

## **GLIMPSES OF THE HISTORY OF PSYCHOSURGERY: AN ODYSSEY IN SCIENCE**

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### **ABSTRACT**

Psychosurgery is the surgical treatment of patients with mental illness resistant to all available forms of conventional therapy. The origins of modern psychosurgery go well back into the 19<sup>th</sup> Century but the actual surgery owes its origin to experiments in chimpanzees, carried out at Yale University, USA in the 1930's. Pre-frontal leucotomy was first carried out by the Portuguese neuro-psychiatrist, Antonia Caetano De Abreu Freire Egas Moniz in collaboration with his neurosurgeon colleague Almeida Lima in Lisbon in 1936 on the first series of 20 patients. In the USA, two surgeons from Washington – Walter Freeman and James Watts, slightly modified Moniz and Lima's operation (Freeman-Watts Standard Lobotomy). This presentation traces the origin of psychosurgery from antiquity to the contemporary period, assesses current status, and explores its impact in different circles – psychoanalysts, ethicists, the Press and the literati of the day. Development of modern psychopharmacology in 1950's pushed psychosurgery into oblivion almost to the point of extinction.

### **Introduction**

Psychosurgery is the surgical treatment of patients with psychiatric illness by means of surgical removal or destruction of nerve pathways within the brain. It excludes patients with recognizable pathological lesion in their brain, which is producing psychiatric symptoms, i.e. patients with benign or malignant tumors or epilepsy and also many surgical interventions that have been developed for the treatment of chronic pain. "Psycho" is derived from the Greek word "psukhe", meaning breath, soul, mind and "surgery" derives again from the Greek – "Cheios", a hand and ergon, work; it applies therefore, to the manual manipulation carried out by surgical practitioners in the effort

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to assuage injuries and diseases of his or her patients. Psychosurgery is a branch of modern neuro-surgery dealing with only mentally ill patients. Brain is the physico-chemical organ of mind. Mental illness is as old as mankind. Primitive people had it and were treated by magico-religious methods. The New Stone Age (9000 BC – 2000 BC) which began in the Near East, has provided archaeologists with much evidence of one very frequently performed operation – “Trephination”, which consists of cutting an opening – circular or square – from tiny hole to about two inches in diameter. In the New Stone Age certain nervous and mental conditions must have been attributed to a demon, which had possessed the patient. This belief is still common in primitive races. Naturally the surgeon would seek to let the demon escape through the trephined hole in the skull. The plate of bone which was cut from the skull was not thrown away but it was hung around the neck as an amulet – an example of our earliest surgical operation associated not only with the treatment of disease but also with its prevention. A great act of far-sightedness indeed! Of course, there were many other reasons for trephination like head injury etc.

### **The Prologue**

Human brain is an eternal magic box. It's exploration was, and still is, a natural instinct for scientists. Trephination seems to be the luminous link with the past in the art of psycho-surgery. History, as we know, is a dialogue between the past and the present. The idea of intervening surgically on the brain to treat mental illness is as old as ancient Egyptian trepanning in the antiquity. Trepanning was still used by Egas Moniz in 1936.

### **Parts and functions of the brain (fig. I)**

1. **FRONTAL LOBE** : Controls behaviour, emotions, organisation, personality, higher intellectual activities, planning and problem solving.
2. **PARIETAL LOBE** : Controls judgement of shape, size, texture and weight, the sensation of pressure and touch, understanding of spoken and written language.
3. **OCCIPITAL LOBE** : Controls colour recognition, shape recognition.
4. **HIPPOCAMPUS** : Controls object recognition, stores meaning of words or places.
5. **TEMPORAL LOBE** : Controls smell identification, sound identification, short-term memory, hearing.

6. CEREBELLUM : Controls balance, muscle co-ordination, posture maintenance.
7. BRAIN STEM (Between spinal cord and forebrain): (Pons, midbrain (thalamas) and Medulla Oblongata) : Controls alertness, blood pressure, digestion, breathing, heart rate.

### **Evolution Of Psycho-Surgery**

#### **19<sup>th</sup> Century : Experimental**

##### **1846 : Switzerland**

It was observed that taking off some parts of dogs' brains makes them less aggressive.

