California Tumor Tissue Registry's
Subscription "C" - Vol 1(2)
October, 2007

"Pathology of the Adrenal Gland"

Note: Please fill out the answer sheet on our web site (www.cttr.org), or fax a copy of the included answer sheet to 909-558-0188. In approximately 4-6 weeks, diagnoses will be posted at www.cttr.org. They will also be on the next months DVD.

Case 1

69 y/o man was hospitalized for 10 days with complaints of easy fatigability. He had dry skin with pigmentation over the lower legs and some cracking of the skin of the lower abdomen. Na 129 mEq, K 4.5 mEq. Work up found chronic active hepatitis, ateriosclerotic heart disease, chronic renal disease, and early COPD. He died 2 months after discharge of apparent cardiac arrest following a femoral arteriogram to evaluate lower extremity vascular insufficiency.

Autopsy: Both adrenal glands were enlarged to 5 cm and appeared completely replaced by tumor. Each weighed 30 grams. There was no infiltration of surrounding tissue. Mets were not seen.

Dx: Adrenal histoplasmosis - Addison's syndrome

Mukherjee JJ; Villa ML; Tan L; Lee KO. Bilateral adrenal masses due to histoplasmosis. J Clin Endocrinol Metab 2005 Dec;90(12): p6725-6

Heninger E; Hogan LH; Karman J; Macvilay S; Hill B; Woods JP; Sandor M. Characterization of the Histoplasma capsulatum-induced granuloma. J Immunol 2006 Sep 1;177(5): p3303-13

Al-Agha OM; Mooty M; Salarieh A. A 43-year-old woman with acquired immunodeficiency syndrome and fever of undetermined origin. Disseminated histoplasmosis. Arch Pathol Lab Med 2006 Jan;130(1): p120-3

Thompson GR; La Valle CE; Everett ED. Unusual manifestations of histoplasmosis. Diagn Microbiol Infect Dis 2004 Sep;50(1): p33-41

Chamany S; Mirza SA; Fleming JW; Howell JF; Lenhart SW; Mortimer VD; Phelan MA; Lindsley MD; Iqbal NJ; Wheat LJ; Brandt ME; Warnock DW; Hajjeh RA. A large histoplasmosis outbreak among high school students in Indiana, 2001. Pediatr Infect Dis J 2004 Oct;23(10): p909-14

Case 2

An 88 y/o Hispanic woman had a 5 mo hx of diminishing mental status and anorexia following a cholecystectomy. Past history included pernicious anemia treated with B12 injections. Upon admission she was found to be in chronic renal failure (creatinine 4.9 mg/dl, Bun 87 mg/dl) and to have a urinary tract infection. She developed hypofibrinogenemia, hypotension and hypothermia, deteriorated and died.

Autopsy showed signs of septic shock with ischemic bowel, secondary to Klebsiela cystitis. Adrenal glands weighed 8 and 7 grams and were grossly unremarkable.

Dx: Adrenal amyloidosis

Overstreet K; Barone RM; Robin HS. Secondary amyloidosis and gastrointestinal stromal tumors. A case report and discussion of pathogenesis. Arch Pathol Lab Med 2003 Apr;127(4): p470-3

Gullu S; Gursoy A; Erdogan MF; Dizbaysak S; Erdogan G; Kamel N. Multiple endocrine neoplasia type 2A/localized cutaneous lichen amyloidosis associated with malignant pheochromocytoma and ganglioneuroma. J Endocrinol Invest 2005 Sep;28(8): p734-7

Hirschfield GM. Amyloidosis: a clinico-pathophysiological synopsis. Semin Cell Dev Biol 2004 Feb;15(1): p39-44

Kebbel A; Rocken C. Immunohistochemical classification of amyloid in surgical pathology revisited. Am J Surg Pathol 2006 Jun;30(6): p673-83

Rocken C; Wilhelm S. Influence of tissue fixation on the microextraction and identification of amyloid proteins. J Lab Clin Med 2005 Oct;146(4): p244-50

Case 3

Adrenal glands in an adult patient who died of superior mesenteric arterial thrombosis and subsequent sepsis. He had a hx of profound hypertension non-responsive to therapy.

Both adrenal glands had this appearance.

Dx: Nodular adrenal cortical hyperplasia

Bourdeau I; Lacroix A; Schurch W; Caron P; Antakly T; Stratakis CA. Primary pigmented nodular adrenocortical disease: paradoxical responses of cortisol secretion to dexamethasone occur in vitro and are associated with increased expression of the glucocorticoid receptor. J Clin Endocrinol Metab 2003 Aug;88(8): p3931-7

Lacroix A; Bourdeau I. Bilateral adrenal Cushing's syndrome: macronodular adrenal hyperplasia and primary pigmented nodular adrenocortical disease. Endocrinol Metab Clin North Am 2005 Jun;34(2): p441-58

Bourdeau I. Clinical and molecular genetic studies of bilateral adrenal hyperplasias. Endocr Res 2004 Nov;30(4): p575-83

Kageyama Y; Ishizaka K; Iwashina M; Sasano H; Kihara K. A case of ACTH-independent bilateral macronodular adrenal hyperplasia successfully treated by subtotal resection of the adrenal glands: four-year follow-up. Endocr J 2002 Apr;49(2): p227-9

Case 4

48 y/o woman with a blood pressure of 180/110, potassium 3.1 mEq/l, and low plasma renin levels. Renal venograms were WNL. Left adrenal vein aldosterone level 21, right was > 300. A right adrenalectomy showed a 4.5 cm gland weighing 12 grams. The cortex was bright yellow and 1 mm thick. Several minute cortical nodules were noted, some in the adjacent soft tissue.

