CASE #1

67 yo woman with a history of HTN and hypothyroidism was found to have a calcium of 11.1 mg/dl (nl < 10.5) on routine labs prior to a screening colonoscopy.

How would you approach this patient?

What additional information would you obtain?

Repeat laboratory confirms the presence of mild hypercalcemia and mild hypophosphotemia with an elevated PTH value of 105 pg/ml.

What additional testing would you do?

What are the indications for parathyroidectomy?

How will you monitor her?

CASE #2

65 yo obese man with a history of HTN, diabetes, dyslipidemia, and gout is found to have a 2cm right adrenal mass on a CT done to evaluate RLQ abdominal pain which has since resolved. He is currently on lisinopril, HCTZ, and metoprolol for his HTN which is marginally controlled.

How would you approach this patient?

What further studies would you recommend?

When is surgery indicated?

How would you monitor him?

CASE #3

32 yo G2P2 woman with a history of anxiety is found to have a prolactin of 56 ng/ml (nl <20) during evaluation of persistent amenorrhea 6 months after she stopped nursing her youngest child.

How would you approach this patient?

What are the potential causes for her elevated prolactin?

When is treatment indicated? How would you treat? For how long?

CASE #4

58 yo obese man with a history of DM, HTN, and dyslipidemia was found to have an afternoon testosterone level of 185 ng/dl (nl>270) after complaining of erectile dysfunction, diminished libido, and decreased energy.

How would you approach this patient?

What do you make of his testosterone level? What about his symptoms?

What additional studies would you obtain?

How would you treat him?

Hyperparathyroidism

- Abdelhadi M, Nordenstrom J. Bone mineral recovery after parathyroidectomy in patients with primary and renal hyperparathyroidism. J Clin Endocrinol Metab 1998;83:3845-51.
- Bilezikian JP, Brandi ML, Eastell R, et al. Guidelines for the management of asymptomatic primary hyperparathyroidism: summary statement from the fourth international workshop. J Clin Endocrinol Metab 2014; Epub ahead of print- Aug 27,2014.
- Bilezikian JP, Khan AA, Potts JT, Jr, Third International Workshop on the Management of Asymptomatic Primary Hyperthyroidism. Guidelines for the management of asymptomatic primary hyperparathyroidism: summary statement from the third international workshop. J Clin Endocrinol Metab 2009;94:335-9.
- Bilezikian JP, Potts JT, Jr, Fuleihan G, et al. Summary statement from a workshop on asymptomatic primary hyperparathyroidism: a perspective for the 21st century. J Bone Miner Res 2002;17 Sup 2:N2-11.
- Bilezikian JP, Silverberg SJ. Clinical practice. Asymptomatic primary hyperparathyroidism. N Engl J Med 2004;350:1746-51.
- Eastell R, Arnold A, Brandi ML, et al. Diagnosis of asymptomatic primary hyperparathyroidism: proceedings of the third international workshop. J Clin Endocrinol Metab 2009;94:340-50.
- Hendrickson CD, Castro DJ, Comi RJ. Renal impairment as a surgical indication in primary hyperparathyroidism: Do the data support this recommendation? J Clin Endocrinol Metab 2014;99:2646-50
- Khan AA, Bilezikian JP, Kung AW, et al. Alendronate in primary hyperparathyroidism: a doubleblind, randomized, placebo-controlled trial. J Clin Endocrinol Metab 2004;89:3319-25.
- Khan A, Grey A, Shoback D. Medical management of asymptomatic primary hyperparathyroidism: proceedings of the third international workshop. J Clin Endocrinol Metab 2009;94:373-81.
- Marx SJ. Hyperparathyroid and hypoparathyroid disorders. N Engl J Med 2000;343:1863-75.
- Miller PD, Bilezikian JP. Bone densitometry in asymptomatic primary hyperparathyroidism. J Bone Miner Res 2002;17 Suppl 2:N98-102.
- Pallais JC, Kifor O, Chen Y, Slovik D, Brown EM. Brief Report: Acquired Hypocalciuric Hypercalcemia Due to Autoantibodies against the Calcium Sensing Receptor. N Engl J Med 2004;351:362-9.

