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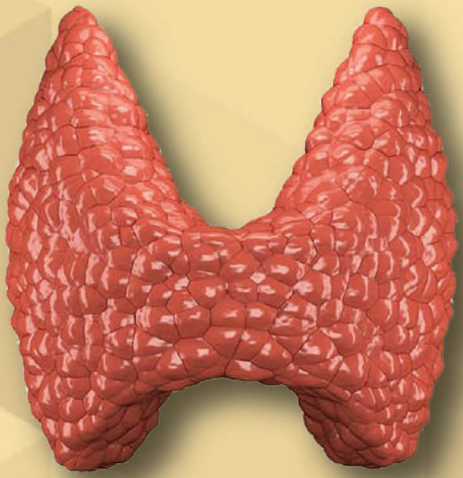

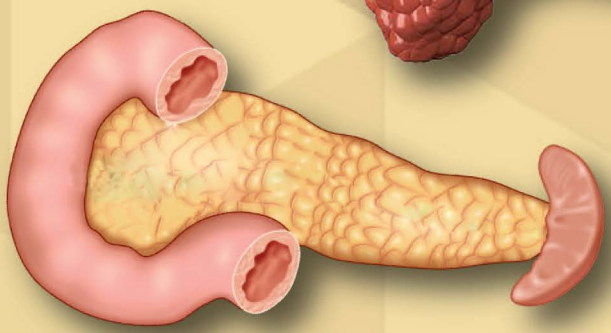

Pramila Kalra

Foreword
Prasanna Kumar KM

JAYPEE

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CHAPTER

4

Pseudo- and Iatrogenic Cushing's Syndrome

Chitra S, Prashant Kaduskar

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CASE 1

A 28-year-old lady presents with complaints of fatigue, inability to climb stairs, since the last two years. She is irritable and has bouts of crying and has stopped pursuing her job as a teacher and prefers to stay at home. She has been found to have hyperglycemia requiring treatment for the same time. Most of her complaints started about 2 years ago when she was put on herbal supplements to increase her appetite and body weight.

On examination, she is conscious, appears lost in thought, has thin skin on the dorsum of her hand, purple-colored striae on her abdomen and calves measuring around 1 cm in width. She has patches of red bruises on her inner arms. Her waist circumference is 96 cm and blood pressure is 150/90 mm Hg. She has proximal myopathy of both upper and lower limbs. She has no hirsutism or increased pigmentation.

A clinical diagnosis of Cushing's syndrome is made. She is asked to stop her herbal supplements. An 8 am cortisol assay is done which reveals cortisol of <0.1 μg/dL.

A diagnosis of exogenous Cushing's syndrome is made.

Q. 1 What is Cushing's syndrome?

Ans. It is a syndrome characterized by signs and symptoms associated with prolonged exposure to inappropriately high levels of plasma glucocorticoids. The glucocorticoids can be exogenous or endogenous. Cushing's syndrome due to exogenous glucocorticoids is called Iatrogenic Cushing's syndrome. Endogenous glucocorticoids can be ACTH dependent or ACTH independent. Iatrogenic Cushing's is the most common form of Cushing's syndrome.

Iatrogenic Cushing's is the most common cause of Cushing's syndrome.

Q. 2 What are the features of iatrogenic Cushing's syndrome?

Ans. Although most clinical manifestations overlap with endogenous Cushing's syndrome, some features can be strikingly different in iatrogenic Cushing's syndrome. The classical symptoms of weight gain, obesity, dorsocervical and supraclavicular fat pads, facial plethora, easy bruising; thin skin, striae, myopathy, and muscle weakness (particularly proximal muscles) are seen in both. Poor wound healing and susceptibility to infection is common. Psychological adverse effects like depression and psychosis can be severe. Metabolic complications like hypertension, hyperglycemia and dyslipidemia also occur.

