

## Introspection of a Neurosurgeon

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Dear friends,

Let me begin by expressing my gratitude to the members of the NTSI for honouring me, to serve as your president. We owe a lot to my predecessors in this position and various members and volunteers who served this society to change it to what it is now. Thank you for your efforts for Neurotrauma. One of the privileges of giving a presidential address is to pay public homage to those who have been supportive and instrumental in my professional journey. I am profoundly indebted to the institutions I belong. Dr. Mala, my wife has been my anchor to windward and provided stability and our children Lydia and Vedant for their support, love and understanding over the past years. I must give my thanks to those magnificent teachers to whom I was lucky enough to be apprenticed. Particularly Dr.V Hemlatha, Dr. BS Das, and Prof GNN Reddy. They demonstrated the humility, warmth, and kindness to patients that cannot be learned by formal study, but comes from observing the example of people who manifest those qualities in their own personality. I love and respect them. I wish to acknowledge the support and inspiration from my good friend Prof A K Mohapatra and Prof S Kalyana Ramana at different stages. I cannot have praise high enough for them.

The well planned scientific programme is replete with learned discussions of the advances in various aspects of neurotrauma. Rather than discuss additional technical things I must share some of my thoughts on certain ethical and clinical issues.

Neurotrauma is as old as man. The roots lie in magic- in the magical and religious belief of the shamans and priest physicians of antiquity. There are two references to brain injuries in the Holy Bible:- The wife of Joel slew the Canaanite general Sisera "by driving a metal tent stake through his temple" while he slept. The other was the case of Goliath who was rendered unconscious by a stone which sunk into his forehead. Warriors used

helmets down the ages. I would assume that the ancient warrior realized very early that it was easiest to annihilate or at least slow down his opponent with a blow to the head. Therefore, the concept of head injury remains as ancient.

Trauma has reached to epidemic proportion. Yet due attention has not been given for its prevention. Should we not do our bit to repay our debt to the society? The only way for evil to prosper is for few good men doing nothing. We must all take on added social responsibility, above and beyond that of patient care. The immediate need of the time is to prevent head injury or injury prevention. It is our moral responsibility to initiate awareness amongst the policy makers and public. What can a single neurosurgeon do? Is often a question that we ask ourselves. True the magnitude of problem seems gigantic and individual action may look to be insignificant but unless that ONE person sets out to meet a challenge, no gainful purpose will ever be served. No concern is too insignificant, no service is too minor. It will have to be an individual who will take the first step to motivate millions of others to join a crusade. All of us are aware how Sir Hugh Cairns at Oxford was the guiding force behind the introduction of crash helmets for motor cyclists. Similarly neurosurgeons are in forefront of the fight of compulsory safety- belts. We are amongst the chosen few who have turned out to be leaders and whose commitments can turn dreams into reality.

Over 6000 yrs, medicine has evolved with man's strengthened observation, experience, judgment, faith, philosophy, economics and enriched above all by science. Medicine and surgery are today capable of performing feats deemed incredible and impossible half a century ago. In spite of the great advances there is a seething discontent against medicine and medical profession among the people, a discontent which is also shared by many within the profession. Why should it be so? This is a striking paradox because when our profession had achieved very little then we held the highest respect and doctors' image outshone that of any other profession. The detailed description of the vivid personality of a

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*Presidential Oration delivered at the 17<sup>th</sup> National Neurotrauma Conference held at Jaipur, (Rajasthan), 06-08 Aug 2009.*

physician, a great physician to the pharaoh Zoser has been found in the recorded history as early as 2700 BC. People lined the bank of Nile in grief while body was taken in ceremonial barge. Egypt Wept. Much before that during the vedic period the Indian Surgeon Sri Dhanvantari and Physician Sri Charak practiced Ayurved. Ayurveda, the science of life emphasizes on service above self for the doctors.

Accident comes as a bolt from the blue. Do we really know what is lurking in the mind of the family members, relatives and friends? Besides the victim his near and dear ones are equally in agony. To me the victim is a patient. Do they really register what I am talking or are they looking beyond. We've never really defeated death but we have means to avoid it. The greatest enemy is suffering, not death. There is no greater award than conquest over the human suffering. To my mind our image is tarnished because we have lost the art of medicine— in assessing the patient as a whole—the mind and body. Technology will not cement the doctor patient relation. Ethics for a doctor means care, compassion and a special empathy for patient—the ability to feel for the patients and prompting them to provide relief which in other words is humanity.