- Patel PC, Pellitteri PK, Patel NM, Fleetwood MK. Use of a rapid intraoperative parathyroid hormone assay in the surgical management of parathyroid disease. Arch Otolaryngol Head Neck Surg 1998;124:559-62.
- Peacock M, Bilezikian JP, Klassen PS, Guo MD, Turner SA, Shoback D. Cinacalcet hydrochloride maintains long-term normocalcemia in patients with primary hyperparathyroidism. J Clin Endocrinol Metab 2005;90:135-41.
- Rubin MR, Bilezikian JP, McMahon DJ, et al. The natural history of primary hyperparathyroidism with or without parathyroid surgery after 15 years. J Clin Endocrinol Metab 2008;93:3462-70.
- Ryan JA, Jr, Eisenberg B, Pado KM, Lee F. Efficacy of selective unilateral exploration in hyperparathyroidism based on localization tests. Arch Surg 1997;132:886,90; discussion 890-1.
- Silverberg SJ, Lewiecki EM, Mosekilde L, Peacock M, Rubin MR. Presentation of asymptomatic primary hyperparathyroidism: proceedings of the third international workshop. J Clin Endocrinol Metab 2009;94:351-65.
- Silverberg SJ, Shane E, Jacobs TP, Siris E, Bilezikian JP. A 10-year prospective study of primary hyperparathyroidism with or without parathyroid surgery. N Engl J Med 1999;341:1249-55.
- Udelsman R, Pasieka JL, Sturgeon C, Young JE, Clark OH. Surgery for asymptomatic primary hyperparathyroidism: proceedings of the third international workshop. J Clin Endocrinol Metab 2009;94:366-72.

Adrenal Incidentaloma

- Bovio S, Cataldi A, Reimondo G, et al. Prevalence of adrenal incidentaloma in a contemporary computerized tomography series. J Endocrinol Invest 2006;29:298-302.
- Dunnick NR, Korobkin M, Francis I. Adrenal radiology: distinguishing benign from malignant adrenal masses. AJR Am J Roentgenol 1996;167:861-7.
- Gorges R, Knappe G, Gerl H, Ventz M, Stahl F. Diagnosis of Cushing's syndrome: re-evaluation of midnight plasma cortisol vs urinary free cortisol and low-dose dexamethasone suppression test in a large patient group. J Endocrinol Invest 1999;22:241-9.
- Grumbach MM, Biller BM, Braunstein GD, et al. Management of the clinically inapparent adrenal mass ("incidentaloma"). Ann Intern Med 2003;138:424-9.
- Kloos RT, Gross MD, Francis IR, Korobkin M, Shapiro B. Incidentally discovered adrenal masses. Endocr Rev 1995;16:460-84.
- Mantero F, Terzolo M, Arnaldi G, et al. A survey on adrenal incidentaloma in Italy. Study Group on Adrenal Tumors of the Italian Society of Endocrinology. J Clin Endocrinol Metab 2000;85:637-44.
- Sawka AM, Jaeschke R, Singh RJ, Young WF,Jr. A comparison of biochemical tests for pheochromocytoma: measurement of fractionated plasma metanephrines compared with the combination of 24-hour urinary metanephrines and catecholamines. J Clin Endocrinol Metab 2003;88:553-8.
- Tsagarakis S, Vassiliadi D, Thalassinos N. Endogenous subclinical hypercortisolism: Diagnostic uncertainties and clinical implications. J Endocrinol Invest 2006;29:471-82.
- Young WF,Jr. Management approaches to adrenal incidentalomas. A view from Rochester, Minnesota. Endocrinol Metab Clin North Am 2000;29:159,85, x.
- Young WF,Jr. Clinical practice. The incidentally discovered adrenal mass. N Engl J Med 2007;356:601-10.

