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Endocrine Disorders and Their Oral Indications: A Comprehensive Review

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Abstract

Cellular metabolism and equilibrium is maintained mainly with the help of endocrine system, which comprises of ductless glands. These glands generate metabolically active hormones. Diabetes mellitus and thyroid gland disorders are most common diseases affecting endocrine system. Periodontal disease, dental caries, xerostomia and burning sensation are some of the oral complications found in such diseases. The purpose of this article is to explain oral manifestations of endocrine disorders and oral considerations in such patients.

Keywords: endocrine disorders, oral manifestations, hormones, gland.

Introduction

Endocrine glands generate metabolically active hormones. These hormones are generated in small quantities but they affect growth, development, immunity and metabolism.[1]. Oral health must be monitored carefully for patients suffering from diabetes mellitus and thyrotoxicosis[2].Deficiency of insulin leads to disturbed metabolism of proteins, fat and carbohydrates, which causes diabetes mellitus.[3] Dysfunction of the thyroid gland is the second most common disease affecting endocrine system and is common in females.[4] Besides diabetes mellitus and thyroid gland disorders, there are some other diseases affecting endocrine system but they are not frequently observed. Addison's disease occurs due to less glucocorticoid and mineralocorticoid hormone generation. Oral health of such patients needs to be carefully monitored during dental treatment.[5]

Disorders of Pituitary Gland

Hyperpituitarism

This disease is caused due to rise in number of granules in acidophilic cells or benign tumour in the anterior lobe of the pituitary gland, which causes hyper function of the anterior lobe of the pituitary gland and it causes excessive secretion of growth hormone in the body. It leads to generalized uniform overgrowth of body parts, known as Gigantism. It mostly affects children. [5] Hyperpituitarism in adults is called Acromegaly. There

can be distortion of face and limbs, associated with systemic complications.[6]

Oral manifestations of Gigantism include dental malocclusion, interdental spacing, unusually prominent forehead, buldging out of the mandible, and hypercementosis of roots.6 In Acromegaly, oral manifestations include increased anterior face height, extended glabella, enlargement of jaw, enlargement of skull, extended mandible, malocclusion, enlarged tongue and interdental spacing. The thickness and height of alveolar bone is increased. Enlarged pulp chambers and excess deposition of cementum on roots can also be observed with the help of intraoral periapical radiographs.[5]

Hypopituitarism

Reduction in the tendency of tissues to respond to growth hormones due to degeneration of anterior pituitary cells, leads to complete or partial loss of anterior and posterior pituitary gland function, and this is known as Hypopituitarism. Craniopharyngioma causes deficiency of growth hormone, and it leads to pituitary dwarfism. Patients, suffering from this disorder, have short stature with normal body proportions because of decreased levels of pituitary hormones.[6] Prepubertal hypopituitary dwarfs mostly suffer from anemia and have low levels of erythropoietin stimulating factor (ESF) in the urine.[7]

The maxilla and mandible are not able to develop properly and are diminished in size. The ramus and condyle are also abnormally smaller in size. The dental arches and dental crown are also not adequately developed and are diminished in size. Dental crowding and malocclusion are common.[2]

Disorders of Thyroid Gland

Hyperthyroidism

Excessive production of thyroxin in the thyroid gland can lead to this disorder, which is also known as thyrotoxicosis. This disorder mostly affects females. The major causes include Graves Disease, toxic thyroid adenoma, multinodular goiter, inflammation of the thyroid gland and excessive consumption of iodine. The metabolic rate of the tissues is elevated due to increased levels of thyroxin in the body.[9]Major clinical features include reduction in body weight, increased appetite, heat intolerance, hair loss, weakness, fatigue, anxiety, tremor, clubbing, sweating of hands, nausea, vomiting and hyperpigmentation of skin. Increased heart rate, systolic hypertension, palpitations and abnormal protusion of the eyeballs can be present.[8]

Oral manifestations include untimely eruption and early loss of deciduous teeth. There is distortion of alveolar bone due to abnormal reduction in bone density.[9] Such patients can suffer from periodontal disease, dental caries, Sjogrens syndrome and burning sensation of tongue.In some cases systemic lupus erythematosus can also be observed.[2] Propylthiouracil and carbimazole are antithyroid agents used in the treatment of such patients. A conservative dental treatment is advisable and consultation with the patient's endocrinologist is suggested.[8]