Some manifestations of glucocorticoid excess occur relatively quickly. Psychiatric effects, insomnia, and increased appetite can occur within hours. Generally, a cushingoid appearance takes weeks or even months to develop, as does development of osteoporosis.

- All the features of endogenous Cushing's can be present in iatrogenic Cushing's syndrome.
- Psychological effects are acute and can be quite severe.

Q. 3 Are there any differences in symptoms of iatrogenic and endogenous Cushing's features?

Ans. There are few clinical features which are more common and some features which are less common in iatrogenic Cushing's.

Hypertension though common in iatrogenic Cushing's, these patients may have relatively less hypertension and hypokalemia compared with patients who have spontaneous Cushing's syndrome depending on the mineralocorticoid activity of the steroid they are taking.

Patients with iatrogenic Cushing's syndrome are less likely to have significant increases in androgens, and therefore they have less hirsutism and other virilizing features than those who have spontaneous disease.

There is increased incidence of glaucoma and other ocular disease such as posterior subcapsular cataracts in these patients.

Avascular necrosis is more common in iatrogenic than in spontaneous Cushing's syndrome.

Osteoporosis is a common and severe adverse effect of glucocorticoid excess and one of the major limitations to long-term glucocorticoid therapy. A significant number of patients on long-term steroid therapy will have at least some loss of bone density. Oral and inhaled corticosteroid uses are associated with increased bone fractures. The bone loss caused by glucocorticoids tends to be in trabecular bone as opposed to cortical bone. Therefore, most loss is in the vertebrae and ribs of the axial skeleton.

- Hypertension, hypokalemia, androgenic features like hirsutism and oligoamenorrhea are less common in iatrogenic Cushing's syndrome.
- Certain features such as posterior subcapsular cataract, glaucoma, avascular necrosis of femur osteoporosis and pancreatitis are more common in iatrogenic Cushing's syndrome than endogenous Cushing's syndrome.

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Q. 4 What are the factors that play a role in the development of iatrogenic Cushing's syndrome?

Ans. Multiple factors decide the effects of steroids and hence the development of iatrogenic Cushing's syndrome. Steroids are available in many different preparations and have different modes of delivery. Although the use of topical, intra-articular, or aerosol therapy has the advantage of allowing more targeted therapy and therefore theoretically fewer systemic adverse effects, every mode of steroid treatment can cause Cushing's features.

Relevant properties of the steroids themselves include the formulation used, pharmacokinetics, affinity for the glucocorticoid receptor, biologic potency, and duration of action.

Pharmacokinetic factors include binding affinities to cortisol-binding globulin (CBG) and other plasma proteins, metabolic inactivation, and plasma half-life. Most synthetic glucocorticoids do not have significant binding to CBG and bind instead to albumin or circulate as free steroid. In contrast, synthetic glucocorticoids have a much higher affinity for the glucocorticoid receptor than cortisol itself. However, these are theoretical considerations and relative estimate of glucocorticoid activity and hence development of Cushing's features cannot be predicted.

Specific modes of delivery have different effects. Oral steroid use is most common form likely to cause Cushing's features. Topical steroids do get systemically absorbed and this may further be enhanced by breakdown of skin integrity. Inhaled glucocorticoids initially thought to be safe do have side effects particularly bone, ocular, and skin manifestations. Cushing's syndrome has been reported in patients taking relatively high doses of intra-articular glucocorticoids. Pediatric cases of intra-articular and intradermal steroid injections causing Cushing's syndrome have been reported.

> The minimum dose of steroid required for development of Cushing's syndrome is the equivalent of prednisolone in dose of 7.5 mg for 3 months.

CASE 2

A 48-year-old lady has been referred from her primary physician to rule out Cushing's disease. She has been suffering with bronchial asthma for 20 years, with acute exacerbations at least 3 times/year requiring hospital admissions. She is on inhaled steroids everyday with use of oral steroids for 1–2 weeks at least 4–6 times/year. She is also diagnosed to have diabetes and hypertension for 5 years and is on treatment. She had sustained fracture of the left wrist following a trivial fall a year ago. On examination, she has central obesity, abdominal striae, thin skin and hypertension. Her primary physician ordered for an 8 am cortisol which showed 28 μg/dL.

