NEUROSURGICAL DISORDERS

DURING PREGNANCY

THESIS

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BY

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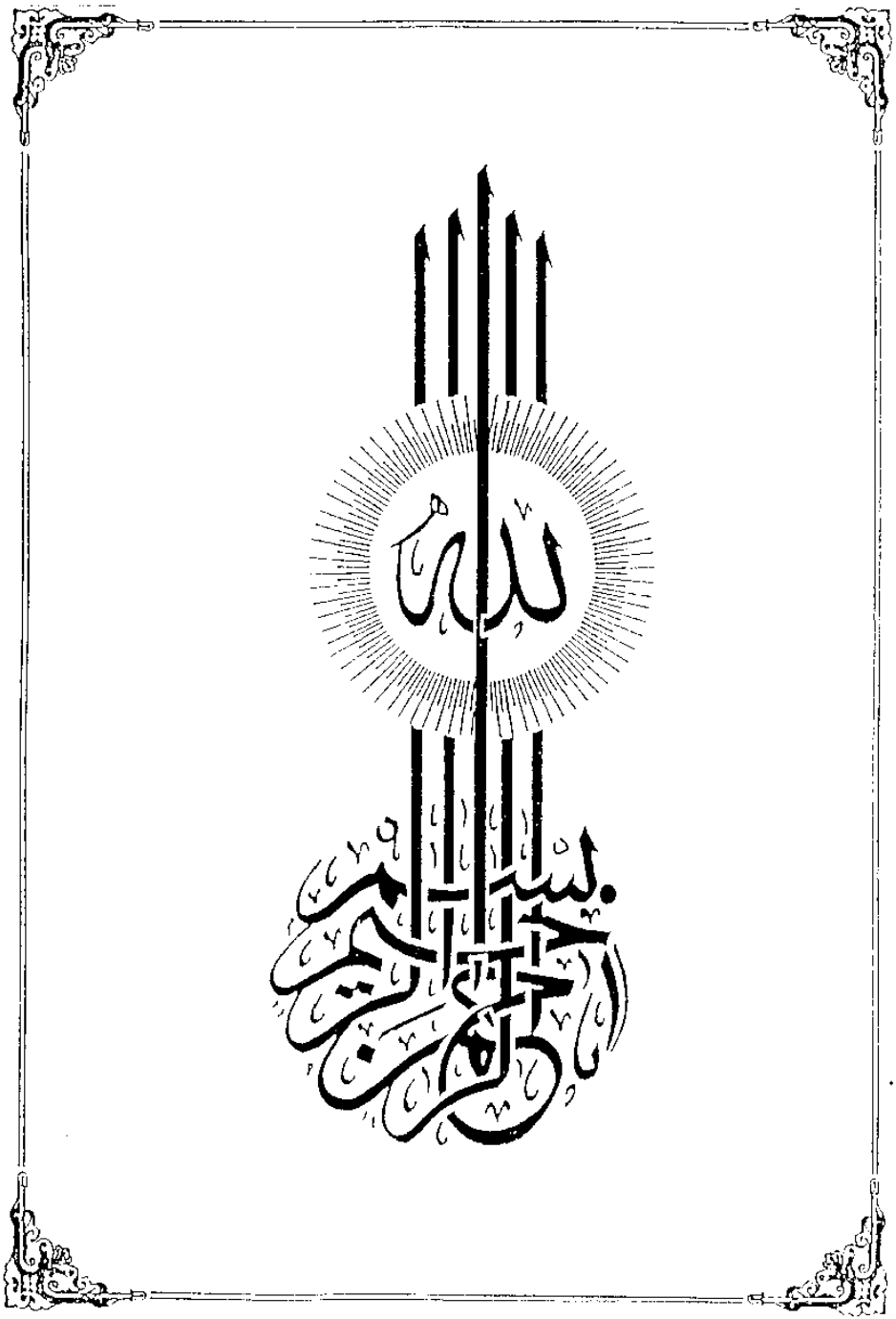

To

My Mother

My Wife

and my Sons , Mohamed and Mostafa .

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ANATOMICAL AND PHYSIO-LOGICAL ALTERATIONS DURING PREGNANCY.

