**Adrenal Glands**

**Dr.Methaq A.M.Hussein**

 **MRCP(UK), Endocrine ,D.M (LONDON )F.I.B.M.S,ASSIST.PROFESSOR**

 *The body has two adrenal glands, one near the top of each kidney. The inner part (medulla) of the adrenal glands secretes hormones, such as adrenaline (epinephrine), that help control blood pressure, heart rate, sweating, and other activities also regulated by the sympathetic nervous system. The outer part (cortex) secretes different hormones, including corticosteroids (cortisone-like hormones, such as cortisol) and mineralocorticoids (particularly aldosterone, which controls blood pressure and the levels of salt [sodium chloride] and potassium in the body). The adrenal glands also play a role in stimulating the production of androgens (testosterone and similar hormones*

*The adrenal glands are controlled in part by the brain. The hypothalamus, produces corticotropin-releasing hormone and vasopressin (also known as antidiuretic hormone). These two hormones trigger the pituitary gland to secretecorticotropin (also known as adrenocorticotropic hormone or ACTH), which stimulates the adrenal glands to produce corticosteroids. The renin-angiotensin-aldosterone system, regulated mostly by the kidneys, causes the adrenal glands to produce more or less aldosterone.*

*The body controls the levels of corticosteroids according to need. The levels tend to be much higher in the early morning than later in the day. When the body is stressed, from illness or otherwise, the levels of corticosteroids increase dramatically.*

CUSHING’S SYNDROME

**What are Cushing’s syndrome and Cushing’s disease?**

Cushing’s syndrome is a rare condition that occurs when there

*is excess cortisol in the body. Cortisol is a hormone normally*

*made by the adrenal glands and is necessary for life. It allows us*

*to respond to stressful situations such as illness or injury, and*

*has effects on almost all body tissues. It is produced in varying*

*amounts over the course of the day, most in the early morning,*

*with very little at night.*

*Cushing’s syndrome refers to the condition caused by excess*

*cortisol in the body, regardless of the cause. When Cushing’s*

*syndrome is caused by a pituitary tumor, it is called Cushing’s*

 *disease.*

*Cushing’s syndrome is more often found in women than in*

*men and often occurs between the ages of 20 and 40*.

**What causes Cushing’s syndrome and Cushing’s disease?**

Cushing’s syndrome can be caused by cortisol-like medications (called

*glucocorticoids) or by a tumor. Sometimes, there is a tumor of the adrenal*

*gland(s) that makes too much cortisol. Cushing’s syndrome may also be caused*

*by a tumor in the pituitary gland (a small gland under the brain that produces*

*hormones that in turn regulate the body’s other hormone glands). Some pituitary*

*tumors produce a hormone called adrenocorticotropic hormone (ACTH), which*

*stimulates the adrenal glands and causes them to make too much cortisol. This is*

*termed Cushing’s disease. ACTH-producing tumors can also originate elsewhere*

*in the body and these are referred to as ectopic tumors*

**What are the symptoms of Cushing’s syndrome**

**COMMON FEATURES LESS COMMON FEATURES**

**Weight gain Insomnia**

**Hypertension Recurrent infection**

**Poor short-term memory Thin skin and stretch marks**

**Irritability Easy bruising**

**Excess hair growth (women) Depression**

**Red, ruddy face Weak bones**

**Extra fat around neck Acne**

**Round face Balding (women)**

**Fatigue Hip and shoulder weakness**

**Poorconcentration Swelling of feet/legs**

**Menstrual irregularity Diabetes**

**How is Cushing’s syndrome diagnosed?**

Because not all people with Cushing’s syndrome have all signs and symptoms,

 *doctors use laboratory tests to help diagnose Cushing’s*

*syndrome and, if that diagnosis is made, go on to determine whether it is*

*caused by Cushing’s disease (i.e., from a pituitary tumor).*

*The most commonly used tests measure the amount of cortisol in the saliva or*

*urine. It is also possible to check whether there is over-production of cortisol by*

*giving a medication called dexamethasone that mimics cortisol. This is called a*

*dexamethasone suppression test. If the body is regulating cortisol correctly, the*

*cortisol levels will decrease, but this will not happen in someone with Cushing’s*

*syndrome.*

*These tests are not always able to definitively diagnose Cushing’s syndrome*

*because other illnesses or problems can cause excess cortisol or abnormal*

*control of cortisol production. These conditions that mimic Cushing’s*

*syndrome are called ‘pseudo-Cushing’s states’ a*

 *Because of the overlap in symptoms and laboratory test results*

*between Cushing’s syndrome and pseudo-Cushing’s states, doctors may have to*

*do a number of tests and may treat pseudo-Cushing’s states – such as depression*

