

Other Sex Cord–Stromal Tumors

Ovarian Leydig cell tumors · Pregnancy luteoma · Gonadoblastoma

Ovarian pathology • Morphology, endocrine effects and clinicopathologic interpretation

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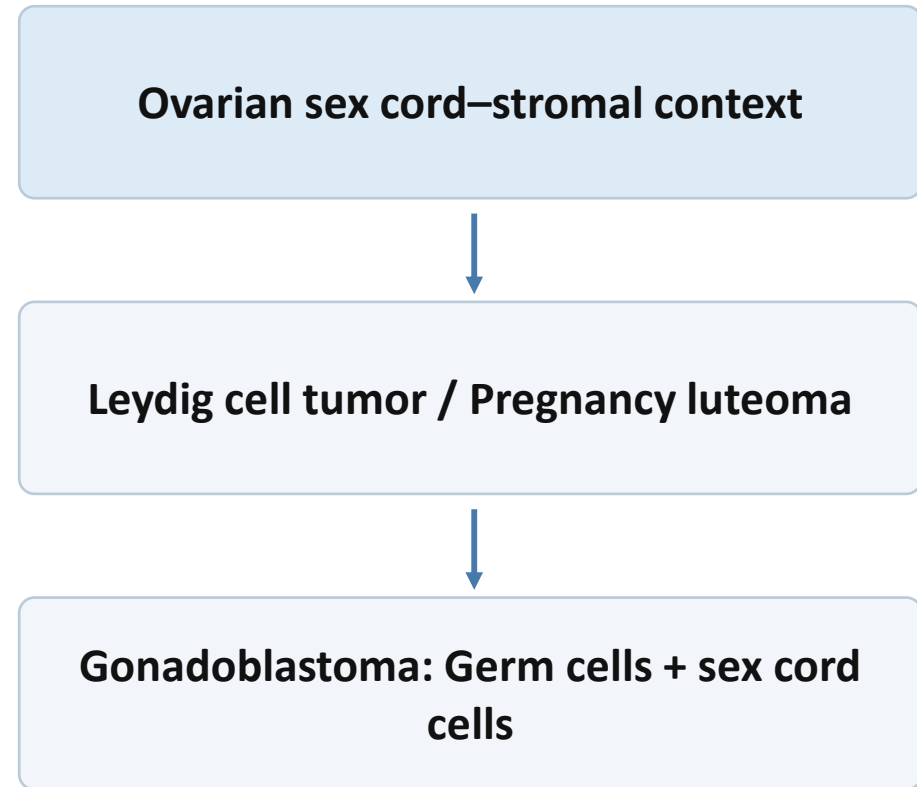
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Learning outcomes

- Identify the defining tissue components of three uncommon ovarian tumors.
- Connect steroid production to the characteristic clinical presentations.
- Distinguish a pure Leydig cell neoplasm from a mixed germ-cell/sex-cord lesion.
- Interpret key morphologic clues, associations and stated prognosis.

The primary diagnostic scope

- Three uncommon lesions are described together.
- Their shared context is ovarian sex cord or stromal differentiation.
- Gonadoblastoma has an additional, essential germ-cell component.



Schematic — conceptual relationship, not specimen imagery

Developmental basis of sex cord–stromal tumors

- Ovarian stroma develops from the sex cords of the embryonic gonad.
- The precursor mesenchyme produces cell types such as granulosa, theca, Sertoli and Leydig cells.
- Tumors can resemble these differentiated gonadal cell populations.

