

Adrenal Insufficiency after Pituitary Surgery

basic level

Overview

Patients who have a tumor in or around the pituitary gland may develop adrenal insufficiency after surgery to remove the tumor. Adrenal insufficiency occurs when the adrenal glands do not produce enough steroids needed by the body. Symptoms include fatigue, muscle weakness, loss of appetite, and weight loss.

What is adrenal insufficiency?

The body has two adrenal glands, one located on top of each kidney. The adrenal glands work with the brain's hypothalamus and pituitary gland to control the release of steroids (cortisol) into the bloodstream. This relationship is called the hypothalamus-pituitary-adrenal axis, or HPA axis (Fig. 1).

Cortisol is important to help the body respond to stress. It also helps regulate:

- blood pressure
- immune system inflammatory response
- blood sugar control
- metabolism of proteins, carbohydrates, and fats

Adrenal insufficiency can either be primary (failure at the level of the adrenal gland) or secondary (failure at the level of the pituitary gland). Following pituitary tumor surgery some patients develop secondary adrenal insufficiency.

What are the symptoms?

The symptoms of adrenal insufficiency include low blood pressure, dizziness with standing, nausea, vomiting, and fatigue.

What are the causes?

Manipulation or damage to the pituitary gland during surgery may prevent the proper secretion of ACTH. This lack of ACTH disrupts the HPA axis and the secretion of cortisol.

Who is affected?

Adrenal insufficiency can be seen before surgery in patients with large tumors. It can also be seen after any type of pituitary surgery though it is more common in ACTH-secreting tumors.

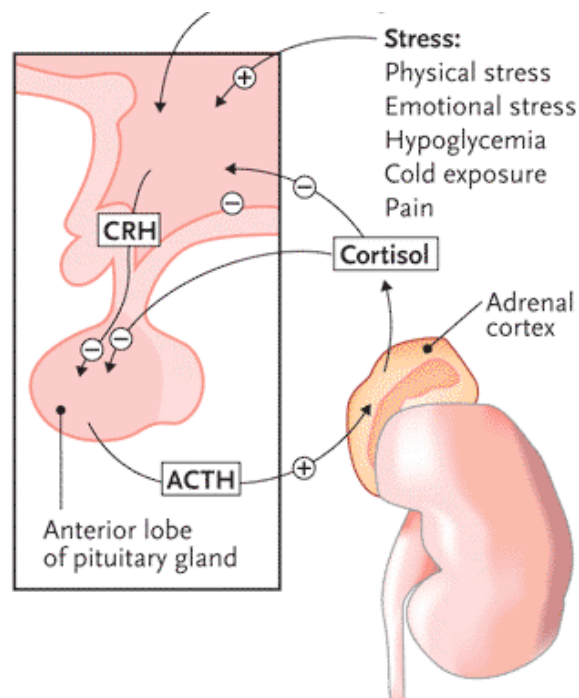


Figure 1. The hypothalamus-pituitary-adrenal axis.

The hypothalamus releases a hormone called corticotrophin-releasing hormone (CRH) that stimulates the anterior pituitary gland to release adrenocorticotropic hormone (ACTH). ACTH acts on the adrenal glands to release cortisol.

How is a diagnosis made?

Adrenal insufficiency is evaluated by measuring the rhythmic elevations of cortisol before and after surgery. Cortisol levels rise and fall during the day, repeating in a 24-hour cycle. The body releases the most cortisol in the early morning hours so it is available for certain metabolic reactions and emotional and physical stressors throughout the day. Lowest levels occur around midnight.

Blood samples are drawn at 8:00 a.m. to measure the amount of cortisol the body is producing on its own. By checking the cortisol in the morning we can see how much the body has for the rest of the day. The body requires about 25 mg of cortisol to function appropriately throughout the day.

What treatments are available?

Treatment of adrenal insufficiency involves replacing the hormones that the adrenal glands are not making. If your cortisol level is low after surgery, you will be prescribed hydrocortisone, a steroid medication similar to the one naturally produced by the body. If your cortisol level is high, then steroid replacement is not required.

If you experience any new symptoms while recovering at home, please call your endocrinologist or neurosurgeon.

If you are prescribed steroid medication, it is very important to follow the instructions below¹:

1. Take the medication as ordered, on a daily basis. DO NOT STOP taking the medication unless directed by your physician. Abruptly stopping your medication can lead to a life-threatening emergency called Addisonian Crisis:
 - Sudden pain in low back, abdomen, or legs
 - Severe vomiting and diarrhea
 - Dehydration
 - Low blood pressure
 - Loss of consciousness
2. Stomach irritation is a potential side effect of steroid therapy. Medications such as famotidine, protonazole or omeprazole help prevent stomach problems.
3. If you notice the presence of tarry stools, notify your physician immediately.
4. Some patients may develop hyperglycemia when taking steroid replacement. Talk to your health care team about monitoring your blood sugars and if you need medication to control them while you are on steroid therapy.

Recovery & prevention

Adrenal insufficiency can either be temporary or permanent after pituitary surgery. Follow up care with an endocrinologist is important after pituitary surgery. The endocrinologist will conduct a history and physical exam, as well as frequently check your blood levels to determine if you need to continue or start steroid replacement. Adrenal insufficiency can be easily managed under the direction and supervision of a health care team. However, the long-term use of steroids requires patient education to monitor for side effects, such as decreased wound healing and increased blood sugars. If you experience any of these side effects or any other symptoms that are new while you are on steroids,

then you need to contact your medical provider immediately for evaluation and management.

Sources & links

If you have questions, please contact the Mayfield Clinic at 800-325-7787 or 513-221-1100. For information about the University of Cincinnati Neuroscience Institute's Brain Tumor Center, call 866-941-8264.

Sources

1. Hickey, J. The Clinical Practice of Neurological and Neurosurgical Nursing, pp. 336-339, 2003

Glossary

Addison's disease (primary adrenal insufficiency): an endocrine disorder that occurs when the adrenal glands do not produce enough cortisol and aldosterone hormones. Hallmark signs are bronzing of the skin, anemia, weakness, and low blood pressure.

secondary adrenal insufficiency: an endocrine disorder that occurs when the pituitary gland does not produce enough ACTH, a hormone that stimulates the adrenal glands to release cortisol.

cortisol: a hormone produced by the adrenal glands that helps the body respond to stress and regulates blood sugar, blood pressure, metabolism, and the immune system.

Cushing's disease: an endocrine disorder caused by increased levels of cortisol in the body; often from an adrenocorticotropic hormone (ACTH)-secreting pituitary tumor. Hallmark signs include a fatty hump between the shoulders, a rounded face, and pink or purple stretch marks on the skin. Also caused by excessive use of corticosteroid medication.

hormone: a chemical substance produced in the body that controls and regulates the activity of certain cells or organs.

hypothalamus: a part of the brain that regulates pituitary hormone responses by secreting releasing factors or inhibiting factors, depending on the needs of the body.

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reviewed by > Tara Orgon Stamper, NP
Naila Goldenberg, MD
Sona Sharma, MD



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506 Oak Street • Cincinnati, OH 45219
513.221.1100 • 800.325.7787