Fluid Balance During Cardiopulmonary Bypass

Essay

Submitted for the Partial Fulfillment of the Master Degree in Anaesthesiology and Intensive Care

By

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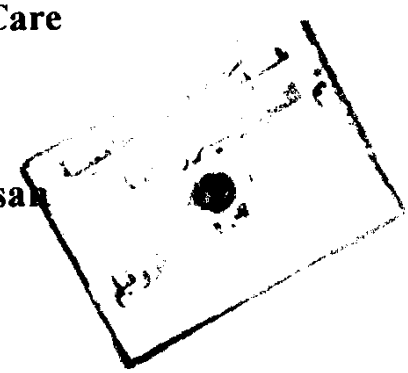

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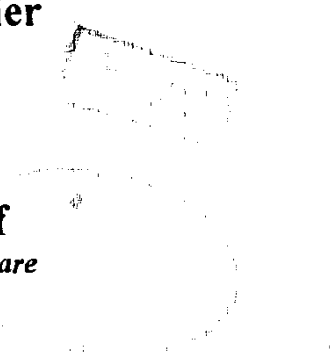

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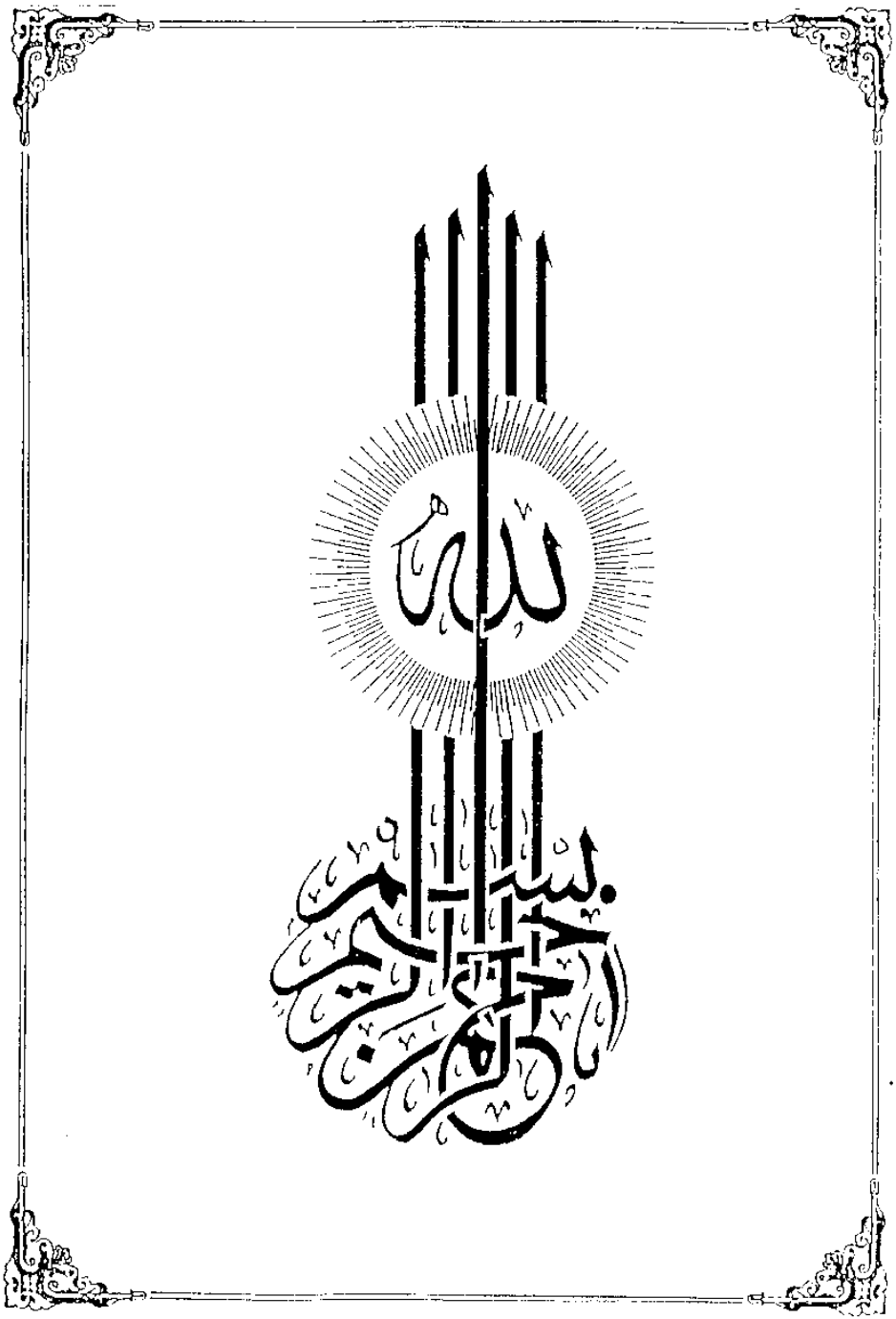

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M. Essam

To My Family

Contents

List of Figures

List of Tables

Introduction

Introduction

During cardiopulmonary bypass there exist some fluid shifts as a result of certain pathophysiological changes occurring during this period with subsequent interstitial fluid accumulation leading to postoperative weight gain together with organ oedema that may be more pronounced in some organs than in others altering their function.

