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Case Study, Chapter 53, Assessment of Kidney and Urinary Function

1. George Wright, 63 years of age, is admitted in same-day surgery for a renal angiogram for the diagnosis of renal artery stenosis. (Learning Objective 5)

a. What patient education should the nurse provide to the patient?
    a. The patient should be educated on his diagnosis, renal artery stenosis. This diagnosis is the hardening or narrowing of the arteries that supply blood to one or both kidneys, likely due to plaque build up. This disease is caused by poor diet and lack of exercise. It could also be caused by a less common vascular inflammatory condition know as vasculitis. Growths may also be present on the kidneys that compress the arties and restrict blood flow.
    b. The nurse should inform the patient that contrast dye will be inserted through an IV catherter to view the vessels more clearly in an x-ray. The patient's allergies should be thoroughly reviewed beforehand. There are minimal complications involved, but thoses risks include bleeding, clots, swelling, infection, kidney failure, and arterial wall damage

b. What preparation should the nurse provide for the patient who is going for a renal angiogram?
    a. We will ask that you fast for 12 hours before the procedure if possible. All medications, allergies, and medical history will be reviewed for the your safety. If you are feeling overwhelmed r anxious, we can provide you with a medication to ease your nevers, but we must first thoroughly explain the procedure and review the consent form. You should prepare to spend 24 hours in the hospital, but if all goes well, you may be discharged early.
    b. The procedure will be very quick. We will remove all cothing and jewelry and you will be provided with a gown. We will ask that you empty your bladder before the procedure. You will lie flat on a table while IV contract is given through your IV site. You will be monitored similtanously with an EKG and vitals machine. The radiologist will then chose a limb with the strongest pulse to insert the catheter. A nurse will shave your graion and the radiologist will insert a needle into an artery in groin, advance the catheter, and insert the dye in an artery near the renal arteries. You may feel faint or nauseous at this point, but it will pass in minutes. X-rays will be taken with the dye in place, the

radiologist will remove the catheter and you will return to your room for recovery.

Resources:

Hinkle, Janice L., and Kerry H. Cheever. *Brunner & Suddarths Textbook of Medical-Surgical Nursing*. Wolters Kluwer, 2018.

"Renal Angiogram." *Renal Angiogram | Johns Hopkins Medicine*, www.hopkinsmedicine.org/health/treatment-tests-and-therapies/renal-angiogram.

2. Laura is a new graduate nurse who has accepted a position on a medical ward that has a high percentage of patients with hypertension. In preparation for caring for these patients, Laura decides to review aspects of blood regulation, including the kidney's renin--angiotensin system. (Learning Objective 2)

a. What does Laura learn in reviewing the role of the vasa recta in blood pressure regulation?
    a. The vasa recta is a network of small capillaries located in the medulla of the kidneys. The vasa recta are highly permeable structures to solutes and water, and play a large role in removing these fluid from the medulla. The vesa recta functions as a "countercurrent exchanger" that is constantly removing water from the kidneys. Remvoing this excess waters plays a vital role in the kidneys job as a fluid regulator for the body. If the water were left in the body, the body would go into fluid overload, leading to hypertension, edema, congestive heart failure and many other things. Without the detailed control of the vasa recta fluid may be lost excessively, leading to fluid deficit resulting in hypotension. The fluid management seen by vasa recta is essential for controlling blood pressure.

b. What is the physiologic reaction in the kidney to a decrease in blood pressure?
    a. Kidneys work to maintain homeostatsis in the body. When the body goes into hypotension, the kidneys work to compensate. Cells known as juxtoglomerular cells monitor blood pressure and when the sense the blood pressure is too low, the trigger a release of reninwhich sets of a chain reaction in the body. The body converts renin into two forms; Angiotensin I and Angiotensin II.

c. How does angiotensin II affect blood pressure?
    a. Angiotensin II sends a signal telling blood vessels to constrict. It also signals for a release of of aldosterone, which tells the kidneys to absorb more sodium and fluids, increasing blood

volume. Now, with smaller and vessels and more volume the blood pressure should begin to increase.

d. How does the adrenal cortex function in conjunction with the kidney to increase blood pressure?
    a. The adrenal glands, located above the kidneys, are responsible for the production of multiple hormones. Most importantly in this scenario, aldosterone. As we learned previously, aldosterone is responsible for telling the kidneys to hold on to sodium and water rather than releasing them in the urine as water. This causes an increase in volume in the blood, increasing blood pressure.

Resources:

Hinkle, Janice L., and Kerry H. Cheever. *Brunner & Suddarths Textbook of Medical-Surgical Nursing*. Wolters Kluwer, 2018.

Nall, Rachel. “Two Ways That the Kidneys Maintain Homeostasis.” *Healthfully*, 24 Dec. 2019, healthfully.com/two-ways-that-the-kidneys-maintain-homeostasis-6622262.html.

“Vasa Recta.” *Vasa Recta - an Overview | ScienceDirect Topics*, www.sciencedirect.com/topics/veterinary-science-and-veterinary-medicine/vasa-recta.