



CURRENT MAJOR DISEASES RELATED TO HORMONAL IMBALANCE

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ABSTRACT

Hormonal imbalances occur when there is too much or too little of a hormone in the bloodstream. Because of their essential role in the body, even slight hormonal imbalances can cause side effects throughout the body. Hormones are chemicals produced by glands in the endocrine system. Hormones travel through the bloodstream to the tissues and organs, delivering messages that tell the organs what to do and when to do it. Hormonal imbalances are associated with many chronic, long term and rare health conditions. Endocrine disorders occur when the endocrine system does not function properly, resulting in hormone imbalances. These disorders can cause a variety of symptoms, depending on which glands or organs are involved. Treatments include medications to correct hormone imbalances, surgical procedures, and lifestyle changes.

Key words: Hormone, Endocrine system, Osteoporosis, Thyroiditis, Prolactinoma.

❖ **DEFINITION:**

A hormonal imbalance happens when there is any difference in release of hormones and also too much or too little of one or more hormones in the body's chemical messengers

CAUSES OF HORMONAL IMABALANCE:

s.no	causes
1	Unhealthy diet
2	Excessive stress
3	High % of fat
4	Pituitary tumors
5	Type1 and type2 diabetes
6	Hereditary pancreatitis
7	Injury to endocrine gland

Table no(1): causes of hormonal imbalance

Hormonal imbalance in females: Women often experience hormonal imbalance at predictable and naturally occurring points in their lives –menstruation ,puberty, pregnancy, menopause. Medical conditions, lifestyle habits, environmental conditions and endocrine gland malfunctions can be other causes of hormonal imbalance in females cause include:

1. Toxins , pollutants, herbicides and pesticides
2. Severe allergic reactions
3. Abuse of anabolic steroid medications
4. Having only one functional x chromosome
5. Deficient levels of iodine
6. Chemotherapy or radiation
7. Too much or too little of glucagon
8. Anorexia
9. Benign tumors or cysts that effect endocrine gland
10. Cancers that impact endocrine gland
11. High levels of iodine
12. Phytoestrogens , natural plant estrogens in say product
13. High levels of glucagon.

Some medical conditions like:

1. Ovarian cancer
2. PCOS
3. Early Menopause
4. Hormonal replacement
5. Birth control medications
6. Primary ovarian insufficiency

Over exercising can increase ones stress hormones and raise the risk of muscle loss, injury , fatigue.

Hormonal imbalances are associated with many chronic or long term, Rare health conditions

COMMON	CHRONIC	RARE
Type 1 and type 2 diabetes	Acromegaly	Osteoporosis
High bp	Adrenal Insufficiency and addison's disease	Rathke's cleft cyst
Diabetes insipidus	Cushing's syndrome	Thyroiditis
Heart diseases	Cystic fibrosis	Non functional pituitary adenoma
High cholesterol	Grave's disease	Prolactinoma
Obesity	Hashimoto's disease	

Table no(2): common, chronic, rare diseases caused by hormonal imbalance

➤ **Osteoporosis:**

Introduction:

Osteoporosis is a progressive systemic skeletal disease characterized by the reduced bone mass/ density and micro architectural deterioration of bone tissue . The term osteoporosis comes from the greek word osteon, meaning bone, porous, meaning pore or passage . osteoporosis literally makes the bone porous . the amount of calcium stored in human bones decreases over time, causing the skeleton to weaken.

Osteoporosis is a progressive systemic skeletal disease characterized by the reduced bone mass / density and micro architectural deterioration of bone tissue. Bone formation initially exceeds bone resorption, but by the third decade this has reversed resulting in a net loss of bone mass. This leads to an increased bone fragility and susceptibility to fracture^[1]

Osteoporotic(Fragility) fractures are fractures that result from mechanical forces that would not ordinarily result in fracture . Osteoporotic fractures are defines as fractures associated with low bone mineral density (BMD) and include spine , fore arm a shoulder fractures.^[2]

Incidence:

The incidence of osteoporosis in postmenopausal women continues to increase with progressively aging populations .currently, it is estimates that over 20 million people world wide have osteoporosis . and 40 million of these are in united states . The reduction in bone strength associated with disease markedly increases the risk of skeletal and non skeletal fractures, and consequent pain and loss of function impinge adversely on the quality of life . In the united states and European union, about 30% of all postmenopausal women have osteoporosis , and it has been predicted that more than 40% of them will suffer one or more fragility fractures during their remaining lifetime approximately 1.5 million fractures annually are attributed to osteoporosis in the united states. In the European union, in the year 2000^[3-5]

Diagnosis : Osteoporosis can be diagnosed in different ways, for example:

X-rays

Bone mineral density scans

Blood tests

Osteoporosis is associated with decreased bone strength , which is a consequence of bone density and density. Many prospective studies have shown that there is a significant correlation between low bone mineral density (BMD) and fracture frequency^[6] .current diagnosis of osteoporosis is largely baqsed on measurement of BMD , using dual energy X – ray absorptiometry (DXA) of the hip or lumbar spine. An individual BMD value compared with the mean of health young population in terms of the number of standard deviations (SD) Is termed as the T- score. The world health organization (WHO) has defined osteoporosis as a T – score less than $-2.5SD$ ^[7]

Causes: Osteoporosis can have a number of causes:

Too little calcium

Vitamin d or other nutrients to build bones.

Underlying medical conditions that change the collagen in bones (for example osteogenesis imperfecta)

Medications that slow down the rate at which new bone is created

Treatment:

An increased understanding of the pathophysiology of osteoporosis has lead to the development of treatments targeting BMD , bone turnover, an fracture. Many large trails have shown that a variety of agents reduce the incidence of new fractures between 30% and 50%in women at high risk of subsequent fractures ^[8-9] less attention has been paid to the outcomes of treatment in postmenopausal women without previous fractures, but there is now some evidence from randomized , double –blind , placebo- controlled trails that vertebral fracture rates can be significantly reduced following treatment ^{:[10-11]}

Pharmacological agents used in the treatment of osteoporosis include antiresorptive agents such as biphosphonates, selective estrogen receptor modulators(SERM), raloxifene, and calcitonin, bone- forming gents such as fluoride and parathyroid hormone, and more recently , a new chemical entity, strontium ranelate, which both increases bone formation and decreases bone resorption . despite of evidence for efficacy of these treatment for osteoporosis, intervention is not optimal , even in women with a history of fracture .

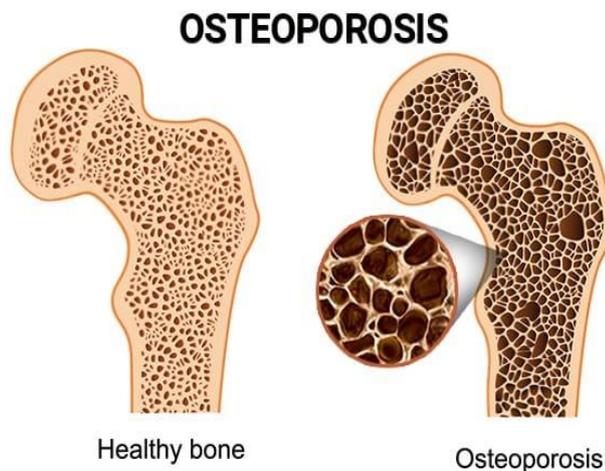


Figure no(1): difference between normal bone and osteoporosis

- **Rathke's cleft cysts:**

Rathke's cleft cysts is also known as Pars intermedia cysts, are non- neoplastic , sellar or suprasellar epithelium –lined cysts arising from the embryologic remnants of rathke pouch in the pituitary gland . RCC is a not-so-common pituitary development disorder. Rathke's cleft cyst is a benign growth found on the pituitary gland in the brain , specially a fluid filled cyst in the posterior portion of the anterior pituitary gland

CAUSES: It mainly occurs when the rathke's pouch does not develop properly , ranges in size from 2-40mm in diameter. Asymptomatic cysts are common and females are twice as likely as males to have a cyst

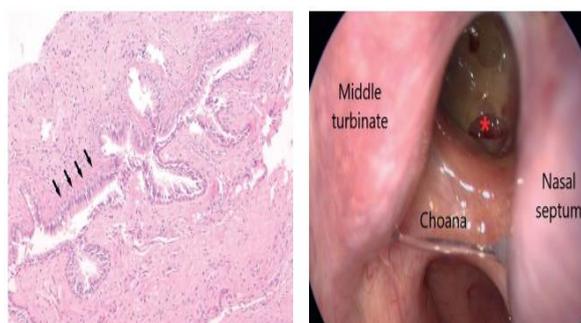


Figure no(2):representation of Rathke's cleft cyst

Diagnosis:

RCC inclues craniopharyngioma

Cystic pituitary adenoma

Other neoplastic cysts

RCC are typically diagnosed with an MRI or CT imaging of brain

RCC are sometimes first misdiagnosed as pituitary gland tumors

Blood tests to check hormone levels and exams to check vision might also be done

Treatment:

Treatment of RCC depends upon symptoms . small RCC's that do not cause any symptoms do not require treatment.

Larger RCC's that are causing symptoms may require surgery, which could include draining and removal of cyst

Cortisol replacement in the form of tab hydrocortisone

Oestrogen was not given as patient did not want to have menstruation

Taking tab cabergoline (0.5mg) twice a week

Taking tab thyroxin (50mcg) once a day was started for central hypothyroidism

Changes in cyst volume and diameter over time were analysed with a one –way analysis of variance (ANOVA)

❖ THYROIDITIS:

Definition:

Thyroiditis is a general term that refers to the “ inflammation of thyroid gland “. Thyroiditis includes a group of individual disorders causing thyroidal inflammation but presenting in different ways

Types:

Types of thyroiditis include:

- Hashimoto's thyroiditis: This is an autoimmune condition , also called as chronic lymphocytic thyroiditis , it's the most common form of thyroiditis , is caused by antithyroid antibodies . it's the most common form of thyroiditis and the most common cause of hypothyroidism.
- Silent or painless thyroiditis: This is an autoimmune condition caused by antithyroid antibodies that can occur within one year after giving birth. It's relatively rare.
- Radiation – induced thyroiditis: This is a condition caused by radiation therapy used as a medical treatment for certain cancers or by radioactive iodine used to treat hypothyroidism.
- Subacute thyroiditis or de quervain's thyroiditis: This is an often painful condition thought to be caused by a virus. It's usually preceded by upper respiratory infections.
- Acute infectious thyroiditis: This is a rare condition caused by an infectious organism or bacterium.
- Drug- induced thyroiditis: This is a condition caused by the use of medications such as amiodarone, interferons, lithium and cytokines. It only occurs in a small fraction of people using these drugs.

- Riedel thyroiditis: This is a rare disease caused by chronic inflammation and fibrosis of your thyroid gland. Fibrosis is the thickening or scarring of tissue.

Affects: Thyroiditis can affect anyone, but it more commonly affects people assigned female at birth (AFAB)- Especially adults.

Symptoms Of Thyroiditis:

1. Fast heart rate
2. Increased appetite
3. Unexplained weight loss
4. Anxiety and nervousness
5. Irritability
6. Trouble sleeping
7. Increased sweating and sensitivity to heat
8. Tremors

Diagnosis:

1. Thyroid function tests
2. Thyroid ultrasound
3. Thyroid antibody tests
4. Erythrocyte sedimentation rate (ESR or sed rate)
5. C-reactive protein (CRP)
6. Radioactive iodine uptake (RAIU) test

Treatment:

The treatment for thyroiditis depends on the type and the symptoms . **Thyrotoxicosis:** Treatment for thyroiditis is -If you're in the thyrotoxic phase of thyroiditis , your provider may prescribe beta- blockers to decrease palpitations (fast heart rate) and tremors .If you have hashimoto's thyroiditis , your provider will prescribe thyroid hormone replacement medication , such as levothyroxine . you'll likely have to take this medication for the rest of your life since the hypothyroidism from hashimoto's thyroiditis is usually present .