The patient's preoperative type of cardiac disease and cardiac status may have a profound effect on fluid accumulation.

The proper preparation of fluids used during bypass together with accurate calculation of the amount of gained and lost fluids during bypass may lessen fluid accumulation, decreasing the incidence of using diuretics or oncotic agents postoperatively, and most important preventing organ dysfunction.

Physiology of Body Fluids

Physiology of body fluids

Organisation of the body:

The cells that make up the body bathed in an internal sea of fluids which is the extra cellular fluid (ECF). From this fluid, the cells take up O_2 and nutrients, and discharge metabolic waste products ***(Rose, 1989).***

Concerning the body fluids, the body is divided into two main compartments, intracellular and extracellular, the later is subdivided into interstitial and intravascular represented by circulating plasma volume, the interstitial fluid is the part of ECF outside the vascular system, bathing the cells ***(Ganong, 1993).***

Size of the body fluid compartments:

About one-third of the total body water (TBW) is extracellular, while the remaining two-thirds are intracellular. In the average, TBW represents about 60% of the body weight. The intracellular compartment accounts for about 40%, and the extracellular for 20% of the body weight, being divided into 15% represented by interstitial fluid, and 5% by the plasma volume. This distribution is shown in Fig. (1) ***(Arieff and Defronzo, 1985).***

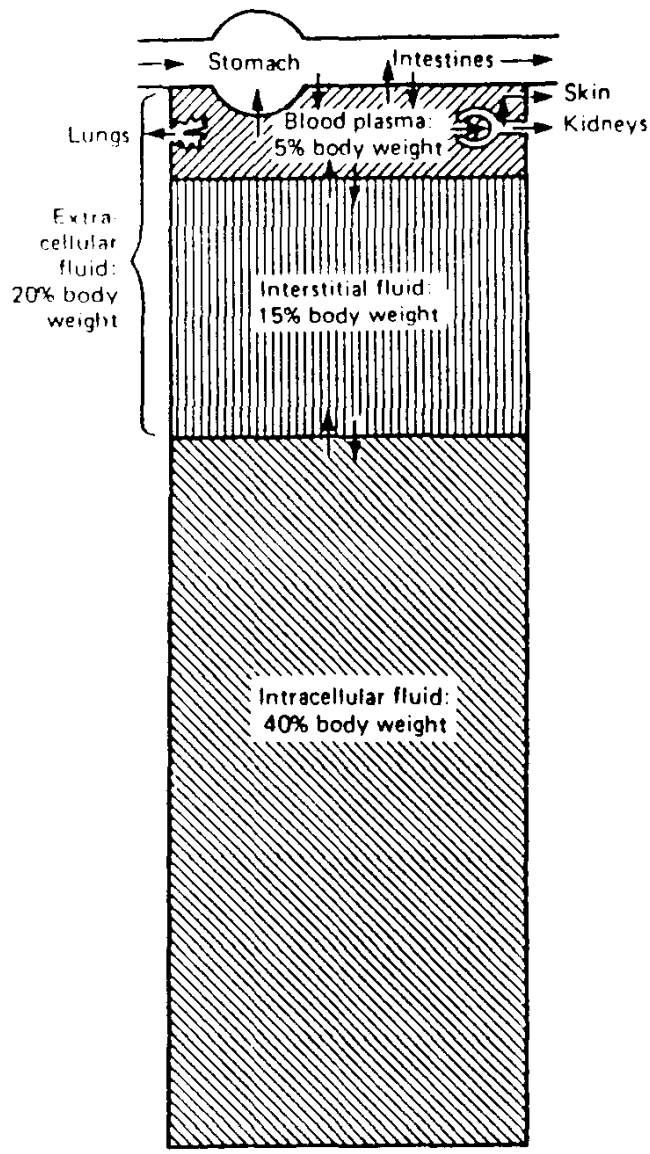

Fig. (1):

Distribution of body fluid compartments.

(Ganong, 1993)

The water content:

The water content of lean body tissue is constant at 71-72 ml/100 gm of tissue, but since fat is relatively free of water, so the ratio of TBW to body weight varies with the amount of fat present, in young male water constitutes about 60% of body weight. These values are some what lower in females, and decrease in both with age ***(Guyton, 1992).***

Total body water and water balance:

Water balance is determined by the difference between water intake as influenced by thirst, habit and availability, and water loss through cutaneous, pulmonary, gastrointestinal and renal routes as shown in table (1) , that if the intake exceeds the losses, the total body water increases and water balance will be positive, but the excess water will be distributed in such a manner to give a steady state, that one-third ECF and two thirds intracellular ***(Arieff and Defronzo, 1985).***

Gains	Drink	1200 ml
	in food	1000 ml
	from oxidation	300 ml
	Total	2500 ml
Losses		
1. Unavoidable	Expired air	400 ml
	Faeces	100 ml
	Skin	300 ml
	Urine (obligatory)	500 ml
2. Avoidable	Free urine	1200 ml
	Total	2500 ml

Table (1): Daily gains and losses

(Arieff and Defronzo, 1985).