##### **1847 : USA**

An Irish workman, Phineas Gage, shed new light on the field of neuroscience in a rock blasting accident which sent an iron rod through the frontal region of the brain. He survived miraculously enough but with marked changes in his personality – a mild mannered man had become aggressive, rude and indulging in the grossest profanity, which was not previously his custom, manifesting but little deference for his fellows, impatient of restraint or advice when it conflicted with his desire. Gage sustained no impairment with regards to his intelligence or memory (observed by Dr Harlow, a Boston physician in 1868). this incident provoked scientists to ask the question:

Can alteration of the brain structure lead to differences in personality?

If so, then, are there specialised regions of the brain responsible for the function of different elements of our personal character?

Thus, completely by chance, the foundational discoveries for the development of pre-frontal leucotomy or frontal lobotomy were laid.

##### **1890 : Germany**

Friederich Golz, a German researcher calmed dogs by removing portions of their temporal lobes.

##### **1890 : Switzerland**

Dr Gottlieb Burckhardt, the superintendent of a psychiatric hospital,

drills holes (trepanation) in the heads of six severely agitated patients (schizophrenic) and extracts sections of the frontal lobes, altering their behaviour with varying degrees of success. Two of the patients died. It was considered morally reprehensible at the time, but the work was not forgotten. Phineas Gage and his iron bar have started a train of thought that will come to a strange and tragic fruition in the next century.

**1895 : Emory Lamphear** – “It seems possible that with additional experience and a minute study of the pathologic changes seen in the brain, the knife may be the means of restoring to reason many cases now considered incurable”.

(Elliot Valenstein : Great and Desperate Cures, Basic Books, New York, 1986).

#### **TWENTIETH CENTURY**

##### **1935 : Yale USA / Lisbon, Portugal**

Following demonstration by Carlyle Jacobsen and John Fulton that frontal lobe mutilation produced a ‘calming’ effect in chimpanzees, Antonio Egaz Moniz and Almeida Lima of Lisbon cut the frontal lobes of 20 of his psychiatric patients and reported similar ‘calming’ effects.

##### **1936 : Washington, USA**

Walter Freeman and James Watts introduced a surgical technique called the ‘Freeman – Watts Standard Procedure’ for frontal lobe lobotomy into the USA. Early technique involved drilling burr holes, later Freeman developed his famous transorbital approach pushing literally an ice pick into the brain via the eye sockets.

**1942** : The ice pick lobotomy has spread worldwide and by now approximately 5000 people are lobotomised each year during the 1940’s.

##### **Neurological Conference, London, July 1935**

It was quite a gathering. John Fulton of Yale University brought two chimpanzees and demonstrated lobectomy in a day long symposium. Fulton had completely removed the entire frontal lobes from these two animals (lobectomy) – which radically altered their behaviour. He could no longer generate experimental forms

of neurosis in the animals. they were seemingly impenetrable. The symposium was fascinated, and the discussion about the significance of the frontal lobes went on and on. Fulton's chimpanzees initiated the charismatic era of modern psychosurgery. The celebrated Russian Ivan Petrovich Pavlov (1849 – 1936), Nobel Laureate in Physiology on Medicine, 1904, the Portuguese neuropsychiatrist Antonio Egaz Moniz, famous for pioneering cerebral angiography (the process of mapping the parts of the brain by injecting contrast solutions which can be seen by x-rays) and Walter Freeman attended the symposium. Egaz Moniz stood up and asked Fulton :

“If the frontal lobe removal prevents the development of experimental neurosis in animals and eliminates frustrational behaviour, why would it not be possible to relieve anxiety states in man by surgical means”.

Implications of this question were shown by Egaz Moniz himself during the subsequent years.

Personalities : Antonio Caetano De Abrev Freire Egas Moniz (1874 – 1955):

Antonio Caitano De Abnev Freire Egas Moniz (1874 – 1955) of University of Lisbon Medical School, Portugal, was an ambitious and multi-talented person – a neurologist, political figure, and a man of letters. By the 1930's he was already known for his successful refinement of techniques enabling doctors to visualise blood vessels in the brain by using radioactive tracers in 1927 (cerebral angiography).

