TOXIC COMA DIFFERENTIAL DIAGNOSIS AND ITS MANAGEMENT

THESIS

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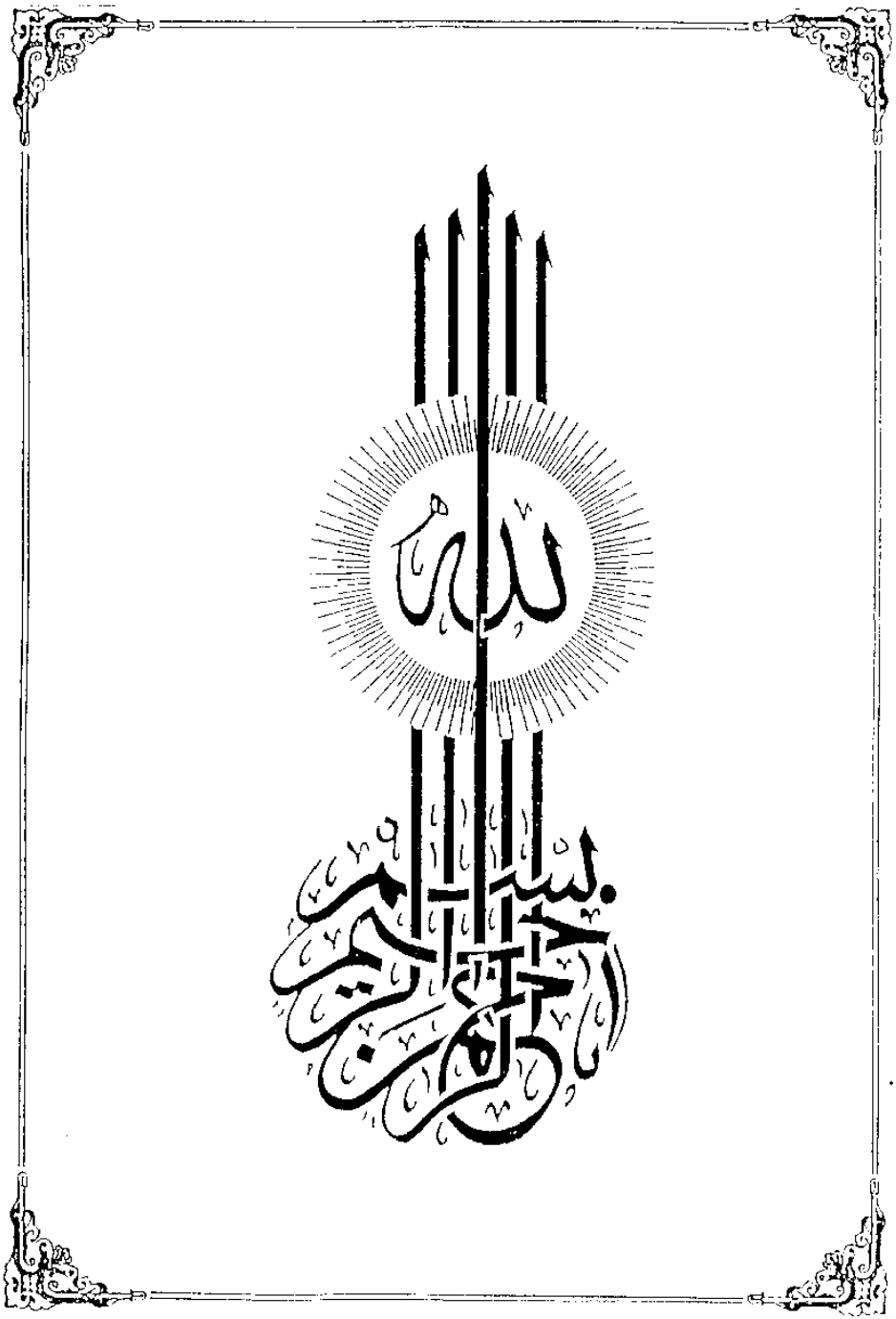

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C O N T E N T S

AIM OF THE WORK

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Coma of toxic origin is an increasingly growing problem, as a result of poisoning with CNS depressants, following either accidental or intentional exposures. It still remains one of the most common clinical emergencies which represent a critical problem that should receive atmost effective symptomatic and specific treatment as well as providing available laboratory facilities.

The present study aimed mainly towards emphasizing the importance of a rapid carefull diagnosis of toxic coma among other cases of coma and to through a light on the importance of early management of these acutely intoxicated patients.

The work also aimed to show the patterns and the availabilities of management undertaken by the P.C.U. of Ain-Shams University for patients in toxic coma.

REVIEW OF LITERATURE

STRUCTURAL COMPONENTS OF OF THE CENTRAL NERVOUS SYSTEM

Various structures of the nervous system regulate specific body functions or store specific information vital to the normal functioning of the body which when stimulated produce specific reactions within the body (Jones, 1985).

The brain is the largest part of the CNS, lies in the cranial cavity, surrounded by three meninges which are from without inwards: dura, arachnoid and pia matter (Romanes , 1984) . Five parts constitute the brain these are: cerebrum, cerebellum, mid-brain, pons and medulla oblongata.

The cerebrum, is the largest and most prominent part, it is divided into two massive cerebral hemispheres. Its outer surface layer is the cortex, it is a vast information-storage area, it is the site of conscious sensations and mental abilities, being the highest and most complicated and elaborate part of the CNS (Barr, 1974).

The sites of conscious sensations are divided into sensory, motor and association areas. The sensory areas receive information such as sight, hearing, touch and

pain, the motor areas relay the individual's responses to the appropriate muscles or by initiating body changes, the association areas convey both sensation and movements to the mental abilities areas for recognition and human interpretation (Jones, 1985).

