INTENSIVE CARE IN NEUROSURGERY

Essay submitted in partial fulfilment for the master degree in general surgery.

By

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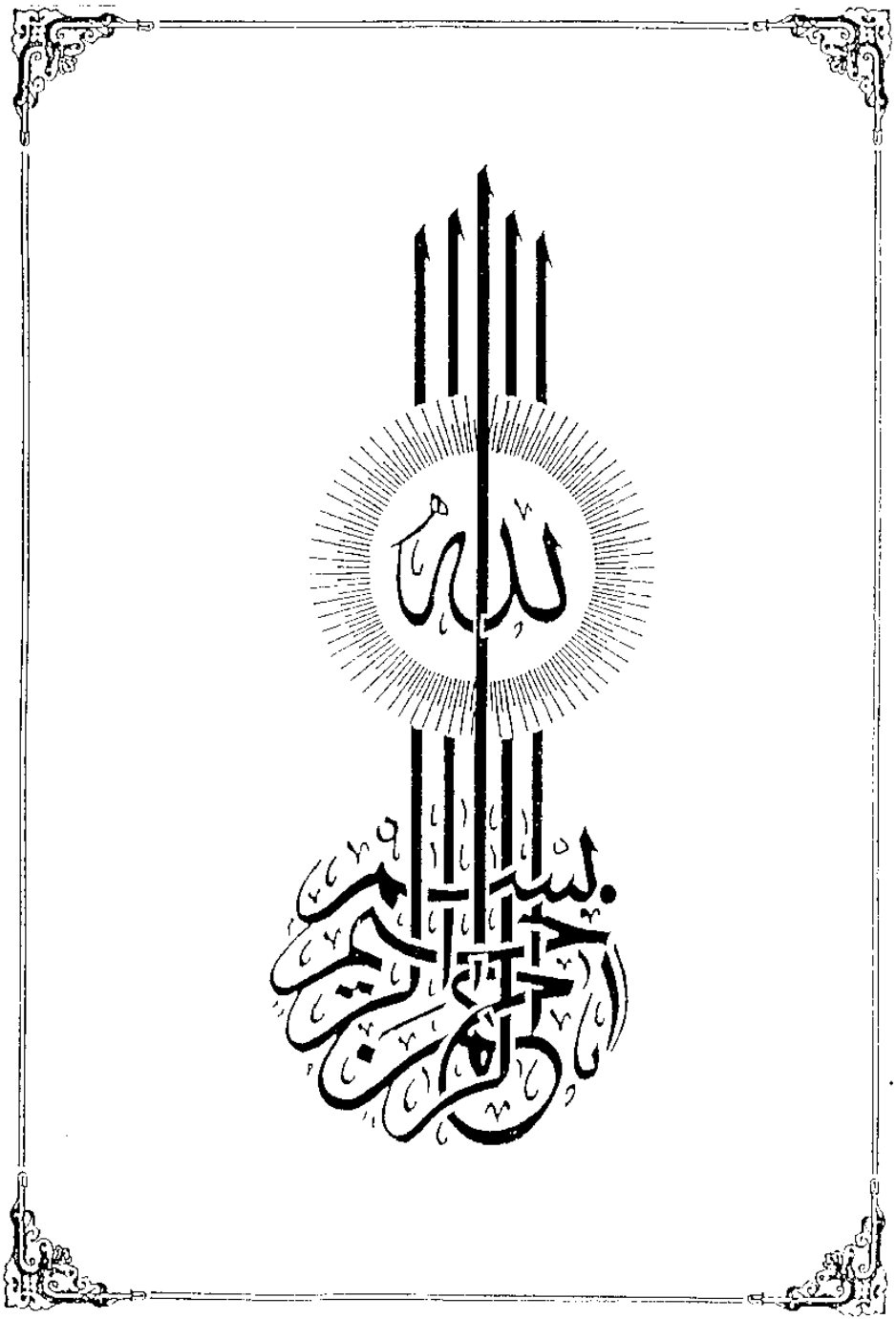
1986

In THEE O my GOD

I put my trust.



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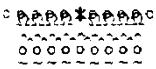
Introduction

It is a fact universally acknowledge that, the passed decade in critical care was marked by a flurry of activity directed toward the neurosurgical patient. The introduction of advanced neurologic monitoring techniques has placed the neurologic intensive care at a turning point. Clinical quantitation of regional cerebral blood flow (CBF), intracranial presseure(ICP), and electrical activity of the brain; are now practical. with computerized tomography (CT) an analysis of the intracranial content can be obtained [145,268]; and more detailes can be superadded by using nucleu-magnetic resonance (NMR), and positron image intensifier (PII). The monitoring advances permit improved application and re-evaluation of the standared neurotherapeutic.