Hypothyroidism

This disorder occurs due to reduced production of thyroxin by thyroid glands, in the presence of thyroid stimulating hormone. Cretinism is hypothyroidism in children. The mental and physical development is disturbed.[9] Dysgeusia and enlarged lips are observed.[5] Myxedema is hypothyroidism in adults and the major symptoms include swelling of face which is of non pitting type, lethargy, poor concentration, dull and

expressionless face, edema in the periorbital region, less hair and macroglossia .[9]

Delayed tooth eruption, delayed closing of epiphyses and skull sutures, reduction in dimension of roots, blurring of lamina dura , and diminished maxilla and mandible are some of the radiographic features of cretinism. Myxedema shows tooth loss, interdental spacing, external root resorption, macroglossia and inflammation of periodontium.[9]

Disorders of Parathyroid Gland

Hyperparathyroidism

Excessive production of parathyroid hormone (PTH) causes this disorder . A benign tumour in one of the four parathyroid glands causes primary hyperparathyroidism, which is characterized by excessive PTH and hypercalcemia. Secondary hyperparathyroidism occurs due to impaired absorption of vitamin D or improper meals causing hypocalcemia and excessive PTH.[9] The disorder mostly affects females and symptoms include pain in bones, stiffness in joints, pathologic fracture involving mandible, osteoporosis and renal calculi. There is marked reduction in the bone density .[10] In long standing cases, brown tumours, which are normally brown or reddish brown with well-defined margins, are found in facial bones and jaws and can lead to enlargement of the cortical bone.[9] They are composed of hemorrhagic infiltrates and hemosiderin deposits. Changes in bone metabolism, elevated PTH levels and peritrabecular fibrosis leads to the formation of this osteolytic lesion causing pain and swelling. Posterior aspect of mandible is mostly affected .[10] There is a rise in serum alkaline phosphatase levels in the body. [9]

Radiographically, ground glass appearance of jaws is observed in such patients. Interdental spacing, increased tooth mobility and malocclusion are also common in such patients.Bone rarefaction of maxilla and mandible, which is generalized, and abnormal tooth eruption is observed.[5] Other oral manifestations include loss of lamina dura, obstruction of pulp chamber by pulp stone, widening of periodontal ligament and floating radiographic appearance of teeth. In some cases, there can be mineralization of soft tissues .[10]

Hypoparathyroidism

This disorder occurs due to deficiency of PTH. because of trauma or surgical excision of parathyroid glands. The major signs and symptoms include hypocalcemia, numbness of limbs, abnormal sensation around oral cavity, tetany , epilepsy, memory loss and Parkinson's disease. Mineralization of basal ganglia, prolonged tooth development, external root resorption, sharp bend in the root and incomplete development of dental enamel are some of the radiographic findings in such patients.[9] Paresthesia of tongue, enlarged pulp chambers, presence of calcified structures in pulp and reduction in length of roots can be observed. Chronic candidiasis and Chvostek sign can be observed.[5] Calcium and vitamin D supplements are used in the treatment of this disorder.[9]

Disorders of Pancreas

Diabetes Mellitus

It is an endocrine disorder, which is multifactorial, and has two major forms, Type 1,insulin dependent diabetes mellitus or juvenile onset diabetes, and Type 2,non insulin dependent diabetes mellitus. The cause for type 1 diabetes mellitus is deficiency or absence of insulin, which is a hormone generated by beta cells of islets of Langerhans in the pancreas .[9] It mostly affects children and patients below thirty years of age. There is idiopathic attack or autoimmune destruction of beta cells. This disturbs insulin production. Insulin replacement therapy can be helpful. [13] Type 2 diabetes mellitus is because of insulin resistance and the number of beta cells are reduced. There is impaired secretion of

insulin and it disturbs the carbohydrate metabolism.[9] It occurs mostly in obese patients between age of 45 to 64 years. The main causes are obesity due to less physical exercise, excessive alcohol consumption, diet rich in fats, cigarette smoking, hypertension, and high cholesterol levels in the body. There is insulin insensitivity, decreased generation of insulin and distortion of beta cells in pancreas. The rise in insulin resistance and low levels of insulin cause hyperglycaemia.[11]Gestational diabetes mellitus is a condition in which there is presence of glucose intolerance during pregnancy. It occurs due to distortion of insulin signaling pathway causing decreased uptake of glucose.[13]Hyperglycemia and glycosuria are the two major clinical features of this disease.[9] Other clinical features include nausea, vomiting, smell of acetone, weakness, fatigue, cramps, abdominal pain, dehydration, peripheral cyanosis, hypotension, tachycardia, weight loss, hypothermia, lack of coordination, Kussmaul breathing, nephropathy, neuropathy, retinopathy, polyuria, polyphagia, polydipsia and coma. Some of the signs of diabetic retinopathy include development of microaneurysms and neovascularization, which can cause impairment of eyesight.[12]

