Observational Study of Demographic Factors among Patients Posted for Major Neurosurgical Procedures in an Elective Setting at a Tertiary Care Centre

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ABSTRACT

BACKGROUND

Major neurosurgical procedures are to be well planned prior to surgery. For Preventing the mortality a morbidity, preparedness preoperatively is essential for smooth conduct of the prolonged neurosurgical procedures. Both anaesthesia and surgery may carry inadvertent risks to patients. Study of the demographic factors like age, sex, associated disease (in the form of ASA-PS stratification) and type of surgery are useful in this direction.

METHODS

It is a small group cross sectional study. Major neurosurgical elective procedures are very limited even in tertiary medical centres. Demographic factors are elicited preoperatively in the patients. Since these patients were posted electively for major neurosurgeries, their mentation is usually stable, with good Glascow coma scale scores.

RESULTS

36 % of patients were males and 64 % patients were females, 56 % paients belonged to ASA PS I with no systemic illness. Majority of patients belonged to the age group 41-50 years.

CONCLUSIONS

The mean height of the patients was 164.2 cm with a standard deviation of 7. Mean weight of the patients was 63.2 Kg $\pm$ 7.1.

KEYWORDS

CP Angle – Cerebello Pontine Angle, CVP – Central Venous Pressure, NIBP- Non Invasive Blood Pressure, BIS – Bispectral Index, ECG – Electrocardiogram, TBI – Traumatic Brain Injury

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BACKGROUND

Demographic factors are very important to the neuroanaesthesiologist and neurosurgeons. This may help in preparation of patient prior to surgery. It is useful in arranging and prioritization of various anaesthetic and surgical equipments for smooth conduction of surgery. The type of surgery, chance of bleeding and optimization of vitals all are linked with each other throughout intraoperative and postoperative periods. Different surgeries need different anaesthetic techniques, positioning and monitors. Optimal positioning of patient is needed during surgery. This helps in decreasing bleeding from surgical site, optimizing intracranial pressure, prevents buldging of brain and optimize recovery after surgery. All these put together planning of anesthesia, surgery, positioning and study of demographic factors helps in optimal outcome for major neurosurgical procedures. Most common monitors employed for major neurosurgical procedures are NIBP, pulse oximeter, CVP monitor, Arterial pressure, Entropy or BIS, peripheral nerve stimulator, oesophaged stethoscope, ultrasonography etc. Most of these monitors are not needed in major general surgery procedure and minor procedures.

The health and health care needs of community can't be estimated without knowledge of its size and characteristics. Neurosurgical patients are associated with high risk of neurological complications in the immediate postoperative period. An operation represents premeditated trauma. The associated risks are predominantly attributable to a physiological stress response. The incidence of postoperative death has little changed in recent years. Most deaths occur in older patients with coexisting medical disease, who were subjected to undergo major surgery.[1,2] Complex nature of surgery, that is frequently performed as can emergency procedure is associated with high mortality rate.[3,4] Severity of acute condition and the functional limitation of patients are the two factors that affect survival.[5] Male gender was associated with increased hospital mortality especially in patients older than 75 years. Patients age and female gender have strong negative correlation with nosocomial infection. According to the U.S.A preventive task force, cognitive function not assessed either preoperatively or postoperatively with increasing cognitive decline after surgery.[5,6] Prior studies suggested that approximately 16 % of elderly > 70 yrs age have mild cognitive impairment.[7,8]

Presence of preoperative anxiety is common among neurosurgical patients. Studies show that there was increased requirement for information especially about surgery in those with increased anxiety. Preoperative treatment with anxiolysis or opiods is controversial, due to increased risk for respiratory depression and hypercarbia leading to increased intracranial pressure. While eleciting the demographic data, alleviation of anxiety about surgery important as most elective patients are in communicable state.

Demographic factors like age, sex and preoperative physiological status and type of surgery lead to various outcomes for the patient. Hence a unscrupulous preoperative assessment needed for neurosurgical patients in view of safe anesthesia practice. Demographic factors are elicited and confirmed during preoperative assessment. Neurosurgical patient vary widely in their presentation from alert, coherent patient to those with depressed neurological status. Other medical disorders like diabetes mellitus, chronic kidney Disease and hepatic disorders will influence anesthetic management and need to be optimized. There is an adverse association of diabetes mellitus and neurological outcome.[9] In a prospective analysis with the advent of tight glycemic control, reduced mortality in neurosurgical patients and other critically ill patients.[10]

We wanted to study the demographic variables like age, sex, ASA PS class and height among major neurosurgical patients posted for elective neuro surgery, in a tertiary hospital setting.

METHODS

It was a small group cross sectional study. Elective neurosurgical patients posted for major neurosurgical procedures were selected for this study. Twenty five major neurosurgical patients, their demographic features like age sex, ASA PS class, height in cm and surgical procedure types were elicited preoperatively. Most of these patients were conscious and oriented, hence it was relatively easy to elicit demographic factors by the preoperative anaesthesia team. Depending on age patients were stratified in various age ranges like, < 30 years, 31 - 40 years, 41 – 50 years, 51 – 60 years etc. As elective neurosurgical patients were selected for the study most of them belonged to either ASA PS class 1 or 2.So also the procedures subjected elucidated from the postoperative notes. Statistical tables were constructed, after employing descriptive statistical methods, arithemetic mean and standard deviation.

Statistical Analysis

Descriptive statistical analysis is applied for calculating demographic variables. Arithmetic mean and standard deviation for age distribution, height and weight were calculated. Percentage distribution was calculated for gender, ASA class and distribution of sample according to surgery.

