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ASSIGNMENT

1. Discuss the pathophysiological process involved in renal failure (Chronic Kidney Disease)

When discussing the pathophysiology of CKD, renal structural and physiological characteristics, as well as the principles of renal tissue injury and repair should be taken into consideration.

Firstly, the rate of renal blood flow of approximately 400 ml/100g of tissue per minute is much greater than that observed in other well perfused vascular beds such as heart, liver and brain. As a consequence, renal tissue might be exposed to a significant quantity of any potentially harmful circulating agents or substances. Secondly, glomerular filtration is dependent on rather high intra- and transglomerular pressure (even under physiologic conditions), rendering the glomerular capillaries vulnerable to hemodynamic injury, in contrast to other capillary beds. In line with this, Brenner and coworkers identified glomerular hypertension and hyperfiltration as major contributors to the progression of chronic renal disease. Thirdly, glomerular filtration membrane has negatively charged molecules which serve as a barrier retarding anionic macromolecules. With disruption in this electrostatic barrier, as is the case in many forms of glomerular injury, plasma protein gains access to the glomerular filtrate. Fourthly, the sequential organization of nephron’s microvasculature (glomerular convolute and the peritubular capillary network) and the downstream position of the tubuli with respect to glomeruli, not only maintains the glomerulo-tubular balance but also facilitates the spreading of glomerular injury to tubulointerstitial compartment in disease, exposing tubular epithelial cells to abnormal ultrafiltrate. As peritubular vasculature underlies glomerular circulation, some mediators of glomerular inflammatory reaction may overflow into the peritubular circulation contributing to the interstitial inflammatory reaction frequently recorded in glomerular disease. Moreover, any decrease in preglomerular or glomerular perfusion leads to decrease in peritubular blood flow, which, depending on the degree of hypoxia, entails tubulointerstitial injury and tissue remodeling. Thus, the concept of the nephron as a functional unit applies not only to renal physiology, but also to the pathophysiology of renal diseases. In the fifth place, the glomerulus itself should also be regarded as a functional unit with each of its individual constituents, i.e. endothothelial, mesangial, visceral and parietal epithelial cells - podocytes, and their extracellular matrix representing an integral part of the normal function. Damage to one will in part affect the other through different mechanisms, direct cell-cell connections (e.g., gap junctions), soluble mediators such as chemokines, cytokines, growth factors, and changes in matrix and basement membrane composition.

The main causes of renal injury are based on immunologic reactions (initiated by immune complexes or immune cells), tissue hypoxia and ischaemia, exogenic agents like drugs, endogenous substances like glucose or paraproteins and others, and genetic defects. Irrespective of the underlying cause glomerulosclerosis and tubulointerstitial fibrosis are common to CKD.

An overview of the pathophysiology of CKD should give special consideration to mechanisms of glomerular, tubular and vascular injury.

1. With the aid of suitable diagrams, discuss the types of dialysis you know.

There are two types of dialysis:

1. Peritoneal dialysis:



There are 2 types of peritoneal dialysis:

Continuous Ambulatory Peritoneal Dialysis (CAPD)
Automated Peritoneal Dialysis (APD)
The basic treatment is the same for each. However, the number of treatments and the way the treatments are done make each method different.

CAPD is "continuous," machine-free and done while you go about your normal activities such as work or school. You do the treatment by placing about two quarts of cleansing fluid into your belly and later draining it. This is done by hooking up a plastic bag of cleansing fluid to the tube in your belly. Raising the plastic bag to shoulder level causes gravity to pull the fluid into your belly. When empty, the plastic bag is removed and thrown away.

When an exchange (putting in and taking out the fluid) is finished, the fluid (which now has wastes removed from your blood) is drained from your belly and thrown away. This process usually is done three, four or five times in a 24-hour period while you are awake during normal activities. Each exchange takes about 30 to 40 minutes. Some patients like to do their exchanges at mealtimes and at bedtime.

APD differs from CAPD in that a machine (cycler) delivers and then drains the cleansing fluid for you. The treatment usually is done at night while you sleep.

1. Hemodialysis:



Hemodialysis cleans the blood by cycling your blood through a machine that removes waste and toxins. It then returns the blood to your body.

* Hemodialysis requires an access portal created by a surgeon. A permanent portal requires minor surgery, usually in your arm, to connect an artery and a vein. The access will be ready in a few weeks to a few months, depending on the type of portal.
* We can place the hemodialysis access portal via any available artery and vein. Our surgeons evaluate you to determine the best placement for the access portal.
* The surgical procedure to place the catheter or access takes approximately 1 to 1.5 hours.
* While you wait for your permanent access, you may have a temporary catheter (tube), often in your neck. Some people on shorter-term dialysis only have temporary access. It is very important to follow the guidelines to keep your catheter clean to avoid dangerous infections.
* A dialysis machine and a special filter wash away waste products from your blood and then return the blood to your body.
* You usually will receive dialysis in a clinical setting, such as a hospital or dialysis clinic. Most patients come to a dialysis clinic 3-5 times a week.