Undifferentiated gonadal mesenchyme



Sex cord and stromal differentiation

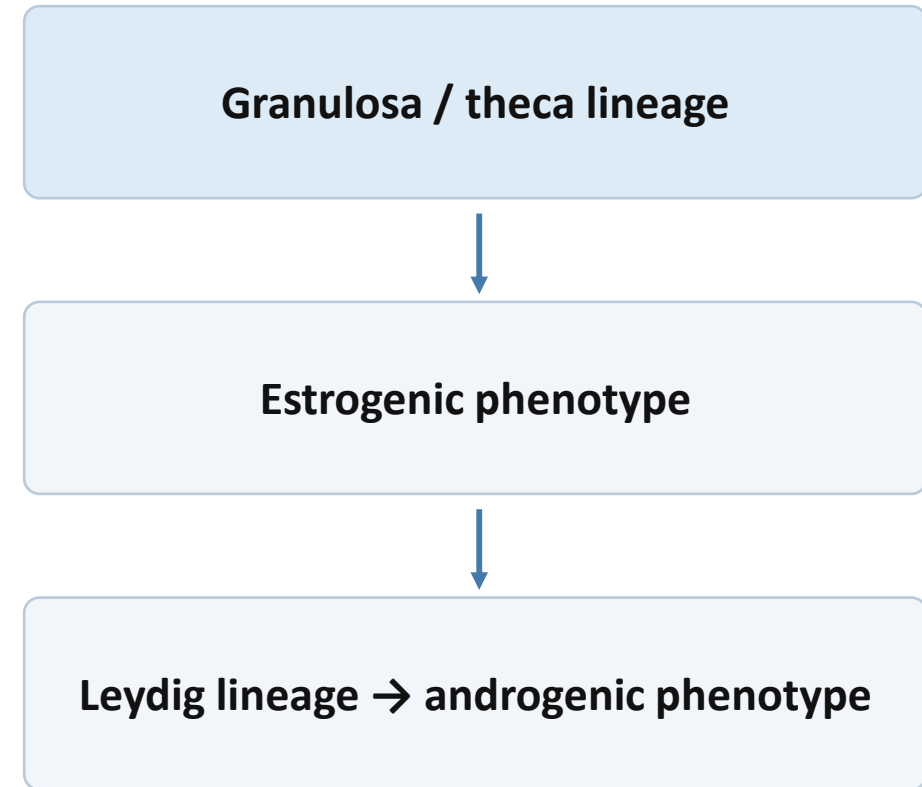


Corresponding ovarian tumors

Schematic — conceptual relationship, not specimen imagery

Why some ovarian stromal tumors alter hormones

- Normal granulosa/theca cells participate in estrogen production.
- Normal Leydig cells are androgen-producing cells.
- Neoplastic differentiation may preserve steroid-producing function.



Schematic — conceptual relationship, not specimen imagery

Hormone phenotype is a diagnostic clue

- Virilization can direct attention toward an androgen-producing ovarian lesion.
- Estrogenic effects suggest a different functional lineage.
- Clinical phenotype is informative but does not replace morphologic classification.