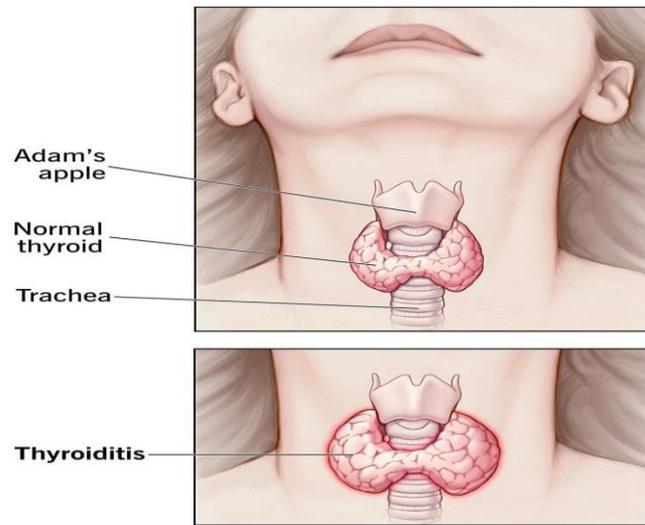
Thyroiditis

Figure no(3):Representation of thyroiditis

❖ **NONFUNCTIONAL PITUITARY ADENOMA :****Introduction:**

A nonfunctioning pituitary adenoma (NFA) is a benign growth in the pituitary gland that does not produce any excessive hormone into the blood and is not cancerous. Non-functioning pituitary adenomas (NFPA's) are benign tumors arising from the adenohypophyseal cells characterized by the absence of clinical evidence of hormonal data, the estimated prevalence of NFPA's is 7-41.3 cases / 1,00,000 and the annual incidence is 0.6-2.34 cases / 1,00,000^[12-14].



Figure no (4): representation of NFPA

Incidence:

The incidence of NFPA's has increased over time , most probably due to an increasing number of incidentally discovered adenomas on brain imaging performed for unrelated reasons(pituitary incidentalomas.)

Symptoms:

The patients with symptomatic NFPA's commonly present with symptoms related to mass effect of surrounding structures, including headache, visual defects, and hypopituitarism.[15]

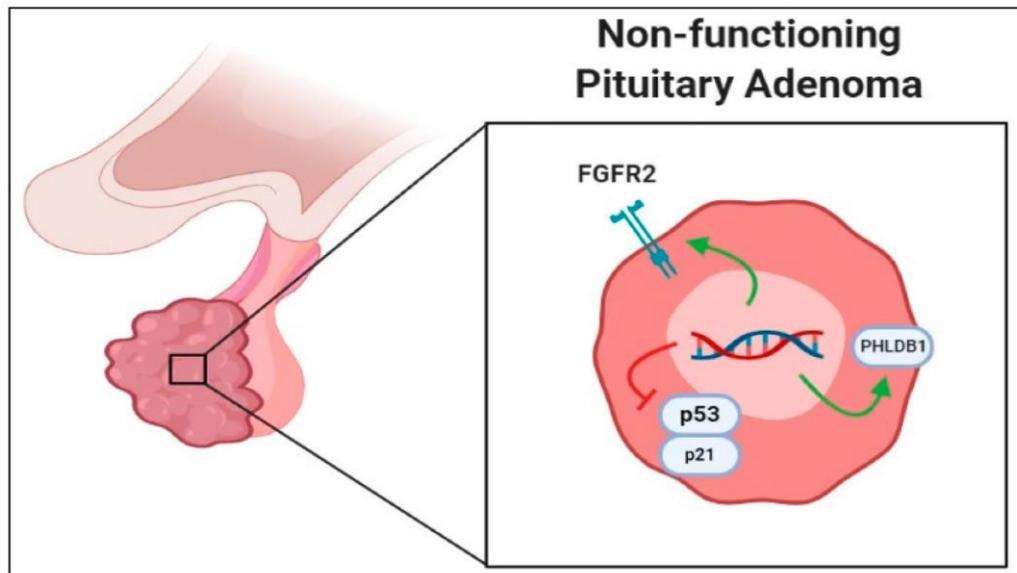


Figure no(5): non-functional pituitary adenoma

Treatment:

In spite of current knowledge of definite NFPA's pathologic subtypes, initial treatment strategies are similar regardless of subset

Surgery: Surgical resection is the primary treatment for symptomatic patients with NFPA's .i.e; those with neuro optomologic complaints or tumors affecting the optic pathway . Surgery is also urgently indicated for patients with apoplexy who develop neuro – ophthalmologic complaints . Tumors larger than 2cm should also be considered for surgery due to their propensity for growth .Pituitary function should be reassessed 1-3 months after surgery and treatment of hypopituitarism introduced according to hormone deficiencies ^[18]