This essay shows the role which can be done by the neurosurgical intensive care unit (NICU) in management of critically ill patients in the field of neurosurgery where complication can have such catastrophic effect. The study focuses on both the advanced and traditional neurological monitoring techniques and the evaluation of such cases. Also the recent neurotherapeutic procedures are emphasized after discussing their scientific and medical bases in solving the different problems in different cases.

Stress is made on the common medical complications in the NICU, which are; the increases of intracranial pressure(ICP), decreases of cerebral blood flow(CBF), brain ischaemia, brain oedema, problems of ventilation and blood-gases disturbance, electrolytes & fluid disturbance, affection of brain metabolism, and other problems.

This essay is also prefaced by discription to the NICU environment and the admission & discharge criteria. Lastly the work has uses head injury, post-operative, and stroke as prototypes for intensive care; because they form the majority of cases which admit to the NICU; showing the role of NICU in their management.



Aim of the work

" Give instruction to a wise man....

and he will be yet wiser "

proverbs 9:9

Following this proverb: this work seeks to provide the practicing neurosurgeon with a data base enabling him to participate rationally in the treatment of acute neurologic disorders and to evaluate new concepts and techniques being directed toward neurosurgical patients.

Golbal view to NICU is built, then its important contribution to the care of neurosurgical patient is explained to make the concept of NICU clear.

Because no one can know about the neurosurgical patient more than the neurosurgeon; what a good result! can be reached if the neurosurgeon become also the intensivest in the intensive care of neurosurgery.

Review of Literature

Neurosurgical Intensive Care Unit Environment.

The critical element in establishing a NICU environment is not space and marter, but rather, the presence of a person with combind skills in neurologic, intensive care technique [445] and surgical interferance if urgent required. The enhanced monitoring capabilities associated with a neurologeic intensive care facility, do much to facilitate the recruitment of nursing personnel, also the central monitoring station with remote injection facilitate the nursing job [439]. The ordinary equipment for ICU are suction (vacum) machine, different types of respirators, D.C. cardioversion set, infusion pumps, near by emergancy laboratory. All are in controled temperture and humidity place. Currently, specialized NICU should probably be limited to designated regional care centers, each equipped with CT head scanner. Studies of therapeutic cost effectivness in these institutions should be performed prior to generalized expansion of these facilities.

Admission/Discharge Criteria.

Patients admitted to NICU usually have one or combination of the following abnormalities:

altered level of consciousness, fluctuating neurologic signs , inappropriate ventilatory capacity and/or a loss of air way protective reflexes. The most common admitting diagnosis are head injury, stroke, brain tumour, and post-hypoxic encephalopathy [48,83,445]. Admission may also be for immediate post-operative observation and stabilization. Less commonly encountered problems include spinal cord tumour and injury, status epilepticus, and various infections, metabolic and hypertensive encephalopathies.

Recovery from neurologic disorder is frequently prolonged compaired with other disease states requiring intensive supportive care. Acute intracranial disorder such as head injury, stroke, may require intensive care for one to three weeks before reaching a stabilized phase; there after an intermediate care facility providing a less intense but highly vigilant and supportive environment become more appropriated. In abscence of such facility discharge to surgical wards come over bed availability problems in the NICU [48].

C.N.S. Monitoring.

The CNS monitoring aims to detect *the abnormal neurological function by clinical examination *the condition of cerebral perfusion by BP _ CBF _ ICP.*neural electrcgenesis by EEG _ EP(Evoked potential) *and altered

metabolism and cellular damage by CMRO2 (cerebral oxygen consumption) [363,416,433] and electrolyts estimation [24,183,184,304].

Recording neurologic status.

Accurate continuing assessment and recording of clinical neurologic status has the first priority in NICU and neurologic examination remain the best tool for assessing progress and the future course [45,54,65,158,238,266,315] Following Jennett's [442] lead in Glasgow, a number of center have co-operated in evaluating the coma scoring in head injured patients [204,443]. The coma scoring system is very simple in design, required only recording of the best possible responses to vocal or noxious stimuli; as characterized by eye opening, verbalization, and motor activity. The Glasgow coma scale is an important tool for inter-institutional comparison

