by neuroleptics, but who persistently refuses to take his drugs for maintenance of his remission after discharge from the hospital and thus remains potentially homicidal, in case of a relapse. In such a patient brain surgery might well be indicated for the purpose of reducing the social danger he might otherwise present.

Manic-depressives and patients with recurring unipolar depressions can today, in most cases, be successfully treated with antidepressant drugs or electroconvulsive therapy, to be followed by lithium for the prevention of future attacks.

Good results have occasionally been reported with psychosurgery in alcoholism and drug dependence problems, but the indications for operating in such cases would have to be based on very careful psychiatric differential diagnosis of the conditions underlying these behaviour disorders; for example, psychosurgery might be successful, if the patient's dependence on alcohol or drugs is mainly an attempt on his part to come to terms with overwhelming depression and anxiety.

Psychosurgery in children has recently received a bad press and remains a questionable and controversial issue. I would not think that it is justified to perform brain surgery on children who present a hyperkinetic syndrome or other behaviour disorders, unless these children have proven utterly refractory to all other treatments, including adequate psychotherapy and pharmacotherapy, and seem to be in imminent danger of complete and irretrievable

deterioration. Such children would, of course, have to be first carefully studied by a competent team of diagnosticians and therapists.

On the other hand, psychiatric patients in the older age range, who present symptoms of anxiety and depression, seem to respond very well to the newer methods of psychosurgery which produce minimal brain damage. It must be remembered that older patients are highly susceptible to depressions, which are rooted in existential loses inherent in the human condition of aging, and that they often do not respond to other psychiatric treatments nor to efforts to provide them with better housing, improved financial security and opportunities for increased social contacts. Since there might not be time for these patients to wait for years, while going first through the whole gamut of all other possible treatments - and in the light of the generally favourable results of psychosurgery in this class of patients - the older age group of depressed patients might represent a special case, where psychosurgery might well be considered within six months, if other treatments have failed to produce results.

One last comment on the indications for psychosurgery: I think psychiatrists should not undertake such treatment single-handedly - notwithstanding transorbital lobotomies! - and neurosurgeons should not do it alone either. Every patient selected for psychosurgery should have been so selected as the result of painstaking consultations between neurosurgeon and psychiatrist. Earlier hopes for objective - perhaps computerized - selection criteria, based on psychometric test batteries, have unfortunately not materialized.

Psychosurgery seems to have entered a new phase of promising developments, but at its best it will probably always have to be a true integration of the psychiatrist's special diagnostic insights and clinical judgment and the neurosurgeon's special technical skills and personal ingenuity.

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