ANATOMIC AND PHYSIOLOGIC ALTERATIONS OF PREGNANCY THAT MODIFY THE RESPONSE TO TRAUMA AND DISEASE

Pregnancy is associated with marked physiologic and anatomic changes in nearly every system of the body. Although these alterations are normal and necessary to meet the needs of the developing foetus and prepare the mother for parturition, their manifestations may resemble changes that in the nonpregnant women would be indicative of pathologic states. Furthermore, the altered physiologic and anatomic relationships may change the pattern of injury or disease, and in many instances necessitate modification of therapy, Finally many laboratory values are altered by the physiologic state of pregnancy . Therefore , the physician attending a pregnant trauma and / or disease victims must keep in mind several complicating factors including the following :

1. The fact that the patient is pregnant may alter the pattern or severity of injury .
2. The pregnancy may alter the signs and symptoms of the injury or the disease and the results of laboratory tests used in diagnosis.
3. The management of the trauma or disease victim needs to be mobified to accomodute and preserve the physiologic changes induced by pregnancy .
4. The injury may have initiated or have been complicated by pathalogic conditions peculiar to pregnancy (e.g. abruptio

placentae, amniotic fluid embolism, ruptured uterus), or apregnancy related disease may occur coincidental to trauma or other disease and thus complicate the diagnosis and therapy (e.g. eclampsia complicating possible head injury .) Dwight , 1979.

1. CARDIOVASCULAR SYSTEM :

A) Cardiac out put : It is of great importance to avoid what is known by Supine hypotension syndrome . In this syndrome some of the pregnant females develop profound hypotension when they assumes the supine position . In this position , the inferior vena cava is almost completely occluded by the enlarged uterus Kerr et al., 1964. This syndrome is completely alleviated by turning to the lateral position Lees et al., 1967.

That is why the pregnant trauma/ or diseased victim should be kept on her left side whenever possible during diagnostic and therapeutic proceedures. When this is impossible as during labarotomy, the uterus should be displaced to the left of the inferior vena cava, using uterine displacer ba attached to the operating table . If this is not available , the table should be tilted 15 to 20 degree to the left, or folded sheets should be placed under the patient's right hip and flank to rotate her body to this

extent. Dwight , 1979.

B) Heart rate : Pregnancy is associated with physiological tachycardia reaching in late pregnancy 80-90/ min, Hytten, 1973.

C) Blood pressure : Blood pressure greater than that of the non pregnant levels is never normal during pregnancy and signifies either apossible pregnancy complication like toxaemia or a response to stress like anxiety or trauma, Dwight ,1979.

D) Venous pressure : There is progressive rise in venous pressure in the legs secondary to compression of the inferior vena cava by the enlarged uterus. However the central venous pressure shows progressive fall during pregnancy, Colditz et al., 1970.

E) Peripheral blood flow : The pregnant female reactsto stress and noxious stimuli with peripheral vasodilatation and not vasoconstriction as in the non pregnant state , so nevertheless a pregnant woman in shock , may not necessarily have cold clamy skin specially during the first trimester, Dolezal 1965.

F) Volume and composition of blood :

1. Plasma and erythrocyte volume .

During pregnancy , plasma volume increases progessively and there is marked increase in the erythrocyte volume, " Hytten and Lind 1973 " . Because the increase in plasma volume is proport-

ionally greater than the increase in erythrocyte volume, the haemotocrit falls some what, the so called physiological anaemia of pregnancy . The pregnancy induced hypervolumia ranges from 20-100% of the non pregnant blood volume "Pritchard 1965" This has two important implications . The protective effect of this hypervolumia allows some gravida to loose 30-35% of their blood before symptoms and signs like hypotension develop "Marx 1965" . On the other hand , it may be necessary to replace massive amounts of blood or fluids or both to a pregnant woman in shock before vital signs return to normal . Monitoring central venous pressure is most helpful in these situations.

2. Red blood indices :

The mean values for haematocrit and haemoglobin are 36% and 12 gm% respectively . "Pitki , 1977".

3. Leucocytic indices :

Pregnancy induces leucocytosis up to 18,000/ Cu. m.m. and during labour , it reaches 25,000/Cu.,m.m "Mitchell 1966" and mostly due to increase in neutrophils number (75%) while the proportion of lymphocytes declines by 10-15% " Andrews 1951".

Coaggulation factors :

There is elevation of concentration of fibrinogen, factor VII, VIII, IX and X while factor II and V remain essentially unchanged Todd et al., 1965.

Bleeding , Clotting and prothrombin time remain unchanged in pregnancy, Margulis 1956 and Todd et al., 1965.

It is difficult to demonstrate increased incidence of spontaneous venous thrombosis during pregnancy, but there is a definite increase of this thrombosis in the immediate post-partum period , so pregnancy perse does not necessitate the use of prophylactic anticoaggulant in cases of prolonged recumbency of pregnant females e.g. during trauma or diseased state, However , when it is decided that a pregnant female should receive anti-coaggulants, the agent of choice is heparin, which does not cross the placenta. The oral anti-coaggulants cross the placenta and have been implicated in teratogenesis. If trauma leads to abruptio placentae or amniotic fluid embolism, the patient may develop a rapidly progressive and severe defi-brination syndrome " D.I.C. ". The management of this situation consists of supportive therapy with fresh blood , fresh frozen plasma or others and delivery as efficaciously as possible , will resolove this syndrome promptly. The use of heparin is not benificial here . If a traumatic lesion necessitates prolonged bed rest in a patient immediately in her post-partum period, serious consideration should be given to the prophylactic use of subclinical doses of heparin, Mc Kay , 1974.