Radiotherapy: Radiation therapy has been showed to be effective as an adjunct to surgical resection in case of post- operative residual tumor^[19]

Asymptomatic tumors: The best treatment strategy for an asymptomatic NFPA is not at defined since there are few natural history studies

This can also be done by:

Asymptomatic tumors

Medical therapy

Dopamine agonists

Somatostatin analogues

Temozolomide

GnRh analogues

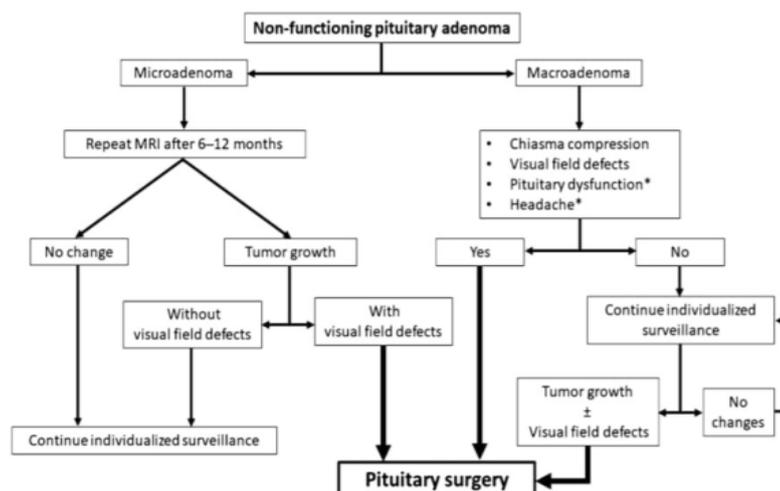


figure no (6) Indication for pituitary surgery in patients with non-functioning pituitary adenomas.

Causes:

Macroadenomas can cause impairment of pituitary function by the involvement of normal gland or pituitary stalk compression, and the risk of hypopituitarism is directly related to tumor volume. microadenomas between 6 and 9 mm eventually lead to pituitary dysfunction.

❖ PROLACTINOMA:

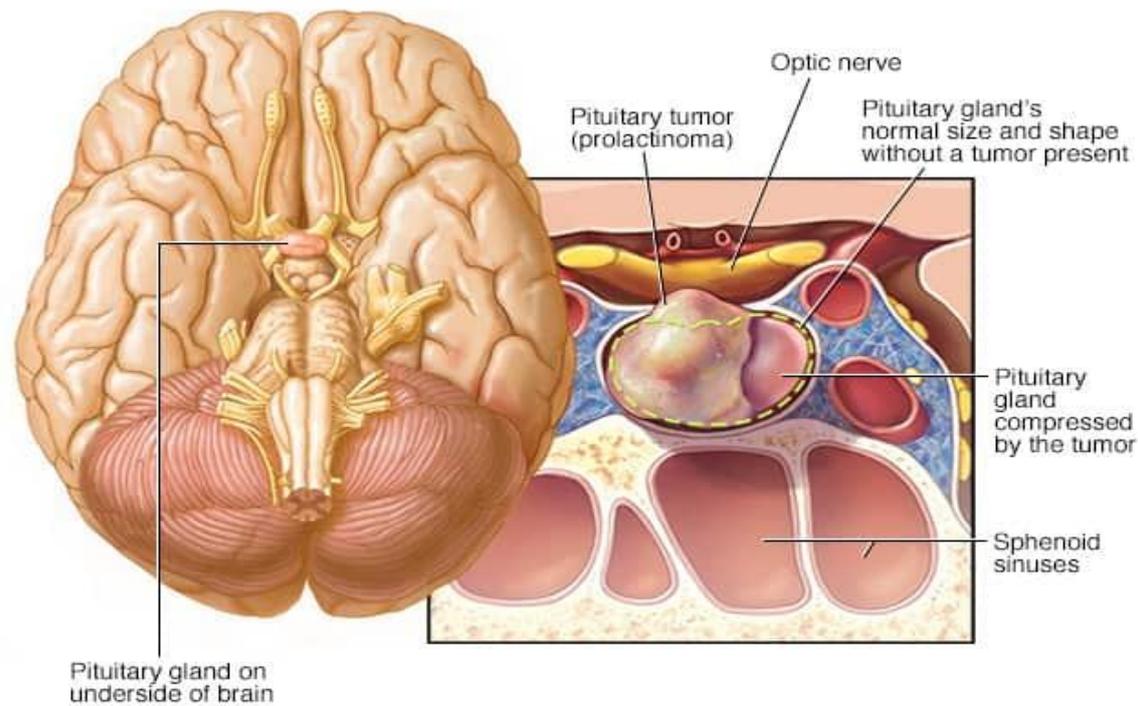
Definition:

Prolactinoma is a non-cancerous tumor of pituitary gland. This causes pituitary gland to make too much of hormone called prolactin.