RESULTS

The present study was conducted in 25 adult patient undergoing major neurosurgical procedure lasting more than 4-5 hours.

Criteria	Criteria Value	Count	Percent
Age	<=30	5	20.0
	31 – 40	5	20.0
	41 – 50	11	44.0
	51 – 60	4	16.0
Sex	Male	9	36.0
	Female	16	64.0
ASA PS Class	I	14	56.0
	II	11	44.0

Table 1. Table Percentage Distribution of the Sample According to Age, Sex and ASA PS Class

Mean	164.2
SD	7.0
Median	164
Minimum	152
Maximum	176

Table 2. Descriptive Statistics of Height

Surgery	Count	Percent
ACOM Aneurysm Clipping	2	8.0
Arachnoid Cyst Fenestration	1	4.0
C6-7 Foraminotomy	1	4.0
Cerebellar Abcess Drainage	1	4.0
CP Angle Tumor Excision	2	8.0
Craniotomy & Excison Cerebellar Tr	2	8.0
Excision Glioblastoma	1	4.0
Excision ICSOL	4	16.0
Excision Parasagittal Meningioma	1	4.0
Excision Pituitary Adenoma	1	4.0
Frontal Meningioma Excision	2	8.0
Glioblastoma Excision	1	4.0
III Ventricle Colloid Cyst Excision	1	4.0
Intraventricular Tumor Excision	1	4.0
MCA Aneurysm Clipping	1	4.0
Meningioma Excision	1	4.0
Optic Nerve Decompression	1	4.0
Right Parietal Meningioma Excision	1	4.0

Table 3. Percentage Distribution of the Sample According to Surgery

Mean	63.2
SD	7.1
Median	64
Minimum	52
Maximum	76

Table 4. Descriptive Statistics of Weight

The patients in the study had mean age of 42.4 ± 10.3 years. 64 % of the patients were females and 36 % were males. ASA PS class of the patients predominated by ASAPSI 56 % and ASA PS II 44 %. Mean height of the Patient was 164.2 cms with a standard deviation of 7. ICSOL Tumor excision predominated among surgeries. Mean weight of the patients were 63.2 kg with a standard deviation of 7.1.

DISCUSSION

Demography is concerned with essential numbering of people and with understanding population dynamics. Primary tumors of central nervous system are relatively uncommon, comprising only 1-2 % of all neoplasms. Extent of preoperative assessment of a patient with cerebral aneurysm will be determined by their clinical presentation.

Patient with unruptured aneurysm may be completely asymptomatic, in contrast to a patient with c/c subarachnoid hemorrhage.[11] Cardiac complication usually associated with neurosurgical patients include abnormalities in rhythm and ECG changes, elevated cardiac enzymes and myocardial dysfunction.[12,13,14]

Most essential neurosurgical cases include relatively straight ward methods such as burrhole craniotomy for hematoma clearance and shunt with insertion mentioned among 44 essential procedures enlisted in the disease control priorities series, Published by world Bank Group.[15] However extradural hemorrhage and hydrocephalus represented by a small fraction of neurosurgical conditions that result in severe disability and death if left untreated.

Demography is scientific study of human population. It underpins and plays roles with many other fields like history, geography, ecology, economics, statistics, epidemiology and social policy. Copeland et al.[16] initially propounded the possum scoring system to evaluate morbidity and mortality in general surgical patients. It is further modifies as P-Possum to improve score's accurancy.[17] The scores have been extensively evaluated in many speciality disciplines too.[18,19] The first validated published tool a rose from an Indian neurosurgical population in 2008, P-Possum having propounded as stronger score.

Demographic factors taken in to consideration in P-Possum score calculation are age in years, sex of patients and duration of surgery. P –possum with its demographic contents combined with postoperative mortality is seeing to be a useful scoring system for neurosurgical patients in whom craniotomies are carried out.

Untreated surgical disease lead to extreme economic costs, profound disability and death.[20] Ten conditions encountered by neurosurgeon are brain and spinal cord tumors, TBI, traumatic spine injury, neural tube defects, stroke, CNS vascular anomalies, CNS infections and epilepsy. Approximately 60 % of essential neurosurgical volume with tumors, hydrocephalus, epilepsy and infection related condition. TBI and stroke related complications constitute approximately 60 % of essential neurosurgical volume. Most deaths occur in old patients with existing medical diseases. Age, gender, preoperative physiological status and type of surgery mainly account for the outcome of treatment. Complex nature of surgery that performed as emergency procedure correlated with high mortality rate.

Study was conducted in major neurosurgical patients posted for elective surgery. 20 % of patients were less than 30years age, 20 % between 31 -40 years, 44 % of patients belonged to the age range of 41- 50 years and, 16 % of patients were in the age group of 51-60 Years.

36 % patients were males and 64 % patients were females, and 56 % patients belonged to ASA PS I class without any systemic diseases.

Mean height of patients were 164.2 cm with a standard deviation of 7. mean weight of patients were 63.2kg with a standard deviation of 4. 16 % of the patients underwent surgery of excision ICSOL, 8 % were subjected to CP angle tumor axcision, 8 % Acom aneurysm clipping.

CONCLUSIONS

The mean height of the patients was 164.2 cm with a standard deviation of 7. Mean weight of the patients was 63.2 Kg $\pm$ 7.1. Most of the patients were females with ICSOL as the predominant neurosurgical elective procedure. The type and extent of surgery may vary institution wise depending on the expertise of surgeons, anesthesiologists and availability of ventilators, other advanced monitoring facilities and robotics.

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