The oral manifestations of diabetes mellitus are as follows:

1. Periodontitis—The gingival fluid in diabetic patients causes development of microorganisms because there is increased glucose level. The local irritants affect periodontal lesion causing bone loss, suppressed immunity and development of advanced glycosylated end products, which causes deposition of collagen in periodontium resulting in shrinking of lumen of blood vessel. The oxygenation of tissues is reduced and the reaction of tissue to pathogens is impaired with reduced ability for repair, leading to damage of periodontal tissues[3].In diabetic patients, the abnormal regulation of cytokines can be aggravated by periodontitis because of the presence of inflammatory mediators. The toxins produced by bacteria aggrevate inflammation of the gingiva and produce periodontal pocket.[14] There is distortion of phagocytosis and impaired activity of polymorphonuclear leukocytes, macrophages and monocytes. This leads to inflammation, pus collection (abscess formation), increased tooth mobility and destruction of alveolar bone.[3]

2. Delay in wound healing in oral cavity—This occurs due to impaired polymorphonuclear chemotaxis and more formation of collagenase.[3] Insufficient blood supply and delay in removal of dead tissues, lead to delay in wound healing. The deficiency of insulin further aggrevates this condition because insulin itself has the potential to fasten healing process.[14]

3. Dental caries—Some of the major causes of dental caries in diabetic patients are increased salivary glucose levels, thick saliva due to increased glucose, decreased flow of saliva, xerostomia, and existence of microbial plaque. Some of the frequently identified bacteria in oral cavity of diabetic patients are Streptococcus mutans, Streptococcus intermedius, and Streptococcus sanguis.[14]

4. Xerostomia—There is decreased quantity of saliva and self consciousness of the patient regarding oral dryness where the range of flow rate of saliva is 0.10-0.01 milliliter per minute and this condition is called hyposalivation. Microangiopathy and autonomic neuropathy causes impairment of the microcirculation of tissues of salivary gland and autonomic innervations, which leads to hypofunction of salivary gland. The use of xerogenic medication can aggrevate this condition.[14]

5. Changes in the tongue--Geographic tongue, also called benign migratory glossitis, can occur in diabetic patients. The tongue show erythematous region

surrounded by white, hyperkeratotic, serpiginous margins and there is deterioration of filiform papillae on the dorsum of the tongue. It is a benign lesion. Burning sensation in the oral cavity is one of the major feature of this benign inflammatory condition.[14]

6. Fungal infection—In diabetic patients, median rhomboid glossitis can be observed. In this disease, the dorsal surface of the tongue exhibits erythematous and depapillated region of atrophic mucosa. The lesion is well-defined, symmetrical and oval or rhomboid in shape. It is present in front of circumvallated papillae and has smooth, shiny surface.[14]

7.Dry socket—Dry socket, also known as alveolar osteitis is a postextraction complication of tooth extraction, in which exposed bone is not shielded by a blood clot or recovering epithelium .It is common in mandible. If there is dislodgment of blood clot after the process of tooth extraction, it leads to dry socket. Atherosclerosis in diabetic patients is one of the major causes of decreased blood supply.[14]

Sulfonylureas (acetohexamide, gliclazide, glimepiride), Biguanides (buformin, metformin) and Meglitinides (nateglinide) are some of the oral antidiabetic agents used in the treatment.[12]

Disorders of Adrenal Gland

Addison 's disease

Deficiency of steroid hormones cortisol and aldosterone, which are secreted by adrenal glands (adrenal cortex),leads to primary adrenal failure, which is known as Addison's disease. It is an autoimmune disease. The clinical features include nausea, vomiting, weight loss, fatigue, headache, dehydration, hyperpigmentation, pain in abdomen, muscles and joints. The maintenance of blood pressure, water and salt balance is controlled by aldosterone. Its deficiency causes hyperkalemia and hyponatraemia.. [15]

Oral manifestations include multifocal pigmentation in the oral cavity, mostly affecting buccal mucosa and alveolar ridge mucosa. There can be presence of dark brown maculae on the labial mucosa and alveolar ridge mucosa. Melanotic maculae in the oral cavity are mostly present on labial mucosa and mostly affects females. They are focal, flat, pigmented lesions, which are smaller than 1cm in diameter. There is marked increase in the generation of melanin but the number of melanocytes remain the same.[15]