After receiving the patient, it is revealed that the patient was continuing to use prednisolone 10 mg/day without disclosing to her doctor. She is educated about being off all medications and a repeat 8 am cortisol is ordered which is 2 μg/dL this time suggesting exogenous cortisol use.

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Q. 1 How is a diagnosis of exogenous Cushing's syndrome made?

Ans. An 8 am cortisol assay if found suppressed (generally accepted as <5 μg/dL), endogenous hypercortisolism can be ruled out and a diagnosis of exogenous Cushing's syndrome can be made. It is important to remember that most synthetic steroid preparations have assay interference with cortisol, hence, if a patient is continuing to take the steroid while being tested, the report may be falsely normal or high. Close monitoring, preferably after admission to exclude surreptitious use of steroid (as in case 2) is necessary.

Q. 2 What are the factors to be considered while withdrawing steroids?

Ans. The discontinuation of steroid therapy can present a significant clinical challenge and following three factors need to be considered while withdrawing steroids—(1) the possibility of suppression of the hypothalamic–pituitary–adrenal (HPA) axis and resulting secondary adrenal insufficiency, (2) the possibility of worsening of the underlying disease for which steroid therapy was initiated, and (3) a phenomenon, sometimes called the steroid withdrawal syndrome, in which some patients encounter difficulty, and even significant symptoms, discontinuing or decreasing steroid doses despite having demonstrably normal HPA axes.

Q. 3 How to taper steroids in patients on long-term steroids with iatrogenic Cushing's?

Ans. Patients on long-term steroid therapy should be offered withdrawal of steroid therapy in following way.

There is a paucity of randomized trials which have looked at the best possible method of tapering steroids. Most are based on regimens that have been followed.

Any patient with steroid use for less than 3 weeks can be stopped without tapering.

Any patient on prednisolone >5 mg for >3 weeks undergoes tapering by 2.5 mg every 3–4 days till the patient is brought down to 5 mg/day. Once the patient is on 5 mg/day, the patient is shifted to the equivalent dose of hydrocortisone 20 mg as it has a shorter half-life and is easier to taper down (as compared to prednisolone). Hydrocortisone is then tapered at the rate of 2.5 mg/1–2 weeks to reach hydrocortisone 10 mg/day in the morning. At this point, the patient is maintained on hydrocortisone 10 mg/day for 2–3 months allowing the axis sufficient time to recover. At the end of 3 months, a synacthen stimulation test can be done to decide if the patient can go off steroids if they have a cortisol value >18 μg/dL. Another way of assessing recovery is doing an 8 am cortisol after omitting the hydrocortisone dose for the day. If the cortisol level >10 μg/dL steroids can be withdrawn with advice for stress dose when infections occur. Most often steroid withdrawal is far from the smooth tapering regimens we design. Conditions for which they were on steroids in the first place may flare up requiring increase in steroid dose. Second, most patients on steroids for a long time, are used to the euphoric sense of well-being they provide and tend to take a step or two back in the tapering program without informing the clinician (Table 4.1).

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TABLE 4.1 Tapering schedule of steroids

Prednisolone dose	*Duration of therapy*	
mg/d	*<3 weeks*	*>3 weeks*
7.5 mg	Can stop	↓ rapidly (2.5 mg q3–4d) then
5.0 mg	Can stop ↓ 1 mg q2–4 week then	OR convert 5 mg pred to HC 20 mg, then ↓ 2.5 mg/week to 10 mg/day then
<5.0 mg	Can stop ↓ 1 mg q2–4 week	After 2–3 months at hydrocortisone 10 mg/d, administer SST/ITT : *Pass:* Withdraw *Fail:* Continue

In patients taking prednisolone 5–7.5 mg/d or equivalent corticosteroid, SST 12–24 hours after omitted dose of steroid to decide sudden or gradual withdrawal.