Serum osmolality and plasma proteins :

There is overall fall in total plasmaproteins by about 1gm% and it is due to fall in plasma albumin concentration and this leads to fall in the colloid osmotic pressure, De Alvarez et al., 1961 and Robertson , 1969 .

Erythrocyte Sedmentation rate :

Due to increased fibrinogen level and alpha- and beta-globulin level , the E.S.R. is increased from 44-114 mm/ hr. Furuhjelm, 1956 . So it is of little or no value in the diagnosis during pregnancy .

Pulmonary system :

The diaphragm is elevated about 4 cm during late pregnancy Thomson , 1938 while it's excursion is increased by 1-1.5 cm. The tidal volume is increased by 40% , minute ventilation is progressively increased , while there is progressive decrease in expiratory reserve volume and the residual volume. The respiratory rate remains unchanged, while the sensitivity of respiratory centres are greately increased. Hytten , 1973 and Prowse , 1965 .

Gastrointestinal system :

Gastric emptying time is prolonged due to reduced gastric motility , so if surgery is indicated , it should be always assumed that the patient has a full stomach . Therefore, a naso-

gastric tube is necessary and essential prior to any surgery and if a general anaesthesia is undertaken a cuffed endotracheal tube should always be used with cricoid pressure during intubation to prevent aspiration of gastric contents , Dewight, 1979.

The diminshed intestinal motility has little significance in clinical practice,Dewight , 1979.

Liver enzynes S.G. O. T. and S.G.P.T. and L.D.H. remain unchanged but alkaline phosphatase progressively increases up to 82 ± 35 I.U./L Bodansky method. In preeclampsia, levels of 132 ± 49 I.U. are found . It is due to the secretion of alkaline phosphatase of placental origin Dewight , 1979.

Pancrease :

Shows reduction in the Lipase level but no change in the level of amylase, Dwight , 1979.

URINARY SYSTEM

* Creatinin clearance : Rises to about 150-100 ml/min Hytten 1973.

* Serum Creatinin : Falls from a mean of 0.8 mg% in the first trimester to 0.5mg% in late pregnancy " Kuhlback , 1966 .

In pregnancy complicated by pre-eclampsia, clearance of creatinin falls, while serum creatinin rises.

* Urine analysis :

All pregnant women have an increased amount of glucose in urine, some-times could be detected by the usual method in urine. Amino acids excretion is also increased , but unless the pregnant female has a renal disease or toxaemia of pregnancy, protein excretion remainsunchanged from the non pregnant state , Hytten 1973 . Also leucocytes excretion is increased, so the presence of small number of leucocytes does not signify renal disease nor injury during pregnancy . In contrary, the presence of R.B.Cs is indicative of renal disease or urinary tract injury . The rate of urine formation is increased because of the augmented load of excretory products Dwight , 1979.

ENDOCRINE SYSTEM

* Pituitary gland, hypertrophies due to oestrogen induced proliferation of lactotrophic cells of anterior pitictary, while the posterior lobe increases its activity only. This hypertrophy is dependent on agreatly increased blood flow . If the pregnant woman get hypotension, the anterior pituitary may undergo ischemic necrosis, and when hypotension becomescorrected haemorrhage may occur inside the gland resulting in Sheehan's syndrome, which is the most common non neoplastic causes of hypopituitarism.

Depending on the magnitude and duration of such hypotension, part or all of anterior pituitary will be lost. The most sensitive hormone and the first to be affected is gonadotrophins. followed in ordered by G. H. , T.H., A.C.T.H. and lastly prolactin . The lesser degree of hypotension can cause hypogonadotrophic amenorrhea, while greater degree may cause panhypopituitarism. Early signs of Sheehan's syndrome in the puerperium are failure of lactation and failure of regrowth of pubic hair . This shows the great importance of prevention and / or prompt treatment of hypotension, Dwight , 1979.

Also , there is hyperplasia of thyroid and parathyroid glands while, there is enlargement and increased activity of adrenal cortex. Other hormonal changes during pregnancy, include human chorionic gonadotrophins, thyrotropins and somatomammotropins all of them secreted by the placenta. There is also marked increase in the level of oestrogen and progestrone,Robert et al., 1977.

MUSCULO-SKELETAL SYSTEM

The regid pelvis becomes more flexible due to laxity of its ligaments. The concentration of ionized calcium remains unchanged. Dwight , 1979.