Cushing's Syndrome

Overproduction of glucocorticoids by the adrenal glands cause this syndrome. Adrenal carcinoma, adrenal adenoma and adrenal hyperplasia are some of the causes of this disorder. Excessive consumption of corticosteroids can also result in this disorder. The normal activity of osteoblasts is impaired resulting in decreased bone mass. It commonly occurs in females, mostly in third or fourth decade of life. The clinical features include abdominal obesity, but with thin arms and legs, abnormal curvature of thoracic spine, growth of fat pads on the face, reddish or purple stretch marks, hypertension and glucose intolerance. Buffalo hump like appearance is common.[9] Osteoporosis and pathologic fractures are common in this syndrome. Impairment of cognition like memory loss, lack of concentration, and loss of motivation can also occur. Depression and disturbed sleep is common in such patients.[6]

One of the major oral manifestation of this disorder is facial plethora, resulting in round, moon-shaped appearance of the face. There is hindrance in the skeletal and dental development of the patient. There is damage to capillaries causing hematoma. Immunosuppresion causing oral candidiasis, herpes zoster infection, slow healing of wounds, gingivitis and periodontitis can occur. [6] There is weakening of bones showing granular

bone pattern in the radiograph. The radiographic feature also includes diffuse thinning and spotted appearance of the skull. There is absence of lamina dura.[9] In some cases, there is damage of the epithelium causing development of oral ulcers. Immunomodulators, specifically immunostimulants, are used in the treatment of oral ulcers in Cushing's syndrome.[16]

Conclusion

Proper attentiveness for appearance of features of hormone toxicity, reduction of stress and understanding of adverse effects of medications are some of the important steps taken during treatment of such patients. Even if there is no coexisting condition, modifications in the dental treatment is important for patients who are suffering from endocrine disorder.[4] Oral cavity is one of the important sites of human body, where manifestations caused by endocrine disorders can be observed.[14] Such patients should undergo periodic dental check up, follow suggestions regarding diet and oral hygiene instructions.[10]

References

1. Misra SR, Oral manifestations of endocrine and etabolic diseases. Indian J Public Health Res Dev.2019;10(11):1189-1191
2. Prabhu HS,Thiruneervannan, R, Premkumar B,J. Oral manifestations of endocrine disorders. Int J Recent Sci Res.2016;7(10):13697-13699
3. Babu K, Krithika A, Dsouza L, Preethi P, Bhandarkar G, Rao PK, et al. Oral manifestations in diabetes mellitus. Dentist 2019;1(2):028-030
4. Chandna S, Bathla M. Oral manifestations of thyroid disorders and its management.Indian J Endocr Metab 2011;15:S113-6
5. Kesidi S, Bhayya H. Oral manifestations of endocrine disorders. Int. J. Appl. Dent. Sci.2019;5(2):476-478
6. Choudhary A, Raina K, Thakur M. Oral manifestations of endocrine system. IJDSIR 2019;2(5):295-303
7. Jepson JH, McGarry EE. Hemopoiesis in pituitary dwarfs treated with human growth hormone and testosterone. Blood 1972;39(2):238-248
8. Carlos Fabue L, Jiménez Soriano Y, Sarrión Pérez MG. Dental management of patients with endocrine disorders. J Clin Exp Dent.2010;2(4):e196-203.
9. White SC, Pharoah MJ. Oral Radiology:Principles and interpretation. 5th edn. India: Elsevier; 2004.p.517-523
10. Mittal S, Gupta D, Sekhri S, Goyal S.Oral manifestations of parathyroid disorders and its dental management. J Dent Allied Sci 2014:3:34-8
11. Olokoba A, Obateru O, Olokoba L. Type 2 diabetes mellitus:a review of current trends. Oman Med J.2012;27(4):269-273
12. Vikas B, Sasidhar J, Reddy C, N D. Diabetes mellitus, its complications and management.wjpmr 2017;3(4):123-130
13. Abutaleb MH. Diabetes mellitus:an overview. Pharm Pharmacol Int J. 2016;4(5):406-411
14. Ahmad P, Akhtar U, Chaudhry A, Rahid U, Saif S, Asif JA. Repercussions of diabetes mellitus on the oral cavity. Eur J Gen Dent 2019;8:55-62
15. Lanza A, Heulfe I, Perillo L, Ermo A, Cirillo N. Oral pigmentation as a sign of Addison's disease:a brief reappraisal. Open Dermatol. J. 2009;3:3-6
16. Panwar M, Dias JJ, Sharma R. Management of oral manifestations in a case of Cushing's Habitus. Int J Experiment Dent Sci 2018;7(1):35-38