He served as the Minister of Foreign Affairs and the Ambassador to Spain and was even one of the signers of the Treaty of Versailles (June 28, 1919) which marked the end of World War I (1914 – 1918).

In July 1935, at an international neurology conference held in London he saw a presentation on the frontal lobes of the brain and the effects of removing them from chimpanzees. Moniz later claimed he had been thinking about similar methods before the conference, but it went into scientific mythology that the calm behaviour of the presenter's formerly temperamental chimp had inspired him to develop the lobotomy to treat mental illness.

Moniz had an idea that some forms of mental illness were caused by an abnormal sort of stickiness in nerve cells, causing neural impulses to get stuck and the patient to repeatedly experience the same pathological ideas. There was no empiric evidence for this theory, but Moniz pressed on. If the nerve fibres causing these morbidly fixed ideas could be destroyed, the patient might improve. In November 1935, he and his assistants made the first attempts at this type of psychosurgery. First they gave a series of alcohol injections to the frontal lobe (through holes drilled in the skull). After seven patients, they switched to cutting the lobe with a wire. Nothing was removed, connections were just severed.

In 1936 Moniz published the very positive results of his first 20 operations on patients who had suffered from anxiety, depression and schizophrenia. Though his follow-up was mainly within the first few days of surgery and his determination of “improvement” rather subjective, his publication was well received. It seemed to offer evidence of the benefits of psychosurgery. For example, Moniz’s first patient was less agitated and less overtly paranoid than she had been before, although she was also more apathetic and in fact duller than Moniz has hoped. She had a few physical side effects such as nausea and disorientation, but overall struck Moniz as much improved. In the 1930’s diagnoses of serious mental illness were increasing, and yet knowledge of its causes or how to treat it was not. Doctors were sometimes willing to try anything to help their most desperately ill patients. This terrible need for treatment cleared the path for widespread acceptance of such radical treatments as shock therapy and lobotomy. In 1949 Moniz shared the Nobel Prize for Physiology or Medicine (for the discovery of the therapeutic value of leucotomy in certain psychosis) with Walter Rudolf Hess (1881 – 1973) of Switzerland (for his discovery of the functional organisation of the interbrain as a co-ordinator of the activities of the internal organs).

Moniz’s name was suggested for the Nobel Prize several times :1928 and 1933 for cerebral angiography, 1937 and 1944 for pre-frontal leucotomy and finally in 1949 for the same.

**Walter Freeman (1895 – 1972)**

In the United States, neurology professor Walter Freeman of George Washington University threw himself into lobotomy practice and promotion with an unmatched

fervour. Within a year of reading Moniz' publication he and an assistant had performed 20 lobotomies. They wrote "In all our patients there was a .... common denominator of worry, apprehension, anxiety, insomnia and nervous tension, and in all of them these particular symptoms have been relieved to a greater or lesser extent". They also claimed that disorientation, confusion, phobias, hallucinations and delusions had been relieved or erased entirely in some patients. But they also noted, "Every patient probably loses something by this operation, some spontaneity, some sparkle, some flavour of the personality". In 1942 they published an influential book promoting the practice. In the United States the number of lobotomies performed per year went from 100 in 1946 to 5,000 in 1949. That year Moniz won the Nobel Prize in physiology/medicine for his contribution. Some 50,000 operations in the USA and about 10,500 in England and Wales were carried out by mid 1950's.

The popularity of the procedure declined drastically in the 1950's and beyond. Evidence of serious side effects mounted with longterm studies. Mortality for early operations varied from 2 to 6 per cent, epilepsy from 10 to 50 per cent, and between a third and a half of patients developed personality changes involving euphoria, apathy and lack of initiative. The use of newly developed psychoactive drugs of pheothiazine drugs (Chlorpromazine etc.) in 1952, the first non-sedating tranquilliser, reduced the perceived need for most lobotomies.

### **Setting The Scene**

After attending the demonstration by John Fulton in a neurological conference in London in July 1935, Egas Moniz had the idea to perform a similar operation to alleviate some severe mental symptom of intractable psychoses. Egas Moniz knew that certain psychoses, such as paranoia and obsessive-compulsive disorders, involve recurrent thought patterns that dominate all normal psychological processes. Based on Fulton's ideas, he proposed to cut surgically the nerve fibres which connect the frontal and prefrontal cortex ('rational brain') to the thalamus ('emotional brain'), a structure located deep in the brain, which is responsible for relaying sensory information to the cortex. In this way, Moniz reasoned, there might happen an interruption of the repetitive thoughts, allowing a more normal life for the psychotic.