Q. 4 How to manage osteoporosis in iatrogenic Cushing's syndrome?

Ans. According to the recommendations of the American College of Rheumatology (ACR) from 2010, the glucocorticoid dose and the duration of therapy should be reduced to a minimum, which is clinically effective in specific diseases, such as rheumatoid arthritis, asthma or others. The glucocorticoid dose reduction and shortening therapy duration minimizes the risk of fractures.

Similar to the general recommendations for osteoporosis treatment, lifestyle modifications, consisting of regular physical activity including exercises with own body weight, fall prevention, smoking cessation, limiting alcohol, compensation of calcium deficiency to a total intake of 1200–1500 mg/day and control of vitamin D3 alteration of 25-hydroxyvitamin D3 concentration are also very important. A recommended preventive dose of vitamin D3 is 800–1000 IU per day.

Monitoring patient's height and Bone Mineral Density (BMD) is also essential in glucocorticoid therapy. The ACR recommends radiological or morphometric assessment of the spine in patients receiving 5 mg or more of prednisolone daily. Before starting treatment, the assessment of global fracture risk based on the presence of other known coexisting risk factors beyond steroids, such as low BMI, parental hip fracture, current smoking, consumption of more than 3 units of alcohol a day and a significant decrease in BMD should also be considered.

American College of Rheumatology recommendations distinguish two groups of patients: Premenopausal women and men less than 50 years of age and postmenopausal women and men over 50 years of age. In the former group as there are no adequate studies and guidelines, individual approach is recommended. For patients with osteoporotic fractures receiving ≥5 mg prednisolone or equivalent for more than a month, it is recommended to start treatment with bisphosphonates of proven effectiveness in glucocorticoid-induced osteoporosis,

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such as alendronate or risedronate, and if steroid dose is ≥7.5 mg, zoledronic acid should also be considered. If treatment with glucocorticoids is continued for a period of 3 months then, regardless of the dose, the patient should receive one of four treatment options: alendronate, risedronate, zoledronate or teriparatide.

The patients in the second group of the ACR recommendations should be divided into three subgroups, depending on the established global fracture risk, calculated on the basis of well proven algorithms, such as FRAX (low, medium or high fracture risk). Among patients with low or medium fracture risk, it is recommended to start therapy with alendronate, risedronate or zoledronate, if steroid administration exceeds 3 months and daily dose is ≥7.5 mg of prednisolone or equivalent. In patients with an average risk of fracture, it is advisable to administer alendronate and risedronate if steroid daily dose is <7.5 mg of prednisolone or equivalent and the patient has been treated for ≥3 months. Patients with high fracture risk should receive one out of the following three drugs: alendronate, risedronate or zoledronate, if they use steroids in a dose of <5 mg/day, even for <1 month, and when they receive >5 mg glucocorticoids per day, teriparatide should be considered.

Q. 5 How should patients with glucocorticoid-induced osteoporosis be monitored?

Ans. Although BMD assessment is not the best modality to quantify micro-architectural damage caused by steroids, they still remain the main monitoring parameter in glucocorticoid induced osteoporosis, owing to a lack of a better feasible mode. The DXA scans should be performed at 1–2 years interval. In addition, at each visit the patient should have assessed the risk of falls, height, medication compliance, and if required, the concentration of 25-hydroxyvitamin D3 and an X-ray of the spine.

CASE 3

A 47-year-old lady with complaints of decreased ability to sleep has been admitted under the department of psychiatry and found to have depression with generalized anxiety disorder. She has also been diagnosed with diabetes and hypertension for 4 years for which she is on metformin 2 g/day with glimepiride 4 mg/day and amlodipine 10 mg/day. She has oligoamenorrhea for many years and has cycles only after taking medroxyprogesterone acetate for 5 days. On examination, her BMI is 31 kg/m^2, has waist circumference of 102 cm, acanthosis nigricans, no striae or bruising. Blood pressure of 140/90 mm Hg. Her psychiatry consultant wants to rule out Cushing's syndrome as a cause of the depression and metabolic features.