Today there is Crippling expense in relation to investigation, treatment and cost of the modern star hospitalization. Ultimately the patient's ire fall on the doctor even though the cream is swallowed by many others. We have more rapport with machines than patients. We are deeply immersed with art of science not art of medicine. For mercy's sake gentlemen, let us have little less science and a little more art.

It's true that trauma gets back seat in the neurosurgical arena. I do not deny many neurosurgical procedures demands finer skill, patience and dexterity. Is it really true that trauma management is easier or even less difficult? Apparently we have taken for granted that it is easy to manage. When a car is designed, each part of it is replicated with the same precise accuracy. As far as head injury is concerned, no two individuals are exactly the same. The disease process is dynamic. Can their treatment be same? Their treatment has to be tailored / customised. We are in the era of nano-specialities. When one is in dilemma one will not feel belittled to take help even from a junior colleague. Our ego should not affect some ones life. We have the problem of affordability, of litigation, defamation and of course infrastructural problems. Relatives want the best and we want to give

the best. But to what extent? To me Honesty is the best policy. I always give a true picture based on the available circumstance.

This patient with spinal injury had refused surgery and he has been happily continuing his job as cashier in a bank. I had operated on a patient where half of the brain was out due to an industrial accident. Every one expected he would die. He was in coma for three weeks before showing any signs of improvement. He became hemiplegic. His friends came and asked me what was the use of saving his life. The reason was that his family would have gotten better compensation if he were to die as it was a work injury. Later he became a librarian. Often there is socio-politico economic and bureaucratic influence in our patient care. My policy have been that of softer than flower where kindness is concerned but stronger than thunder where principles are at stake. One must balance the treatment.

One of the goals in treating patients with severe TBI in intensive care is to control brain edema and maintain ICP below target levels. The mainstay of treatment is medical therapy. But in certain patients with diffuse severe TBI, such treatment is not effective. In these patients, DC to reduce ICP is a potential option as second tier. Worldwide, there have been strong advocates and opponents of the procedure. The procedure has its origins thousands of years ago, with early trepanation performed for a range of medical, religious and mythical reasons. Ever since Prunier (1873) discovered trephined neolithic skull which was 20 to 40 thousand years old, archaeologists have found more than 1500 of these skulls with evidence of surgical trephination and healing, which is certainly an indication that the patient lived. Why these holes were made by prehistoric man can only be conjectured. The secret remains hidden in the past. It could be a religious ritual or therapeutic for the escape of evil spirits and other such superstitious causes. Ultimate effect was possibly decompression. Returning to ancient times again, the Edwin Smith Papyrus is the earliest written record on trephination, composed by an Egyptian surgeon around 2500 BC to 3000 BC.

Herodotus, Hippocrates, Celsus and Galen, each had recommended trephination for head injury. Thus the Greeks and Romans developed the art of trephining to a high degree of perfection. Even the Sushruta Samhita mentions trephination. In the Medieval period, Roger of Salerno recommended trephining for skull fracture and drain the exudates. The 17th century was full of

wars and trauma. In 19th century Larry Barron, Napoleon's surgeon and George Guthrie described extensively head injury and decompression. World War I saw lot of head trauma due to the trench war fare when the upper part of body was exposed. In the modern era, it was Kocher and subsequently Harvey Cushing described DC specifically to relieve intracranial pressure. In 1950s role of decompressive hemicraniectomies in reducing intra cranial pressure has been reported on and off for traumatic head injury. This is the CT scan of a young man aged 19 yrs who sustained head injury on 19<sup>th</sup> Nov.2006. He presented 14 hrs later when CT scan revealed multiple contusion. His GCS was 7 on admission. He had undergone bifrontal DC. The ICP reduced after surgery and contusion resolved slowly. Later he developed subdural hygroma, hydrocephalus and distortion of brain. Soon after cranioplasty he required ventriculoperitoneal shunt. Five months after the fateful event this young man had gone back to school.

We have performed DC on 165 patients with severe TBI at our institute over a period of 8 years. The youngest patient was 6 years.

All patients with dilated pupils had undergone emergency DC based on their CT report and clinical findings. CT scan was available for all patients. The commonest feature was compressed lateral vent. Many of the features overlapped. Post operative CT were done on day 1,3 and 5 to assess the progress. Eighteen patients had associated posttraumatic ischemic infarction. Twenty five patients had undegone surgery within 24 hrs of hospitalization. The intracranial pressure in these patients was not measured before performing decompressive craniectomy.

