13 — The Adrenal Glands

ANSWERS: CHAPTER 13

MATCHING

1. d 3. b 5. c
2. e 4. a

IMAGE LABELING

1A. Zona glomerulosa
1B. Zona fasciculata
1C. Zona reticularis
1D. Cortex
1E. Medulla
2A. Right adrenal gland
2B. Perinephric fat
2C. Right kidney
2D. IVC
2E. Aorta
2F. Left kidney
2G. Perinephric fat
2H. Left adrenal gland
3A. Right kidney
3B. Liver
3C. IVC
3D. Aorta
3E. Right adrenal gland
4A. Spleen
4B. Left kidney
4C. Left adrenal gland
4D. Aorta
4E. IVC
4F. Liver
4G. Pancreas

MULTIPLE CHOICE

1. a 6. b 11. a 16. b
2. c 7. b 12. d 17. a
3. c 8. d 13. c 18. d
5. c 10. b 15. c 20. a

FILL-IN-THE-BLANK

1. Endoscopic; intraoperative
2. Medulla; cortex; capsule
3. Larger
4. Anterior; medial; superior
5. Gerota’s or renal; adipose
6. 90; cortisol; estrogen; androgen
7. Negative feedback; Low; CRH; ACTH
8. Catecholamine; thyroid; posterior pituitary; chromaffin; pheochromone
9. 3 to 6; 2 to 4; 3 to 10
10. Superior; lateral; lateral; lateral; posterolateral
11. Retroperitoneal fat line; IVC; right renal vein; inferiorly; posteriorly

12. Anteriorly; inferiorly; posteriorly
13. Newborns; calcifications
14. Addison’s; ACTH; skin
15. Waterhouse-Friderichsen syndrome; pneumococcal; meningococcal; gram negative
16. Incidentaloma; adenomas; metastases
17. MEN; multiple; Cushing’s
18. Steroids; hemorrhage; necrosis; adrenal; IVC; lymph nodes
19. Hypertension; headaches; sweating; tachycardia; catecholamine
20. 4th; bilateral; IVC; inferiorly

SHORT ANSWER

1. Ultrasound may be used in pregnant patients and children in whom radiation exposure is a concern. Patients with MEN syndrome who will receive multiple screening examinations might also be candidates for sonography. Patients with limited retroperitoneal fat might not image as well with CT and may be candidates for sonography. Indications for sonography of the adrenal glands include evaluation for the presence of metastases, extent of tumor invasion, characterization of cystic and solid masses, adrenal hemorrhage, patency of the local vasculature and IVC, and hypertrophy of the glands.

2. Addison’s disease is most commonly caused by idiopathic atrophy of the adrenal glands. This may also be caused by an autoimmune disorder, infection, or tuberculosis. Symptoms include hyperpigmentation of the skin, sodium and potassium retention, impaired renal function, fever, fatigue, muscle weakness, hypotension, and gastrointestinal distress.

3. Hypersecretion of cortisol from the adrenal cortex causes Cushing’s syndrome. The most common cause is long-term use of steroids. Hypersecretion of ACTH by the pituitary gland can also cause Cushing’s disease. Functional tumors such as adenomas or adenocarcinomas may also cause the disease. Symptoms include elevated serum glucose levels, which lead to diabetes. Protein loss, weakened muscles and abdominal tissue, poor wound healing, hyperpigmentation of the skin, osteoporosis, and hypertension may also occur.

4. An incidentaloma is an unexpected mass that is found during an imaging procedure. The patient’s history and symptoms determine how the incidentaloma is evaluated. In patients with a history of malignancy, an adrenal incidentaloma may represent metastases. In patients without a history of malignancy, they typically represent adenomas, although they could also represent cysts, myelolipomas, pheochromocytomas, or adenocarcinomas.
IMAGE EVALUATION/PATHOLOGY

1. The mass is superior to the right kidney. The perinephric fat line separates this mass from the right kidney, indicating that the mass is extrarenal.

2. The lesion seen in this image is anechoic with well-defined borders and good through transmission consistent with a simple cyst. Cysts of the adrenal gland are typically asymptomatic and found incidentally during an examination of the abdomen. Cysts with a “ring” calcification are most often malignant and should be investigated further.

3. The mass is a well-defined, hyperechoic solid mass. The mass is superior and medial to the right kidney in the location of the right adrenal gland. Due to the echogenicity of the mass, it is likely a myelolipoma.

4. The mass is a solid, hypoechoic, homogenous mass with well-defined borders, which is typical of an adrenal adenoma. Adenomas are usually asymptomatic but may be functional, in which case they cause Cushing’s syndrome or hypercortisolism.

CASE STUDY

1. The mass is a large, well-defined, hypoechoic solid mass. An echo interface can be seen between the mass and the liver as well as between the mass and the right kidney. The mass is located superior and medial to the right kidney, leading to a diagnosis of an adrenal mass based on its location. The contralateral adrenal gland should also be evaluated closely because most adrenal metastases are bilateral.