What would you do next?

Q. 1 What is pseudo-Cushing's syndrome?

Ans. Pseudo-Cushing's states can be defined as a condition where some or all of the clinical features of Cushing's syndrome with some evidence of hypercortisolism. Resolution of the underlying primary condition leads to disappearance of the signs and symptoms of Cushing's syndrome.

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Q. 2 What is the importance of diagnosing pseudo-Cushing's state?

Ans. It is quite important to determine if the patient has Cushing's syndrome or a pseudo-Cushing's state in a time- and cost-effective manner, because if a patient with a pseudo-Cushing's state is misdiagnosed as having Cushing's syndrome, that patient could undergo needless testing and unnecessary surgery. On the other hand, it is important to identify Cushing's syndrome accurately as it is a condition with increased mortality and morbidity.

Q. 3 What are the causes of pseudo-Cushing's syndrome?

Ans.

- *Some clinical features of Cushing's syndrome may be present:*[8]
  - Pregnancy
  - Depression and other psychiatric conditions
  - Alcohol dependence
  - Glucocorticoid resistance
  - Morbid obesity
  - Poorly controlled diabetes mellitus
- *Unlikely to have any clinical features of Cushing's syndrome:*
  - Physical stress (hospitalization, surgery, pain)
  - Malnutrition, anorexia nervosa
  - Intense chronic exercise
  - Hypothalamic amenorrhea
  - Cortisol-blinding globulin excess (increased serum but not urine cortisol).

Q. 4 What is the pathogenesis of pseudo-Cushing's syndrome?

Ans. Many of the conditions mentioned above have underlying defect in HPA axis or other physiological mechanism which leads to pseudo-Cushing's state.

Depression: It is hypothesized that endogenous CRH is elevated in depression. The adrenal glands would then hypertrophy leading to the increased response of cortisol to ACTH. Cortisol feedback to the corticotroph would remain present, although also blunted. Most of these changes are reversible after recovery from depression.

Alcoholism: There is a hypersecretion of CRH in chronic alcohol abuse and chronic liver disease. Also, in alcoholism, there appears to be impaired binding of cortisol to cortisol-binding globulin (CBG), leading to elevated levels of free cortisol. Another possible explanation for pseudo-Cushing's syndrome in patients with alcohol abuse is impaired hepatic metabolism of cortisol. Lastly, AVP levels are elevated in patients with decompensated liver disease which may stimulate cortisol secretion.

Obesity: In obesity, there is an activation of HPA axis, probably attributed to increased metabolism of cortisol.

The other causes of pseudo–Cushing's are less likely to have clinical features of Cushing's syndrome but only have biochemical hypercortisolism.

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Q. 5 What are the tests available for differentiating pseudo-Cushing's from Cushing's syndrome?

Ans. The tests that are used to rule out pseudo–Cushing's syndrome are essentially screening tests for Cushing's syndrome with a relatively greater specificity for identifying Cushing's syndrome.

- *Low-dose dexamethasone test:* In conditions where the probability of pseudo–Cushing's disease is high, LDDST may be an optimal screening test as it has greater specificity as compared to overnight dexamethasone test or 24 hours urine cortisol levels.

  In the LDDST, dexamethasone (0.5 mg) is given every 6 hours for eight doses and the serum cortisol assessed after that. It is important to acknowledge that conditions that alter cortisol-binding globulin levels can interfere with the test results as are ingestion of drugs which alter dexamethasone metabolism. With a cut-off value of 1.8 μg/dL, the sensitivity ranges from 90% to 95%. Not all studies that have explored LDDST have reported similar results, but of the tests available, LDDST is preferred first line test.
- *Midnight serum cortisol:* Midnight serum cortisol value >7.5 ug/dL is diagnostic of Cushing's syndrome. In a study by Papanicolaou, et al. using this cut-off correctly identified 225/234 patients with Cushing's syndrome, while a value less than this cut-off was found in all 23 patients with pseudo-Cushing's states. Thus, the specificity was 100% and the sensitivity was 96%.