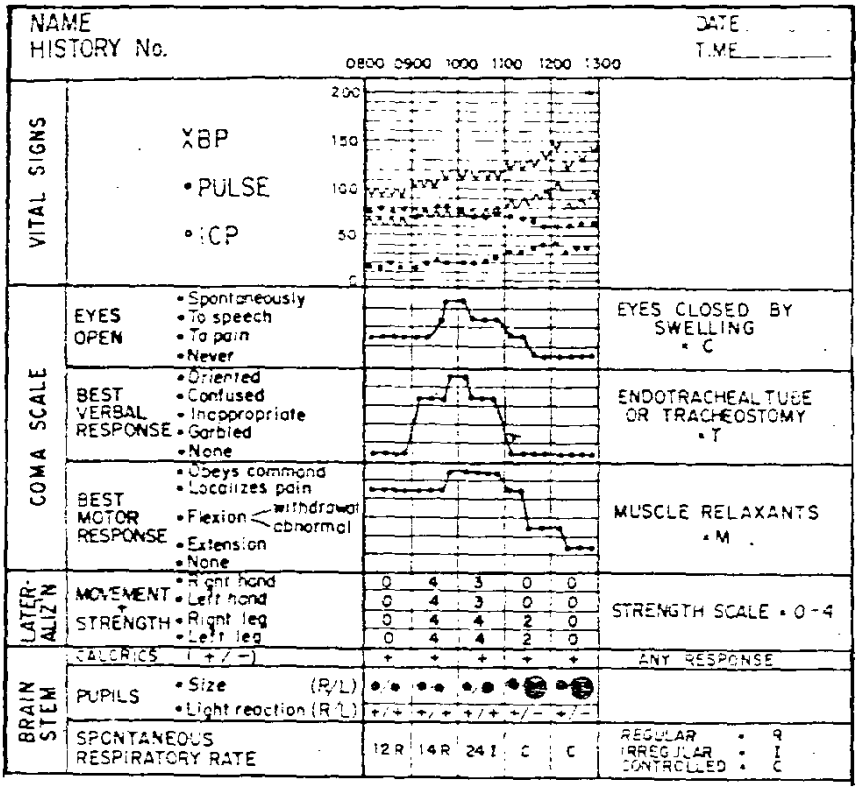
Glascow Coma Scale

Eye opening	open	spontaneously	4
		to verbal command	3
		to pain	2
	no response	no response	1
Best verbal response	oriented	oriented	5
	disoriented	confuses & converses	4
		inappropriate word	3
		incomprehensible sound	2
		no response	1
Best motor response	to verbal command	obeys	6
	to painful stimuli	localizes pain	5
		flexion withdrawal	4
		abnormal flexion (decorticate rigidity)	3
		extension (decerebrate rigidity)	2
		no response	1

The Glasgow coma scale dose not give enough picture of an individual's over all neurologic and medical status to give critical care management. The emergency room nursing personel should know the glasgow coma scale [442]. The physician in the emergency room can then add to the information obtained from glasgow coma scale to in include a complete eye response (with pupilary reflexs), verbal response, (and orientation) and motor response of arms, hands, legs and feet bilaterally (including anal tone). A specialist in NICU will assess the brain stem reflexs and may follow Maryland coma scale or the more complete scale of NICU the Sandiago coma scale which incorporate the glasgow coma scale in its neurologic status recording form for the quick evaluation.

Monitoring of I C P .

Nowadays it is common to monitor ICP. The most often used technique for monitoring of ICP are placement of intraventricular cathetar or a subarachnoid or epidural transducer bolt [29,55,57,82,132,277,361,367]. The subarachnoid bolt, or epidural transducer are more commonly used because of the very low infection rate. An other closed system is used mainly if the monitoring of ICP is needed after neurosurgical intervension for the post-operative care. This system includean Omaya reservoir through which an small butterfly needle can be inserted at any time when the ventricular fluid pressure (VFP) monitoring is required



Sandiago Coma Scale.

Which incorporate the glasgow coma scale in its neurologic status recording form for the quick evaluation [246].

[443] or when ventricular pressure response (VPR) is studied

《will explain in the role of NICU in post-operative care》

The indication of ICP monitoring :

- The comatose patient with glasgow coma score of 8 or less is a candidate for monitoring of ICP [29,55,57,132,361, 367].
- Patient treated by controlled ventilation (in order to compensate for the less of clinical signs resulting from the use of muscle relaxant)[291].
- In the immediately after neurosurgery particularly in situations where no decompressive procedure has been carried out e.g biopsy of brain tumour [27,212,336].
- Combination of appropriately timed CT scans and continuous ICP recording [202,225,268,438,439].
- Study of cerebral perfusion pressure (CPP) [225].
- Estimation of cerebral blood flow (CPF) and impending cerebral ischemia [130].

Whatever, the subarachnoid bolt, the intraventricular catheter or Omaya reservoir connected to butterfly needle or epidural aduptor and transducer are used, the device or the catheter is connected to pressure transducer mounted on the patient's head and connection is made by cable from this to a bed side monitoring unit consisting of an amplifier and chart recorder. In addition the series out-put of the pressure is sampled five times per second by a bed- side micoprocessor and display on a visual