The three entities are biologically distinct

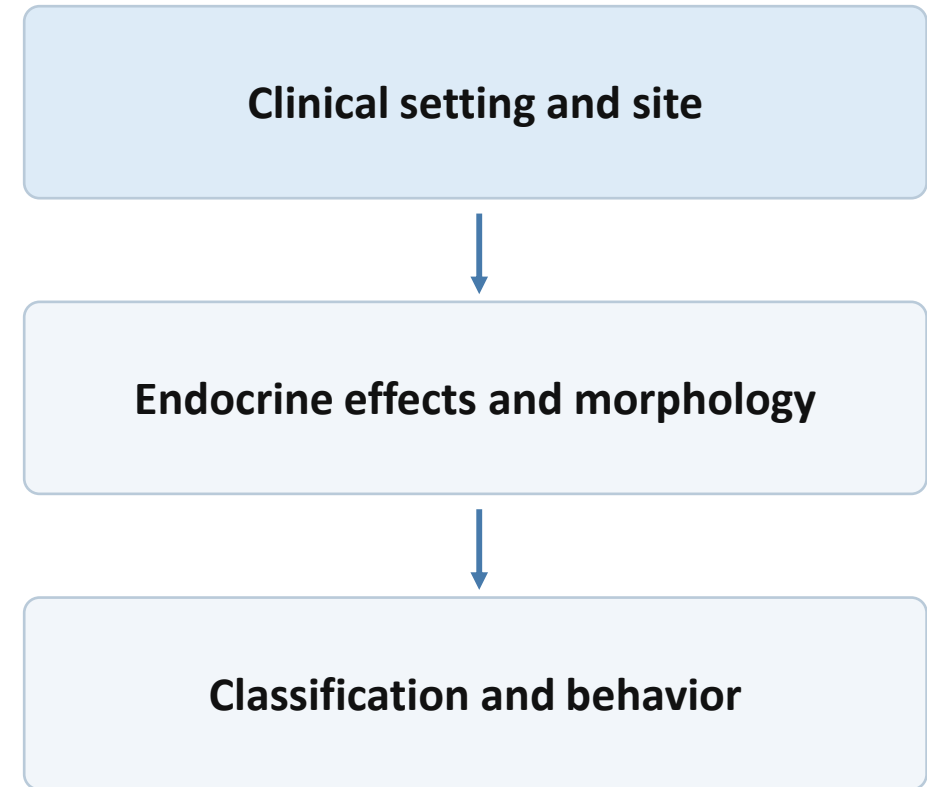
Entity	Defining context	Central clue
Leydig cell tumor	Unilateral ovarian hilar tumor	Lipid-rich cells; Reinke crystalloids
Pregnancy luteoma	Ovarian lesion of pregnancy	Corpus luteum-like tumor; virilization possible
Gonadoblastoma	Germ cells + sex cord derivatives	Abnormal sexual development; dysgerminoma association

Separate lineage from clinical manifestation

- An androgenic presentation describes endocrine effect, not a single tumor type.
- A pregnancy-associated ovarian lesion requires interpretation in gestational context.
- A mixed germ-cell/sex-cord lesion requires recognition of both populations.

Four-domain review of an ovarian lesion

- Localize the lesion and establish clinical context.
- Characterize hormonal manifestations.
- Identify the constituent cell populations.
- Use behavior and associated tumors to complete interpretation.



Schematic — conceptual relationship, not specimen imagery

Claims supported by the textbook excerpt

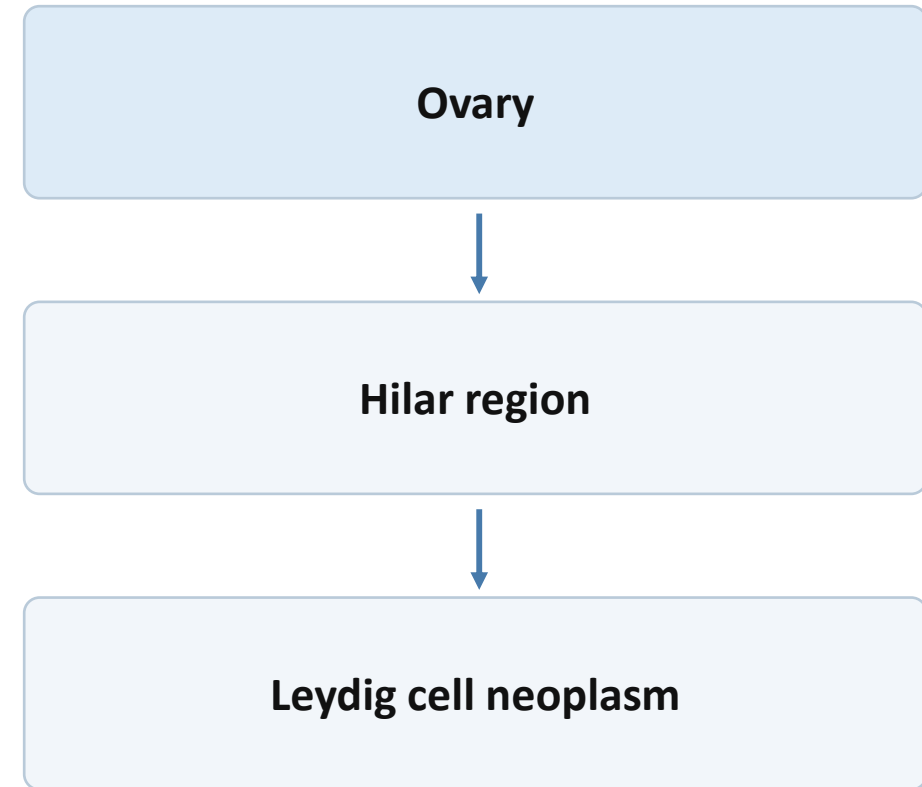
- Leydig tumors: Location, cellular morphology, androgenic manifestations and benign course.
- Pregnancy luteoma: Similarity to pregnancy corpus luteum and possible virilization.
- Gonadoblastoma: Biphasic composition, clinical context, coexistence and prognosis.
- The excerpt does not provide a comprehensive immunohistochemical algorithm for these three lesions.