It can cause vision difficulties, infertility, and other problems.

It is the most common type of hormone-producing tumor that develops in the pituitary gland.

Prolactinoma occurs most commonly in people under the age of 40. They are common in people assigned female at birth than people assigned male at birth and rarely occur in children and adolescents.



Figure(7): representation of prolactinoma

Causes: Prolactinoma cause is unknown .

In some cases, genetic factors may play a role . prolactinoma causes decreased level of some hormones. Making too much of prolactin [hyperprolactinomia] can also happen for reasons other than prolactinoma.

- Medications
- Kidney diseases
- Underactive thyroid gland
- Other types of pituitary tumors
- Pregnancy and breast feeding^[16-17]

Reasons For Increased Levels Of Prolactin: It normally rises during pregnancy and breastfeeding. Some of the other are:

- Physical stress, such as painful, such a pain full blood draw
- Epileptic seizures
- Nipple stimulation
- A meal
- Exercise
- Pituitary tumors
- Medicines which increase prolactin levels are:

Anti psychotics

Hyper tensives

Prolactin Regulation

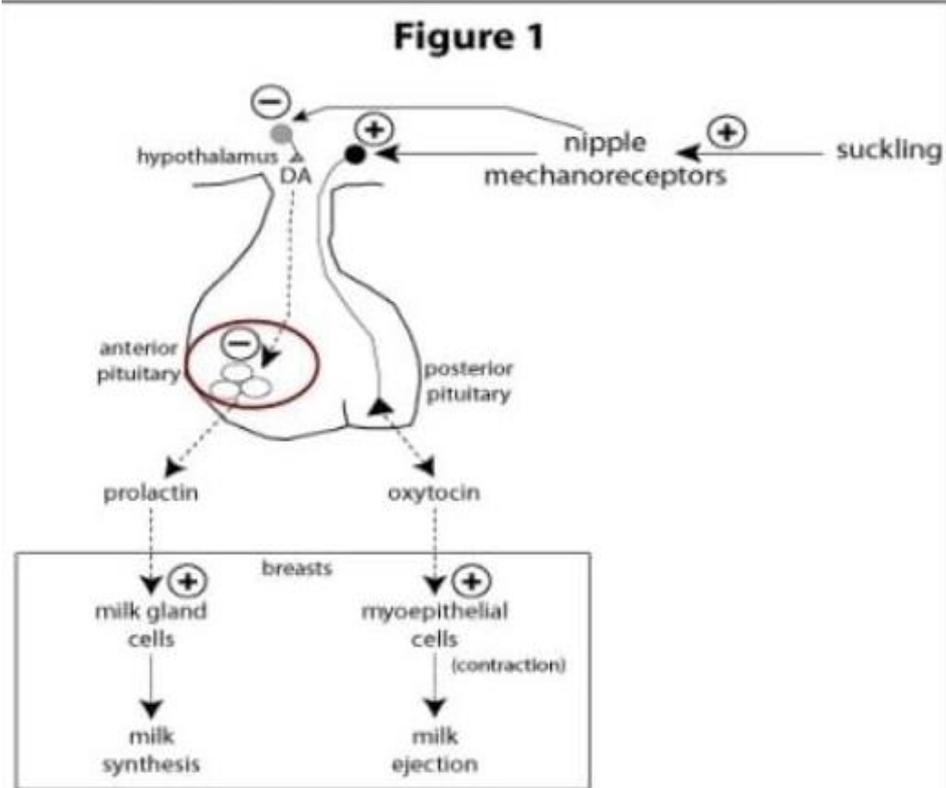


Figure no(8): Regulation of protaction levels

Symptoms: A prolactinoma might not cause any signs or symptoms^[16-17]