Moniz, working with a neurosurgeon and colleague, Dr Almeida Lima, developed a surgical approach to the problem, which he called leucotomy ('white matter cutting'). He would open several small holes in trepanning the two sides of the brain, and insert a special wire knife, called a leukotome into the brain substance. With a few sideways movements, the fibres were severed and the patient could recover. Moniz reported that the results were good in several patients. Severely agitated, anxious or depressive patients had a general improvement in their symptoms, in some cases in a striking way. In other patients, however, the operation had no success, and Moniz was cautious to propose that leucotomy should be used only when the case was so hopeless as to warrant it.

After Moniz and his colleagues reported his results to the world (in six countries, simultaneously) in 1936, several centres around the world started to try out the new surgery. In Brazil, the noted neurosurgeon Mattos Pimenta, from the Paulista School of Medicine, in Sao Paulo, was one of the first to perform Moniz leucotomies, with doubtful success. Leucotomy and lobotomy are apparently synonymous in psychosurgery. Walter Freeman and James Watts considered that leucotomy was an incorrect name for the procedure. It suggested that it was only the white matter – the Leukos, that was affected but actually nerve cells were also destroyed. Hence, they renamed it the lobotomy.

### **The Heyday Of Lobotomy**

So, probably prefrontal leucotomy (lobotomy) would fizzle out (Moniz would retire early, after being shot in the spine by one of his ex-patients, becoming paraplegic) and be abandoned a few years after being invented. Many psychiatrists, particularly the psychoanalysts were adamantly against it.

However, an ambitious American physician and clinical neurologist, Walter Freeman, attended the same London conference as Moniz. Later he read Moniz's reports in the library. He became very excited with the idea and his results and teamed up with a neurosurgeon James Watts to apply the newly invented technique in American patients. They first operated in September 1936. After a few cases, he was convinced that leucotomy worked, and started to propagandise it heavily. He was met with suspiciousness and resistance by the bulk of American neurosurgeons, but he insisted,



eventually winning the reluctant approval of his colleagues. He and Watts perfected the technique, arriving to what he called the “Freeman-Watts Standard Procedure” which had a precise set of guidelines for the insertion of the leucotome.

Freeman was very good in convincing the general press about the promises of the prefrontal lobotomy (as he called it now) and almost single-handedly pushed it as a valid therapeutic procedure across the nation’s insane asylums, hospitals and psychiatric clinics. He also performed with Watts many operations around the country, but he was dissatisfied with the messiness and length of the operation. Having heard about an Italian who had developed a trans-orbital approach to the frontal lobe (i.e. by inserting a leucotome after making an opening in the roof of the eye orbits), he invented in 1945 a much quicker and simpler way: the so called “ice-pick lobotomy”. Instead of a leucotome, which required a surgical trepanning, he used a common tool to break ice, which could be inserted under local anaesthesia by tapping it with a hammer. The ice pick would perforate skin, subcutaneous tissue, bone and meninges in a single plunge; and then Freeman would swing it to sever the prefrontal lobe. This would take no more than a few minutes, with no need to intern the patient in the hospital. The procedure was so ghastly, however, that even seasoned and veteran neurosurgeons and psychiatrists would not stand the sight of it, and sometimes faint at the ‘production line’ of lobotomies assembled by Freeman. James Watts became distressed with this kind of operation and broke his ties with Freeman.

Lobotomy took America and some other countries by storm. They were performed in a wide scale in the 40’s, because the mental asylums were brimming over with cases after the Second World War. Between 1939 and 1951, more than 18,000 lobotomies were performed in the United States, and tens of thousands more in other countries.