Leydig cell tumor: Defining entity

- A rare ovarian tumor of Leydig-cell differentiation.
- Located in the ovarian hilus and usually unilateral.
- Dominant secreted steroid: Testosterone.
- True Leydig cell tumors are almost always benign.

The ovarian hilus is a discriminating site

- The textbook specifically locates Leydig cell tumors in the ovarian hilus.
- Location complements rather than substitutes for histologic examination.
- The tumor is described as unilateral.



Schematic — conceptual relationship, not specimen imagery

Unilateral occurrence is characteristic

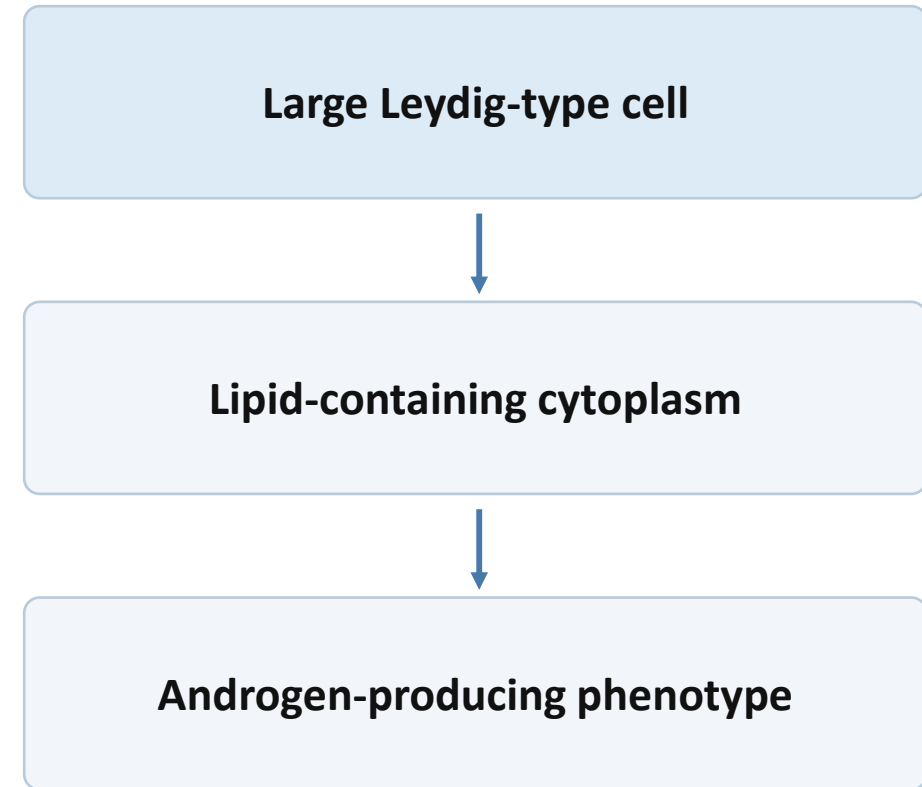
- The lesion is described as rare and unilateral.
- Side and exact size are not specified by the source as diagnostic criteria.
- Retain gross laterality and anatomic relationship in pathology documentation.