*– to see if the high cortisol levels become normal during treatment. If they do*

*not, and especially if the physical features get worse, it is more likely that the*

*person has true Cushing’s syndrome*

**Pseudo-Cushing’s states**

Depression.pregnancy,obesity,alcoholism,strenios excersize,uncontrolled diabetes and sleep apnea

**What tests are needed specifically to diagnose Cushing’s disease?**

*Patients with adrenal causes of Cushing’s syndrome have low blood ACTH*

*levels and patients with the other causes of Cushing’s syndrome have normal or*

*high levels. A doctor can measure the level of ACTH in the blood; measuring*

*the ACTH levels helps to determine if the tumor is in the adrenal gland(s) or*

*elsewhere in the body.*

*The best test to distinguish an ACTH-producing tumor in the pituitary from*

*one in another part of the body is a procedure called inferior petrosal sinus*

*sampling, or IPSS. This test involves inserting small plastic tubes into both the*

*right- and left-sided veins in the groin (or neck) and threading them up to the*

*veins near the pituitary gland. Blood is then taken from these locations and also*

*from a vein not close to the pituitary gland.*

*During the procedure, a medication that increases ACTH levels from the*

*pituitary is injected. By comparing the levels of ACTH produced close to*

*the pituitary gland in response to the medication with those produced by*

*other parts of the body, the presence or absence of a pituitary tumor can be*

*determined.*

*There are other tests used for the diagnosis of Cushing’s disease, such as the*

*dexamethasone suppression and corticotropin-releasing hormone (CRH)*

*stimulation tests. However, these are not as reliable as IPSS to distinguish*

*between the causes. A doctor may want to do multiple tests to confirm the*

*results.*

*It is also possible to visualize the pituitary gland using a process called magnetic*

*resonance imaging (MRI). This involves an injection of a contrast agent that*

*will help the tumor to show up on the MRI scan (*

*If this test shows a definite tumor and the CRH and dexamethasone test results*

*are compatible with Cushing’s disease, IPSS may not be needed.* ***However, up***

***to 10% of healthy people have an abnormal area on their pituitary consistent***

***with a tumor. Therefore, the presence of an abnormality alone is not diagnostic***

***of Cushing’s disease.*** *Also, in about 50% of patients with Cushing’s disease, the*

*tumor is too small to be seen. Thus the absence of a tumor on a MRI scan does*

*not necessarily exclude Cushing’s disease*

**What are the treatment options for Cushing’s disease**

**?**

**The best way to cure the tumor is by surgically** *removing it, but there are other 1.*

*ways to control the tumor and effects of excess cortisol. In addition, there*

*are other complementary approaches that may be used to treat some of the*

*symptoms. For example, diabetes, depression and high blood pressure will be*

*treated with the usual medicines used for these conditions. Also, doctors may*

*prescribe calcium or vitamin D supplements, or other medicine to prevent*

*thinning of the bone*

**Other options for treatment include radiation therapy to the entire pituitary 2.**

gland or targeted radiation therapy (called radiosurgery

***3.medical treatment*** *: l. These medications include*

***ketoconazole, metyrapone and/or occasionally mitotane.*** *Gastrointestinal*

***complaints such as nausea, lack of interest in eating, and diarrhea can occur***

***with each of these. Ketoconazole can damage the liver, so blood tests are done***

***to monitor liver function. Metyrapone can cause excess hair growth in women***

***and high blood pressure in both men and women. At high doses, mitotane***

***can cause problems with coordination and thinking and it also can cause birth***

***defects or abortion. Neither ketoconazole nor mitotane should be given to a***

***woman who would like to have children in the near future.***

***new medications***

***pasireotide, may act to both stop tumor growth and lower ACTH***

***production. Since it does not kill the tumor, it has to be given indefinitely. One***

***of the important side effects of pasireotide is that it can raise blood sugar levels;***

*therefore, blood sugar levels must be carefully monitored. Pasireotide is* ***FDAapproved***

***for the treatment of Cushing’s disease***

***Cabergoline***

***mifepristone, does not affect the***

***tumor itself but blocks the effects of cortisol in the entire body, and improves***

***the complications associated with excess cortisol. It is approved for the***

***treatment of high blood sugar caused by Cushing’s syndrome.***