FEMALES	MALES	BOTH
irregular periods	Erectile dysfunction	Loss of fertility
Painfull intercourse due to vaginal dryness	Smaller muscles	Weak/ brittle bones (osteoporosis)
Milky discharge from breasts when not pregnancy or breastfeeding	Enlarged breasts	Loss of intrest
Acne and excessive body& facial hair growth	Decreased body or facial hair	

Table no(3): symptoms of prolactinoma across various genders

S.NO	DIAGNOSIS	TREATMENT GOALS
1	Blood test	Bringing your prolactin level back to normal
2	Imaging tests like MRI, CT scanning	Shrinking the tumor
3	Testosterone level blood test	Making sure that your pituitary gland is working properly
4	Prolactin level blood test	Correcting any problems caused by the tumor , such as irregular periods, low testosterone levels, headache , vision issues.
5	Vision test	-
6	It is often detected at an earlier stage in people assigned female at birth (AFAB) due to irregular periods	-

Table no(4): diagnosis and treatment goals of prolactinoma

Treatment options include:

- Medication
- Surgery
- Radiation therapy

RADIATION THERAPY: Rare third option for treating prolactinomas if medications / surgery don't work to reduce your prolactin levels.Side effects and complications of radiations therapy for prolactinoma treatment include:^[20-21]

Low levels of thyroid hormone

A decrease in levels of other pituitary gland hormone

vision loss

Brain injury

MEIDICATIONS:

Dopamine agonists : Bromocriptine, Cabergoline

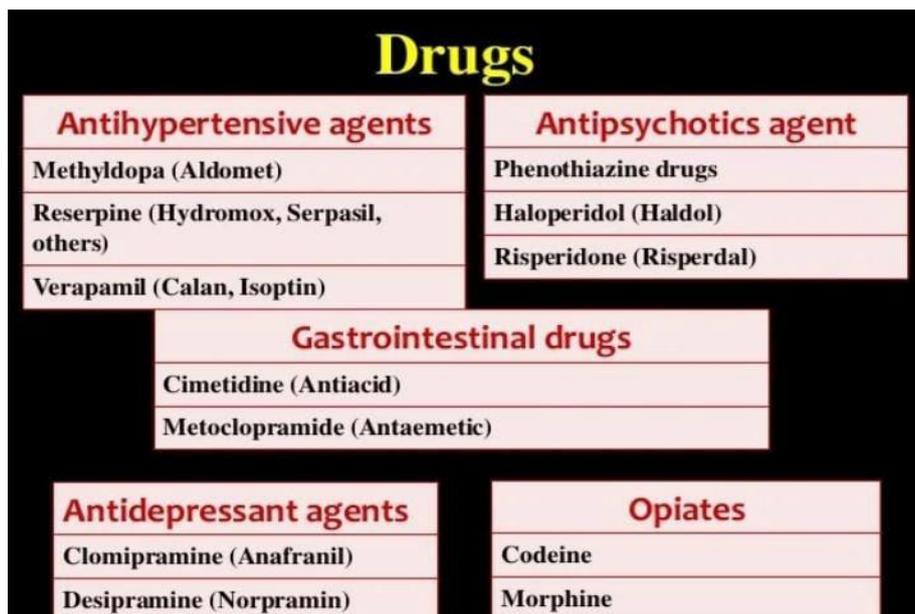


Figure no(9): different types of classification of drugs used in treatment

The common side effects of dopamine agonists are nausea, vomiting, dizziness

- Transphenoidal surgery
- Oral contraceptives

SURGERY: Surgeries are needed to be performed in following cases:

If someone is having negative reactions and side effects to medications If you take anti-psychotic medications that interacts with medications that treat prolactinoma You have a large prolactinoma and you want to surgically remove it before trying to become pregnant The medications to treat prolactinoma aren't working to shrink the tumor

There are mainly two types of surgeries used to treat prolactinoma

1. Transphenoidal : This is most common to treat prolactinomas . A surgeon performs the surgery through an incision (small cut) at the back of your nasal cavity or under your lip
2. Transcranial : Surgeons usually only use this type of surgery if the tumor is large or has spread to other areas . A surgeon removes the tumor through an opening in your skull^[18-19]

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