Hyperprolactinemia

- Biswas M, Smith J, Jadon D, et al. Long-term remission following withdrawal of dopamine agonist therapy in subjects with microprolactinomas. Clin Endocrinol (Oxf) 2005;63:26-31.
- Casanueva FF, Molitch ME, Schlechte JA, et al. Guidelines of the Pituitary Society for the diagnosis and management of prolactinomas. Clin Endocrinol (Oxf) 2006;65:265-73.
- Colao A, Di Sarno A, Cappabianca P, Di Somma C, Pivonello R, Lombardi G. Withdrawal of long-term cabergoline therapy for tumoral and nontumoral hyperprolactinemia. N Engl J Med 2003;349:2023-33.
- Colao A, Di Sarno A, Guerra E, et al. Predictors of remission of hyperprolactinaemia after long-term withdrawal of cabergoline therapy. Clin Endocrinol (Oxf) 2007;67:426-33.
- Colao A, Galderisi M, Di Sarno A, et al. Increased prevalence of tricuspid regurgitation in patients with prolactinomas chronically treated with cabergoline. J Clin Endocrinol Metab 2008;93:3777-84.
- Gillam MP, Molitch ME, Lombardi G, Colao A. Advances in the treatment of prolactinomas. Endocr Rev 2006;27:485-534.
- Kars M, Delgado V, Holman ER, et al. Aortic valve calcification and mild tricuspid regurgitation but no clinical heart disease after 8 years of dopamine agonist therapy for prolactinoma. J Clin Endocrinol Metab 2008;93:3348-56.
- Melmed S, Casanueva FF, Hoffman AR, et al. Diagnosis and treatment of hyperprolactinemia: an Endocrine Society clinical practice guideline. J Clin Endocrinol Metab 2011;96:273-88
- Molitch ME. Drugs and prolactin. Pituitary 2008;11:209-18.
- Ono M, Miki N, Kawamata T, et al. Prospective study of high-dose cabergoline treatment of prolactinomas in 150 patients. J Clin Endocrinol Metab 2008;93:4721-7.
- Roth BL. Drugs and valvular heart disease. N Engl J Med 2007;356:6-9.
- Schade R, Andersohn F, Suissa S, Haverkamp W, Garbe E. Dopamine agonists and the risk of cardiac-valve regurgitation. N Engl J Med 2007;356:29-38.
- Schlechte JA. Clinical practice. Prolactinoma. N Engl J Med 2003;349:2035-41.
- Vance ML. Hypopituitarism. N Engl J Med 1994;330:1651-62.
- Webster J, Piscitelli G, Polli A, Ferrari CI, Ismail I, Scanlon MF. A comparison of cabergoline and bromocriptine in the treatment of hyperprolactinemic amenorrhea. Cabergoline Comparative Study Group. N Engl J Med 1994;331:904-9.
- Zanettini R, Antonini A, Gatto G, Gentile R, Tesei S, Pezzoli G. Valvular heart disease and the use of dopamine agonists for Parkinson's disease. N Engl J Med 2007;356:39-46.

Androgen Deficiency

- Araujo AB, Mohr BA, McKinlay JB. Changes in sexual function in middle-aged and older men: longitudinal data from the Massachusetts Male Aging Study. J Am Geriatr Soc 2004;52:1502-9.
- Bacon CG, Mittleman MA, Kawachi I, Giovannucci E, Glasser DB, Rimm EB. Sexual function in men older than 50 years of age: results from the health professionals follow-up study. Ann Intern Med 2003;139:161-8.
- Basaria S, Coviello AD, Travison TG, et al. Adverse events associated with testosterone administration. N Engl J Med 2010;363:109-22.
- Bhasin S, Cunningham GR, Hayes FJ, et al. Testosterone therapy in men with androgen deficiency syndromes: an endocrine society clinical practice guideline. J Clin Endocrinol Metab 2010;95:2536-59.
- Braun SR. Promoting "Low T": a medical writer's perspective. JAMA 2013;173:1458-60.