2 yrs later she was normotensive.

Dx: Adrenal hyperplasia (zona glomerulosa) - Hyperaldosteronism

Katayama Y; Takata N; Tamura T; Yamamoto A; Hirata F; Yasuda H; Matsukuma S; Daido Y; Sasano H. A case of primary aldosteronism due to unilateral adrenal hyperplasia. Hypertens Res 2005 Apr;28(4): p379-84

Mansoor GA; Malchoff CD; Arici MH; Karimeddini MK; Whalen GF. Unilateral adrenal hyperplasia causing primary aldosteronism: limitations of I-131 norcholesterol scanning. Am J Hypertens 2002 May;15(5): p459-64

Hirono Y; Doi M; Yoshimoto T; Kanno K; Himeno Y; Taki K; Sasano H; Hirata Y. A case with primary aldosteronism due to unilateral multiple adrenocortical micronodules. Endocr J 2005 Aug;52(4): p435-9

Nadar S; Lip GY; Beevers DG. Primary hyperaldosteronism. Ann Clin Biochem 2003 Sep;40(Pt 5): p439-52

Ghulam A; Vantyghem MC; Wemeau JL; Boersma A. Adrenal mineralocorticoids pathway and its clinical applications. Clin Chim Acta 2003 Apr;330(1-2): p99-110

Case 5

61 y/o woman with marked wt. gain and edema. She was flushed and had rounded facies. She had elevated cortisols that did not suppress. The sella turcica was normal. The slide is from a 29 gm, 5.2 bright yellow-orange adrenal tumor.

Dx: Adrenal adenoma - Cushing's syndrome

Hisamatsu H; Sakai H; Tsuda S; Shigematsu K; Kanetake H. Combined adrenal adenoma and myelolipoma in a patient with Cushing's syndrome: case report and review of the literature. Int J Urol 2004 Jun;11(6): p416-8

Sippel RS; Chen H. Subclinical Cushing's syndrome in adrenal incidentalomas. Surg Clin North Am 2004 Jun;84(3): p875-85

Karasawa R; Hotta M; Aiba M; Takano K. Cushing's syndrome due to a large adrenocortical adenoma with histological features simulating ACTH-independent macronodular adrenocortical hyperplasia. Pathol Int 2004 Apr;54(4): p273-8

Armand R; Cappola AR; Horenstein RB; Drachenberg CB; Sasano H; Papadimitriou JC. Adrenal cortical adenoma with excess black pigment deposition, combined with myelolipoma and clinical Cushing's syndrome. Int J Surg Pathol 2004 Jan;12(1): p57-61

Nomura K; Saito H; Aiba M; Iihara M; Obara T; Takano K. Cushing's syndrome due to bilateral adrenocortical adenomas with unique histological features. Endocr J 2003 Apr;50(2): p155-62

Case 6

56 y/o male with a 5.5 cm, 85 gram mass in the adrenal gland. Mass was an incidental radiographic finding.

Dx: Infarcted adrenal cortical adenoma

Erickson LA; Lloyd RV; Hartman R; Thompson G. Cystic adrenal neoplasms. Cancer 2004 Oct 1;101(7): p1537-44

Porpiglia F; Destefanis P; Fiori C; Giraudo G; Garrone C; Scarpa RM; Fontana D; Morino M. Does adrenal mass size really affect safety and effectiveness of laparoscopic adrenalectomy? Urology 2002 Nov;60(5): p801-5

Riddell AM; Khalili K. Sequential adrenal infarction without MRI-detectable hemorrhage in primary antiphospholipid-antibody syndrome. AJR Am J Roentgenol 2004 Jul;183(1): p220-2

Case 7

43 y/o woman with a nodule in the left adrenal gland.

Dx: Pheochromocytoma of adrenal gland

Heymann WR. Flushing, pheochromocytoma, and the dermatologist. J Am Acad Dermatol 2006 Dec;55(6): p1075-7

Pham TH; Moir C; Thompson GB; Zarroug AE; Hamner CE; Farley D; van Heerden J; Lteif AN; Young WF. Pheochromocytoma and paraganglioma in children: a review of medical and surgical management at a tertiary care center. Pediatrics 2006 Sep;118(3): p1109-17

Gao B; Meng F; Bian W; Chen J; Zhao H; Ma G; Shi B; Zhang J; Liu Y; Xu Z. Development and validation of pheochromocytoma of the adrenal gland scaled score for predicting malignant pheochromocytomas. Urology 2006 Aug;68(2): p282-6

Handa U; Khullar U; Mohan H. Pigmented pheochromocytoma: report of a case with diagnosis by fine needle aspiration. Acta Cytol 2005 Jul-Aug;49(4): p421-3

Kobayashi T; Iwai A; Takahashi R; Ide Y; Nishizawa K; Mitsumori K. Spontaneous rupture of adrenal pheochromocytoma: review and analysis of prognostic factors. J Surg Oncol 2005 Apr 1;90(1): p31-5

Case 8

Adrenal tumor from a 62 y/o female with abdominal pain. The tumor was 14 x 11 x 5 cm, 122 grams, and partly cystic.