### **Abuse Of Lobotomy**

Ice pick lobotomy was considered to have amazing potential for controlling society’s misfits, viz schizophrenics, homosexuals, communists, radical political and social activists. It was widely abused as a method to control undesirable behaviour, instead of being a last resort therapeutic procedure for desperate cases. In Japan, the

majority of the operated cases were children, many of whom had only problematic behaviour or a bad performance at the school. Inmates in prisons for the insane were widely operated. Families trying to get rid of difficult relatives would submit them to lobotomy. Rebels and political opponents were treated as mentally deranged by authorities and operated. Amateur surgeons would often perform hundreds of lobotomies without even doing a systematic psychiatric evaluation. The Hollywood and Broadway (New York) actress and radical political activist – not a mental patient Francis Farmer was a victim of Freeman's transorbital lobotomy in 1941 in the Western State Hospital in Fort Stella, Coombe. When, in 1949, Antonio Egas Moniz was awarded the Nobel Prize for Medicine and Physiology, in recognition of his creation of the prefrontal leucotomy (lobotomy) it became a respectable procedure, and as a result, in the ensuing three years, more lobotomies were performed than in all previous years (Figure II).

#### **The Demise Of Lobotomy**

Over 50,000 lobotomies were performed in the US alone between 1939 – 1951. Finally, around 1950, the first discordant voices against the lobotomy folly started to be heard. Scientific evidence for the benefits of lobotomy was not coming. Even lobotomy's proponents admitted that only one third of the operated patients would improve, while one third remained the same, and one third got worse (25 to 30% is the proportion of spontaneous improvement in many kinds of mental diseases! Thus, a large proportion of the operated patients could have recovered without the lobotomy). In the United States, a major evaluation study called the Columbia-Greystone project was conducted in 1947 and failed to provide evidence of the positive effects of lobotomies. Many times, the evaluation was performed by the surgeons who did the work, without any kind of scientific controls. At the 1960 World Psychiatry Congress, Freeman presented the results of his follow-up studies on 3,439 lobotomy patients, claiming they showed that 85% of his private trans-orbital patients were now at home, and two thirds of them were "usefully occupied". His data were so anecdotal, so subjective that they were not taken seriously. At the same time a 10 year study on British patients did not make such encouraging reading.

Ethical objections began to pile up, because of the irreversible damage to the brain, and also because of the reports of severe collateral effects of the surgery on the

personality and emotional life of the patients. In addition, the appearance of new antipsychotic and anti-depressive drugs, such as Thorazine in the 50's gave new means to combat most of the symptoms experienced by agitated and uncontrollable patients. Neurosurgeons everywhere started to abandon lobotomy in favour of more humane methods of treatment.

Concern over the protection of patients against lobotomy and similar radical therapies, particularly in inmates, where release was widely exchanged with agreement to a lobotomy (a highly unfair, unbiased and controversial offer); translated into laws in the United States in the 1970's and in many other countries as well. Psychosurgery was classified as an experimental therapy, with many safeguards to the patient's rights.

The original lobotomy operation is now rarely performed, if ever, although many countries still accept psychosurgery as a form of radical control of violent behavior (Japan, Australia, Sweden and India are among them). In the former Soviet Union, lobotomy was outlawed in the 1940's because there was an ideological stance against it.

#### **Lobotomy – Criteria And Ultimate Fate**

- The major indication for psychosurgery (lobotomy) is the presence of a debilitating, chronic disorder that has not responded to any other treatment.
- A reasonable guideline is that the disorder should have been present for 5 years.....
- Chronic intractable major depressive disorder and obsessive-compulsive disorder are two reportedly most responsive to psychosurgery.
- The presence of vegetative symptoms and marked anxiety further increases the likelihood of a successful therapeutic outcome.
- When patients are carefully selected, between 50 and 70 per cent have significant therapeutic improvement with psychosurgery.
- As measured by intelligence quotient scores, cognitive abilities improve after surgery....

Rosemary Kennedy, sister of John Fitzgerald Kennedy (1917-1963), 35<sup>th</sup> President of the USA (1961-1963), was given the miracle cure of the frontal lobotomy

to help cure her of “aggressive impulses”. The operation was a complete success and Rosemary was rendered off to a convent for care owing to the small detail that she was totally unable to care for herself.

Rose Williams, sister of the famous playwright Tennessee Williams (1911-1983), Pulitzer Prize Winner (1947) for “A Streetcar Named Desire”, also had a lobotomy in 1943 following a series of ‘mental breakdowns’ and a diagnosis of schizophrenia. The operation was considered to be a failure and Rosemary was disabled for life. Tennessee Williams went on to become an alcoholic.