- Calof OM, Singh AB, Lee ML, et al. Adverse events associated with testosterone replacement in middle-aged and older men: a meta-analysis of randomized, placebo-controlled trials. J Gerontol A Biol Sci Med Sci 2005;60:1451-7.
- Feldman HA, Longcope C, Derby CA, et al. Age trends in the level of serum testosterone and other hormones in middle-aged men: longitudinal results from the Massachusetts male aging study. J Clin Endocrinol Metab 2002;87:589-98.
- Feldman HA, Goldstein I, Hatzichristou DG, Krane RJ, McKinlay JB. Impotence and its medical and psychosocial correlates: results of the Massachusetts Male Aging Study. J Urol 1994;151:54-61.
- Fernandez-Balsells MM, Murad MH, Lane M, eta al. Adverse effects of testosterone therapy in adult men: a systematic review and meta-analysis. J Clin Endocrinol Metab 2010;95:2560-2575.
- Finkelstein JS, Lee H, Burnett-Bowie SA, Pallais JC, et al. Gonadal steroidsand body composition, strength, and sexual function in men. N Engl J Med 2010;363:123-35.
- Harman SM, Metter EJ, Tobin JD, Pearson J, Blackman MR, Baltimore Longitudinal Study of Aging. Longitudinal effects of aging on serum total and free testosterone levels in healthy men. Baltimore Longitudinal Study of Aging. J Clin Endocrinol Metab 2001;86:724-31.
- Jain P, Rademaker AW, McVary KT. Testosterone supplementation for erectile dysfunction: results of a meta-analysis. J Urol 2000;164:371-5.
- Klee GG, Heser DW. Techniques to measure testosterone in the elderly. Mayo Clin Proc 2000;75:S19-25.
- Korenman SG, Morley JE, Mooradian AD, et al. Secondary hypogonadism in older men: its relation to impotence. J Clin Endocrinol Metab 1990;71:963-9.
- Laumann EO, Paik A, Rosen RC. Sexual dysfunction in the United States: prevalence and predictors. JAMA 1999;281:537-44.
- Meikle AW, Arver S, Dobs AS, et al. Prostate size in hypogonadal men treated with a nonscrotal permeation-enhanced testosterone transdermal system. Urology 1997;49:191-6.
- Mohr BA, Bhasin S, Link CL, O'Donnell AB, McKinlay JB. The effect of changes in adiposity on testosterone levels in older men: longitudinal results from the Massachusetts Male Aging Study. Eur J Endocrinol 2006;155:443-52.
- Pallais JC, Caudill M, Pitteloud N, Seminara S, Crowley W (May 2007). Hypogonadotropic Hypogonadism Overview in: GeneReviews at GeneTests: Medical Genetics Information Resource [database online]. Copyright, University of Washington, Seattle, 1997-2007. <u>http://www.genetests.org</u>.
- Rosner W, Auchus RJ, Azziz R, Sluss PM, Raff H. Position statement: Utility, limitations, and pitfalls in measuring testosterone:an Endocrine Society position statement. JClin Endocrinol Metab 2007;92:405.
- Snyder PJ. Hypogonadism in elderly men--what to do until the evidence comes. N Engl J Med 2004;350:440-2.
- Snyder PJ, Peachey H, Hannoush P, et al. Effect of testosterone treatment on bone mineral density in men over 65 years of age. J Clin Endocrinol Metab 1999;84:1966-72.
- Snyder PJ, Peachey H, Hannoush P, et al. Effect of testosterone treatment on body composition and muscle strength in men over 65 years of age. J Clin Endocrinol Metab 1999;84:2647-53.
- Spratt DI, O'Dea LS, Schoenfeld D, Butler J, Rao PN, Crowley WF, Jr. Neuroendocrine-gonadal axis in men: frequent sampling of LH, FSH, and testosterone. Am J Physiol 1988;254:E658-66.
- Swerdloff RS, Wang C, Cunningham G, et al. Long-term pharmacokinetics of transdermal testosterone gel in hypogonadal men. J Clin Endocrinol Metab 2000;85:4500-10.

- Tenover JS. Effects of testosterone supplementation in the aging male. J Clin Endocrinol Metab 1992;75:1092-8.
- Vigen R, O'Donnell CI, Baron AE, et al. Association of testosterone therapy with mortality, myocardial infarction, and stroke in men with low testosterone levels. JAMA 2013;3101:1829-36.
- Winters SJ. Androgens: endocrine physiology and pharmacology. NIDA Res Monogr 1990;102:113-30.
- Wu FCW, Tajar A, Beynon JM, et al. Identification of late-onset hypogonadism in middle-aged and elderly men. N Engl J Med 2010;363:123-35.
- Xu L, Freeman G, Cowling BJ, Schooling CM. Testosterone therapy and cardiovascular events among men: A systematic review and meta-analysis of placebo-controlled randomized trials. BMC Medicine 2013;11:108.