A late decompressive craniectomy ie. after 24 hrs and within 6 days was performed in 140 patients with intracranial pressure >35 mm Hg, or a unilateral or bilateral absence of pupillary reflexes, besides abnormalities in computed tomography scan.

Patients with major injuries, fixed and dilated pupils, massive infarction of cerebral hemisphere were not operated. Large decompressive craniectomy (at least of e"12 cm in diameter) was done in all cases with opening of the dura. Duraplasty was done in 111 cases. A bifrontal craniectomy was done in 90 patients with massive global swelling. Cranioplasty was done 4 to 6 weeks later depending on the functional recovery. 15.8% needed reoperation and all of them had hemicraniectomy

for mass lesions like development of contusion/brain swelling with herniation. Hemorrhagic contusion expansion was observed in 40%. Subdural hygromas developed early after decompressive surgery .

Hydrocephalus and epilepsy were common complications encountered in children. Twenty patients needed a ventriculoperitoneal shunt for hydrocephalus, and 1 patient presented with brain abscess 53 days after the operation. Gastrostomy was done in 8%, and tracheostomy in 20%. All type of complications have been recorded in this series. Only one out of 18 Patients with associated posttraumatic infarction recovered, four remained vegetative. Of these, 26% had good outcome. Five patients could resume their former occupation and another 11 had to change jobs. Mild deficits were seen in 17 patients, and 21% remained in a vegetative state. Overall 53% patients died. Young age and early surgery had better outcome. Children with severe head injury, presenting with decorticate posturing and treated by unilateral decompressive craniectomy, showed good recovery.

It is important to recognize that poor neurological status on presentation does not necessarily equate to irreversible cerebral injury. Judicious use of DC combined with modern neuro-intensive care offers the potential to save life with acceptable functional outcome. Young age and early surgery are useful predictors of better outcome. The decision to perform DC needs to be individualized and should not be used as a salvage strategy.

It must be remembered that none of us are immortal and we as neurosurgeons must strive to see our patients try to live beyond their expectancy but this increase must at all times, be one of quality, not only socially and economically, but also mentally. We must see that our patient are fully rehabilitated to the highest socio economic level possible with rightful place in the society..

Theoretical physicist like Michio Kaku and Henry Sernat are of opinion that the quantum theory will give us nano technology-the ability to make machines the size of atoms. Possibility of Tiny computers, the size of atoms, inserted into our blood stream will do the repairing work. Raymond Ruzsweil , author of "Age Of Spiritual Machines", contends that scientists have already replicated input-output characteristics of clusters of hundreds of neurons. There is a possibility of scaling up from hundreds of neurons to billions of neurons that the human brain contains, and of computing further than

500 trillion bytes per second as our human brain does? Even if this becomes possible in the distant future there are certain human qualities which machines however intelligent can never possess-for these qualities are not directly linked to intelligence. How can a machine ever possess imagination, experience, wisdom, intuition and above all how can it blossom into spirituality that was essence of the great avatars Lord Buddha, Jagat Guru Shankaracharya, Swamy Vivekanand, Mahatma Gandhi, Jesus Christ. A brains success is not measured by its ability to process information in precisely repeated ways. Instead it has evolved to guide behaviors that allow us to survive and reproduce which often requires fast response to complex situation.

Human being is distinctly unique. I can fore see that the quantum leap in our knowledge of biotechnology and computer revolution will control and shape the destiny of man. The evolutionary history of man stretches back to millions and millions of years. Man has not ceased to

evolve- he will continue to do so perhaps indefinitely through the corridors of time unless he destroys himself or is destroyed during the passage. Man possesses a neuronal compass which has and can guide him to his intellectual destiny. The future will be close to heaven. Then I believe the journey of the neurosurgeon will be successful.

In closing I wish to say despite the vicissitudes and strife of the medicine these days, our profession still offers the singular opportunity to help other human beings to relieve pain and suffering, to work with most advance technology and to provide for secure future. In spite of all our scientific knowledge and expertise we still have much to learn in the treatment of our patients. Treatment must remain an art. The most rewarding thing we can do now is to help create a better tomorrow free of neurotrauma.

Thank you for listening and thanks to the many authors whose work I have paraphrased and plagiarized.