Walter Freeman, himself with no qualifications for surgery, recorded details of 3,439 lobotomies that were carried out by himself. Freeman performed his last lobotomy in 1967 which resulted in fatality when he ruptured a blood vessel and the patient inevitably bled to death. Freeman died from cancer on May 3 1972 at the age of 76.

Probably fewer than 20 psychosurgical operations are now carried out each year in the United States for psychiatric disorders. For these lucky 20 people the procedures are not strictly “lobotomies” because radiation is used to produce tiny lesions in the cingulate gyrus region of brain, which has been connected with the development of obsessive-compulsive disorder (OCD). The application of new molecular genetic techniques has now enabled us to explore the mechanisms of aggression.

### **The Epilogue**

The history of psychosurgery is a long eventful journey – an odyssey in experimental surgery indeed! It created social excitement. It allured the ‘Press of the day in the USA. Some newspapers like New York Times, Washington Evening Star, Saturday Evening Post etc., deliberately conducted the publicity machine for Walter Freeman’s neo-discovery. The popular coverage was universally optimistic with headlines such as: “Psychosurgery Cured Me”, “Wizardry of Surgery Restores Sanity to Fifty Raving Maniacs”, “Turning the Mind Inside Out”, and memorably and tragically incorrectly “No Worse Than Removing a Tooth”. The Press muddled people’s perception about the relevance and therapeutic status of psychosurgery. They were confused. Then, in 1962, came the final nail in the coffin of psychosurgery when the writer-physician Ken Kesey published his Pulitzer Prize winning novel “One Flew Over the

Cuckoo's Nest", a story set in a US asylum. (Annual Pulitzer Prizes awarded each May since 1917 for literature, fiction, poetry, biography, history, drama, music and journalism (8 Prizes) have been established in the USA by the will of the Hungarian émigré Joseph Pulitzer (1847 – 1911)). It was all over for the psychosurgeons. Lobotomy was finally seen for what it was: not a cure but a way of managing patients. It was just another form of restraint, a mental strait jacket nailed permanently over the brain. It did not create new people; it subtracted from the old ones. It was an act of defeat. It was an act of frustration.

**“The writer, a freeman addressing free men, has only one subject – freedom”.**

- In “What is Literature”

JEAN – PAUL SARTRE (1905 – 1980)

- Awarded Nobel Prize in Literature, 1964 but Declined.

## सारांश

### विज्ञानशास्त्र की भ्रमण में मानसिक शल्य चिकित्सा का इतिहास - एक झलक

शिशिर के. मजुमदार

मानसिक शाल्य चिकित्सा एक ऐसी चिकित्सा पद्धति है, जो उन मानसिक रोगियों का उपचार करती है जिनका उपचार अन्य पद्धतियों द्वारा सम्भव नहीं है। आधुनिक मानसिक शल्य चिकित्सा का आविर्भाव सन् १९३० में माना जाता है। इसकी शुरुआद वन मानुष पर प्रयोगों द्वारा अमरीका के पैले विश्वविद्यालय में किया गया है। सर्व प्रथम प्री-फ्रान्टल ल्यूकोटमी पुर्तगाली वैज्ञानिक एन्टोनियो सिटामो अब्रेप फेरे एगास मौनीज ने अपने साथी एवं नाडी शल्य चिकित्सक एल्मिदा लीमो के साथ लिज़बन शरह में सन १९३६ में बीस रोगियों पर किया गया। वाशिंगटन अमेरिका के शल्यचिकित्सक वाल्टर फ्रीमान एवं जेम्स वाटस ने उपरोक्त पद्धति में कुछ सुधार लाये प्राचीन काल से अजातक की उसकी स्थिति तथा मानसिक विश्लेषकों नीतिशास्त्र के विद्वानों एवं पंडितों पर शल्य चिकित्सा के प्रभाव को यह लेख खोज निकालती है।

स १९५० मे मानसिक औषधि विज्ञान के विकास के साथ ही मानसिक शल्यचिकित्सा का विस्मरण होता गया।