  Where there is a low clinical index of suspicion, such as in simple obesity, but lack of suppression on dexamethasone testing and mildly elevated UFC, a sleeping midnight serum cortisol less than 1.8 μg/dL effectively excludes Cushing's syndrome at the time of assessment.
- *Midnight salivary cortisol:* One study examined 11 PM salivary cortisol in 39 patients with proven Cushing's syndrome. The average 11 PM salivary cortisol was 20 times higher in the patients with Cushing's syndrome than the other two groups. Using a cut-off of 3.6 nmol/L (0.13 μg/dL), 36/39 patients with Cushing's syndrome had an elevated value, while 38/39 of the normal volunteers had values less than the cut-off. The sensitivity and specificity of this test was 92% and 96%, respectively. The ability to assay cortisol from saliva is not widely available in India.
- *Dexamethasone-CRH test:* The dexamethasone test takes advantage of the fact that in patients with Cushing's syndrome, dexamethasone ineffectively suppresses the production of pituitary ACTH. CRH stimulates the pituitary to secrete ACTH which leads to an increase in cortisol levels. Patients with Cushing's syndrome have a larger increase in plasma ACTH and cortisol levels than in normal individuals or those patients with pseudo-Cushing's states after injection of CRH.

  In one study 39 patients with Cushing's syndrome and 19 patients with pseudo-Cushing's state underwent the combined test. Patients received dexamethasone (0.5 mg) 4 times a day for 2 days starting at 12 noon (last dose at 6 am). At 8 am on the day of the last dose, the patients received intravenous ovine CRH (1 μg/kg) and cortisol and ACTH were measured at various times.

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A plasma cortisol greater than 1.4 μg/dL (38 nmol/L) measured 15 minutes after the CRH injection correctly identified all patients with Cushing's syndrome, while a value less than 1.4 μg/dL identified all patients with pseudo-Cushing's states (100% sensitivity and specificity). Of course, CRH is difficult to procure in India.

- *Loperamide test:* Loperamide decreases ACTH and cortisol levels. The opiate agonist is given at a dose of 16 mg at 8:30 AM and 3 samples (basal, 180 and 210 min after drug) are obtained. In 41 patients with confirmed Cushing's syndrome, loperamide did not suppress the cortisol levels below 138 nmol/L (5 μg/dL), while in 104 of 110 patients referred for evaluation of Cushing's syndrome, which was subsequently ruled out, the cortisol value suppressed to less than 138 nmol/L (5 μg/dL) at either 150 or 210 min. This test has not been validated nor routinely used in our clinical setting.
  Other tests that have been used but not recommended are Insulin tolerance test, IL-6 test and desmopressin test.

Q. 6 How is the patient in Case 3 managed?

Ans. As the pretest probability of Cushing's syndrome is low and that of pseudo-Cushing's high, she is subjected to midnight serum cortisol which is 1.4 μg/dL and her LDDST is 0.6 μg/dL. Hence, Cushing's syndrome is ruled out and she is followed up.

Q. 7 What is the treatment of pseudo-Cushing's syndrome?

Ans. The treatment essentially consists of treating the underlying cause. Careful interpretation of relevant screening tests are suggested. Serial follow-up of patients and watchful observation of development of any new features of Cushing's syndrome and retesting when appropriate, are recommended.