Dx: Pleomorphic carcinoma of adrenal gland

Ren R; Guo M; Sneige N; Moran CA; Gong Y. Fine-needle aspiration of adrenal cortical carcinoma: cytologic spectrum and diagnostic challenges. Am J Clin Pathol 2006 Sep;126(3): p389-98

Lujan MG; Hoang MP. Pleomorphic leiomyosarcoma of the adrenal gland. Arch Pathol Lab Med 2003 Jan;127(1): pe32-5

Seo IS; Henley JD; Min KW. Peculiar cytoplasmic inclusions in oncocytic adrenal cortical tumors: an electron microscopic observation. Ultrastruct Pathol 2002 Jul-Aug;26(4): p229-35

Chadha MK; Le Vea C; Javle M; Kuvshinoff B; Vijaykumar R; Iyer R. Anaplastic pancreatic carcinoma. A case report and review of literature. JOP 2004 Nov;5(6): p512-5

Case 9

68 y/o man had a 1 yr hx of loss of libido and increasing breast size. Total estrogen per 24 hrs was 1552 micrograms (N male 4-25), 17 hydroxysteroid 17 mg per 24 hours (N 3-10), and 17-ketosteroids 17 mg per 24 hours (N 9-22). Estradiol examination was 611 picograms (normal 10-10). Abdominal x-rays and angiogram showed a left adrenal mass.

The removed adrenal showed an 8.9 cm diameter, 269 gram tumor.

Patient died 4 yrs after surgery with massive metastatic tumor in the liver.

Dx: Adrenal cortical carcinoma - estradiol producing

Fukai N; Hirono Y; Yoshimoto T; Doi M; Ohtsuka Y; Homma K; Shibata H; Sasano H; Hirata Y. A case of estrogen-secreting adrenocortical carcinoma with subclinical Cushing's syndrome. Endocr J 2006 Apr;53(2): p237-45

Wieneke JA; Thompson LD; Heffess CS. Adrenal cortical neoplasms in the pediatric population: a clinicopathologic and immunophenotypic analysis of 83 patients. Am J Surg Pathol 2003 Jul;27(7): p867-81

Raven G; de Jong FH; Kaufman JM; de Ronde W. In men, peripheral estradiol levels directly reflect the action of estrogens at the hypothalamo-pituitary level to inhibit gonadotropin secretion. J Clin Endocrinol Metab 2006 Sep;91(9): p3324-8

Kuhn JM; Lefebvre H; Duparc C; Pellerin A; Luton JP; Strauch G. Cosecretion of estrogen and inhibin B by a feminizing adrenocortical adenoma: impact on gonadotropin secretion. J Clin Endocrinol Metab 2002 May;87(5): p2367-75

Case 10

Adrenal tumor from a 53 y/o female with a 3 yr hx of increasing facial hair, back of hand, and shoulders, and decreasing breast size. Darkening of pubic hair and deepening voice.

Dx: Adrenal cortical carcinoma - virilizing

Yeh MW; Lisewski D; Campbell P. Virilizing adrenocortical carcinoma with cavoatrial extension. Am J Surg 2006 Aug;192(2): p209-10

Shen WT; Sturgeon C; Duh QY. From incidentaloma to adrenocortical carcinoma: the surgical management of adrenal tumors. J Surg Oncol 2005 Mar 1;89(3): p186-92

Fukushima A; Okada Y; Tanikawa T; Kawahara C; Misawa H; Kanda K; Morita E; Sasano H; Tanaka Y. Virilizing adrenocortical adenoma with Cushing's syndrome,

thyroid papillary carcinoma and hypergastrinemia in a middle-aged woman. Endocr J 2003 Apr;50(2): p179-87

Ren R; Guo M; Sneige N; Moran CA; Gong Y. Fine-needle aspiration of adrenal cortical carcinoma: cytologic spectrum and diagnostic challenges. Am J Clin Pathol 2006 Sep;126(3): p389-98

Mokos I; Bernat MM; Marekovic Z; Pasini J. Virilizing adrenal cancer and bail-out nephrectomy. Coll Antropol 2005 Dec;29(2): p753-5

Goodarzi MO; Dawson DW; Li X; Lei Z; Shintaku P; Rao CV; Van Herle AJ. Virilization in bilateral macronodular adrenal hyperplasia controlled by luteinizing hormone. J Clin Endocrinol Metab 2003 Jan;88(1): p73-7