Leydig cell cytology: Large cells

- The neoplasm comprises large Leydig-type cells.
- Individual cell borders are distinct.
- Cells contain abundant cytoplasmic lipid.
- The combined constellation supports the differentiation.

Lipid-rich cytoplasm is a lineage clue

- The source explicitly describes lipid-laden Leydig cells.
- Lipid content is consistent with their steroid-producing phenotype.
- Cytoplasmic character should be interpreted with location and cell identity.



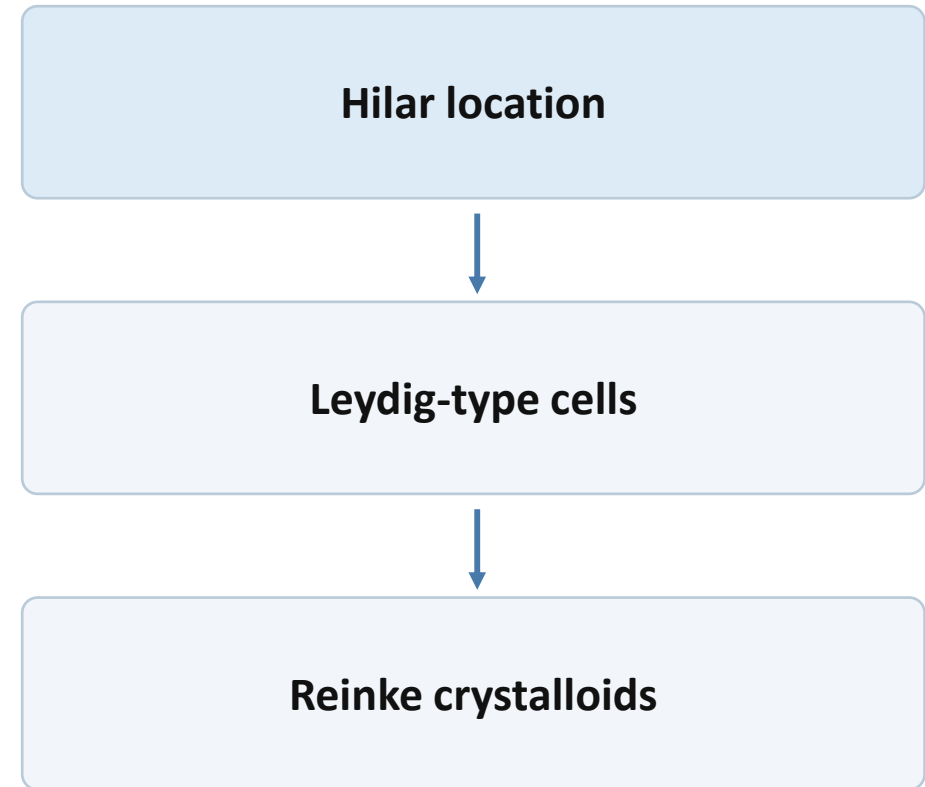
Schematic — conceptual relationship, not specimen imagery

Reinke crystalloids: Hallmark clue

- Characteristic cytoplasmic structures are called Reinke crystalloids.
- Their intracytoplasmic location is the relevant structural feature.
- The text identifies them as a feature of true ovarian Leydig cell tumors.

Diagnostic reasoning from morphology

- Hilar position suggests the correct anatomic setting.
- Large lipid-rich cells with distinct borders suggest Leydig differentiation.
- Reinke crystalloids add characteristic cytoplasmic evidence.