The cerebellum lies below the posterior part of the cerebrum, separated from it by the falx or tentorium cerebelli (Larsell and Jansen, 1972). The cerebellum is the center of muscle coordination, equilibrium, muscle tone and maintenance of posture (Walton, 1982).

Anterior to the cerebellum, lies the midbrain, pons and medulla. The medulla contains the vital centers; the respiratory, vasomotor, cardiac centers and many important correlation centers (Adams and Sidman, 1968).

The thalamus is an oval mass of grey mater lying in the middle of the cerebrum. It serves as a center for impulses to and from the cerebral cortex. It can relay diffuse signals from the brainstem to all parts of the cortex or cause its generalised activation (Holmes, 1968).

On the thalamus' inferior surface lies in the subthalamus and the hypothalamus which controls the basic life functions as regulation of blood pressure body fluid balance, sleep-wake cycles, body temperature and hormonal secretions (Guyton, 1980).

CONSCIOUSNESS

Consciousness is a state characterised by awarness of self and enviroment and an ability to respond to enviromental factors (Plum and Posner, 1980).

It is also the condition of normal person when fully awake, who is responsive to psychologic stimuli and indicates by his behaviour and speech that he has awarness of himself and his enviroment (Adams, 1984).

Normal conciousness can be regarded as having two separate but closely inter-related components. The first of these is the arousal component of wakefulness, which relates to the physical manifestation of awakening from sleep as: open eyes and motor activity. The second is the content of consciousness which consists of the sum of the psychological functions of sensations, emotions and thoughts. (Cartlidge, 1985).

The content of consciousness can be regarded as being the sum of cognitive functions, thus, it is the cortex which mediates this aspect of consciousness i.e. the cerebral cortex is responsible for the awarness which do not depend on neuronal content, but also on the complexity of these neurons's connections (Hubel, 1979).

The normal level of consciousness depends upon the activation of the cerebral hemispheres by groups of neurons located in the brainstem which is "The reticular activating system" and that this system projects to the cortex and being responsible for the wakefulness component of consciousness (Swash, 1985).

This reticular activating system is best defined as physiologic system not an anatomic one. It is contained in the reticular formation. (Ropper and Martin, 1986). The reticular formation consists of loosely grouped neurons that extend from the spinal cord to the cerebral cortex, passing through the medulla, pons, midbrain and thalamus into the cortex. All sensory and motor pathways carrying impulses to and from the cerebral cortex give off branches into the reticular formation, which is consequently stimulated whenever information is being transmitted to and from the cortex (Jones, 1985).

The relay between the R.A.S. and thalamic and cortical areas is accomplished by neurotransmitters. Of these the influence of acetylcholine and norepincphrine on arousal is best established (Jouvet, 1972, Cooper et al., 1974). Cholinergic fibers connect the midbrain to other areas of upper brainstern, thalamus and cortex.

These pathways are thought to mediate the clinical and EEG arousal observed after administration of cholinergic drugs. (Defeudis, 1974). It is also suggested that monaminergic system plays an important role in sleep, arousal and coma. (Elliasson et al., 1972). Serotonin subserves a function in the regulation of sleep wake cycle, but still its role has not been clearly established (Costa et al., 1974, Ropper and Martin, 1986).

Definitions for Coma:

According to the Medical Research Council Brain Injuries Committee in 1941 "Coma is a state of absolute unconsciousness, as juged by the absence of any purposive logically understandable response to external stimuli or inner needs". Jennett in (1972) defined coma as "failure to open the eyes or to utter recognisable words in response to verbal or painful stimuli, coupled with inability to obey simple commands". Coma according to Plum and Posner 1980 "Complete unresponsiveness with eyes closed and no evidence of psychologically appropriate responses to stimulation". It was also briefly defined by Matthews in(1982)as "unarousable unresponsiveness", in deep coma even primitive avoidance reflexes may be absent, while in light coma some reflexes can be obtained.

Other definition, by Adams 1985, "The patient who appears to be asleep and is at the same time incapable of sensing or responding either to external stimuli or inner need is in a state of coma".

From all the previous definitions, it is concluded that they are all more or less the same and that coma is a state of unconsciousness that differs from syncope in being sustained and from sleep in being less easily reversed. (Brust, 1984).

The comatose patient differs greatly from a person in sleep in that this person may still respond to unaccustomed stimuli. So, he is arousable, and at times capable of some mental activities in the form of dreams, which leave their traces in memory (Cartlidge, 1985).

It is important to recognize that sleep and coma are physiologically quite different, sleep is an active physiological process whereas coma can be regarded as a negative phenomenon (Plum, 1980).

A patient in light coma might show sleep-wake cycles, this observation supports the view that in man, the control of sleep and awakening resides in the brainstem. (Cartlidge, 1985).

The term sleep describes two behavioural states which are:

- readily reversible loss of responsivity to environmental events and
- reversibility that differentiate sleep from other altered states of consiousness as coma and anasthesia (Mountcastle, 1979).

Two major schools thought about the causation of sleep: one of these believes that sleep is a passive process and occur when the neuronal mechanisms that cause wakefulness become fatigued, the other is that active centers in the brain transmit signals into the reticular activating system to inhibit it and thus causing sleep. So it is passive inhibition in the first and active one in the second. (Petre-Quadens, 1974, Schmidt, 1975).

Difference between sleep and coma

Sleep shares with coma in a number of features like: closure of eyelids, cessation of blinking and swallowing, upward deviation or divergence or roving movement of the eyes, loss of muscular tone, decrease or loss of tendon reflexes and [illegible] Babinski sign, irregular respiration, and even Cheyne-Stokes in type and occasionally incontenence of urine