SUGGESTED READING

1. Ambrosi B, Bochicchio D, Colombo P, Fadin C, Faglia G. Loperamide to diagnose Cushing's syndrome. J Am Med Assoc. 1993;270:2301-2.
2. Groote Veldman R, Meinders AE. On the mechanism of alcohol-induced pseudo-Cushing's syndrome. Endocr Rev. 1996;17:262-8.
3. Grossman JM, Gordon R, Ranganath VK, Deal C, Caplan L, Chen W, et al. American College of Rheumatology 2010 Recommendations for the Prevention and Treatment of Glucocorticoid-Induced Osteoporosis. Arthritis Care Res (Hoboken). 2010;62: 1515-26.
4. Israel E, Banerjee TR, Fitzmaurice GM, et al. Effects of inhaled glucocorticoids on bone density in premenopausal women. N Engl J Med. 2001;345(13):941-7.
5. Jansen TL, Van Roon EN. Four cases of a secondary Cushingoid state following local triamcinolone acetonide (Kenacort) injection. Neth J Med. 2002;60(3):151-3.
6. Jobling AI, Augusteyn RC. What causes steroid cataracts? A review of steroid-induced posterior subcapsular cataracts. Clin Exp Optom. 2002;85(2):61-75.
7. Kumar S, Singh RJ, Reed AM, et al. Cushing's syndrome after intra-articular and intradermal administration of triamcinolone acetonide in three pediatric patients. Pediatrics. 2004;113(6):1820-4.

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8. Laan R, van Reil P, van de Putte L, et al. Low-dose prednisone induces rapid reversible axial bone loss in patients with rheumatoid arthritis. Ann Intern Med. 1993;119(10): 963-8.
9. Lipworth BJ. Systemic adverse effects of inhaled corticosteroid therapy: a systematic review and meta-analysis. Arch Intern Med. 1999;159(9):941-55.
10. Mankin HJ. Nontraumatic necrosis of bone (osteonecrosis). N Engl J Med. 1992;326(22):1473-9.
11. Neiman et al. Guidelines for the diagnosis of Cushing's syndrome. J Clin Endocrinol Metab. 2008;93(5):1526-40.
12. Orth DN, Kovacs WJ. The adrenal cortex. In: Wilson JD (Ed). Williams Textbook of Endocrinology, 9th edn. Philadelphia: WB Saunders Company; 1998. pp. 605-10.
13. S Hopkins RL, Leinung MC. Exogenous Cushing' syndrome and glucocorticoid withdrawal. Endocrinol Metab North Am. 2005;34:371-84.
14. Theodore Friedman. What is Pseudo-Cushing's? Chapter in Adrenal Disorders. Margioris AN, Chrousos GP (Eds).
15. Van Staa T, Leufkens H, Abenhaim L, et al. Use of oral corticosteroids and risk of fractures. J Bone Miner Res. 2000;15:993-1000.
16. Van Staa T, Leufkens H, Cooper C. Use of inhaled corticosteroids and risk of fractures. J Bone Miner Res. 2001;16:581-8.

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Clinical Cases in Endocrinology

This book has been written to inculcate the importance of a proper clinical approach to any case in Endocrinology among students and clinicians. In Endocrinology, the final diagnosis depends on laboratory reports but a correct approach to the case and the decision to order the correct clinical tests and their proper interpretation is the key to approach any case in Endocrinology.

This book is a good guide to understand approach to important cases in Endocrinology for MBBS, MD and DM students. The important topics in Endocrinology have been covered. This can also be used by clinicians to understand complex cases in Endocrinology. This is written in a very concise manner so can be kept in clinics also for ready referencing.

The book has been written by many leading Endocrinologists who are working in various superspecialty hospitals and medical colleges in India and abroad. The cases are the real-world cases, which have been penned down for benefitting the clinicians.

Pramila Kalra MD DM (Endocrinology) MNAMS FACE (USA) is presently working as Professor of Endocrinology at Ramaiah Medical College, Bengaluru, Karnataka, India. She has 13 years of experience in Endocrinology and has been actively involved in DM teaching program, academic case discussions and interaction with many senior Endocrinology professors since then. She is passionate about teaching and designing innovative methods of teaching for students.

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