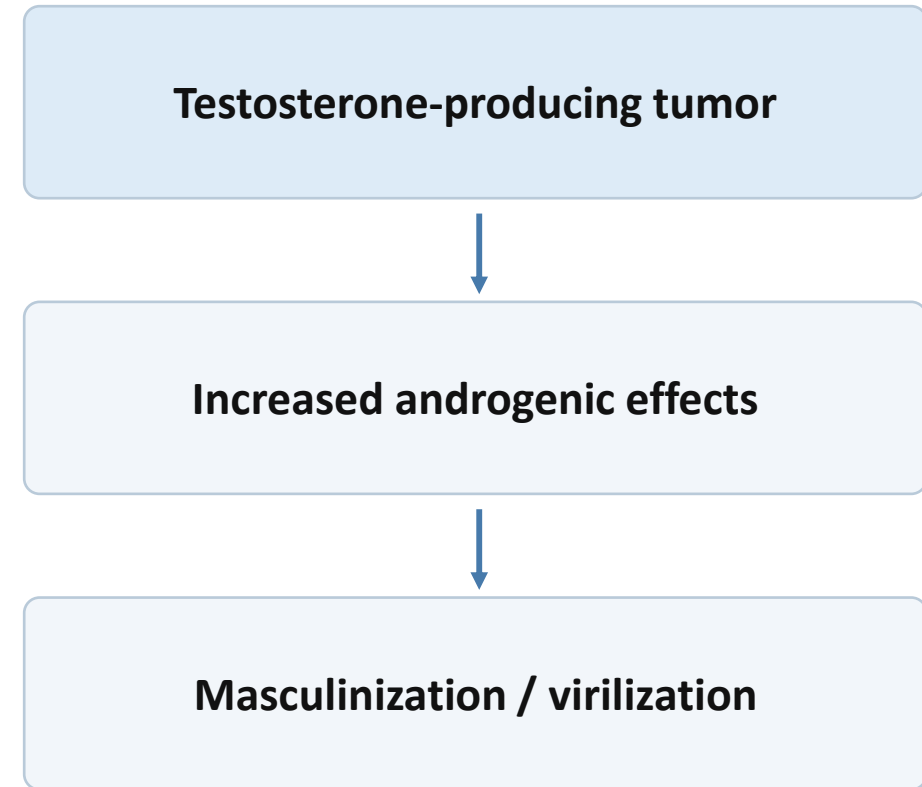
Schematic — conceptual relationship, not specimen imagery

Morphology cannot be inferred from virilization

- Hirsutism, voice changes and clitoral enlargement are clinical effects.
- None of these findings independently demonstrates Reinke crystalloids.
- Histologic examination establishes tumor morphology and classification.

Functional output: Testosterone predominates

- Leydig cell tumors primarily produce testosterone.
- An excess of androgenic signaling explains the masculinizing syndrome.
- Clinical recognition requires connecting secretion to target-tissue effects.



Schematic — conceptual relationship, not specimen imagery

Hirsutism: Visible androgenic expression

- Hirsutism is a listed presentation of ovarian Leydig cell tumor.
- Interpret the sign as part of a broader endocrine syndrome.
- Hormonal signs should be matched with an appropriate ovarian lesion.

Voice change: Systemic endocrine effect

- Voice change is a characteristic masculinizing feature in the source.
- It illustrates the systemic influence of tumor steroid production.
- The finding is not unique to Leydig cell tumors.

Clitoral enlargement: Another virilization feature

- Clitoral enlargement is explicitly described in the clinical presentation.
- It belongs to the same testosterone-dominant symptom complex.
- It should not be interpreted separately from the total clinical context.

Clinical triad described for ovarian Leydig tumor

Clinical sign	Interpretive significance
Hirsutism	Androgen-dependent hair growth
Voice changes	Systemic masculinization
Clitoral enlargement	Androgenic genital change

Severity compared with Sertoli–Leydig tumors

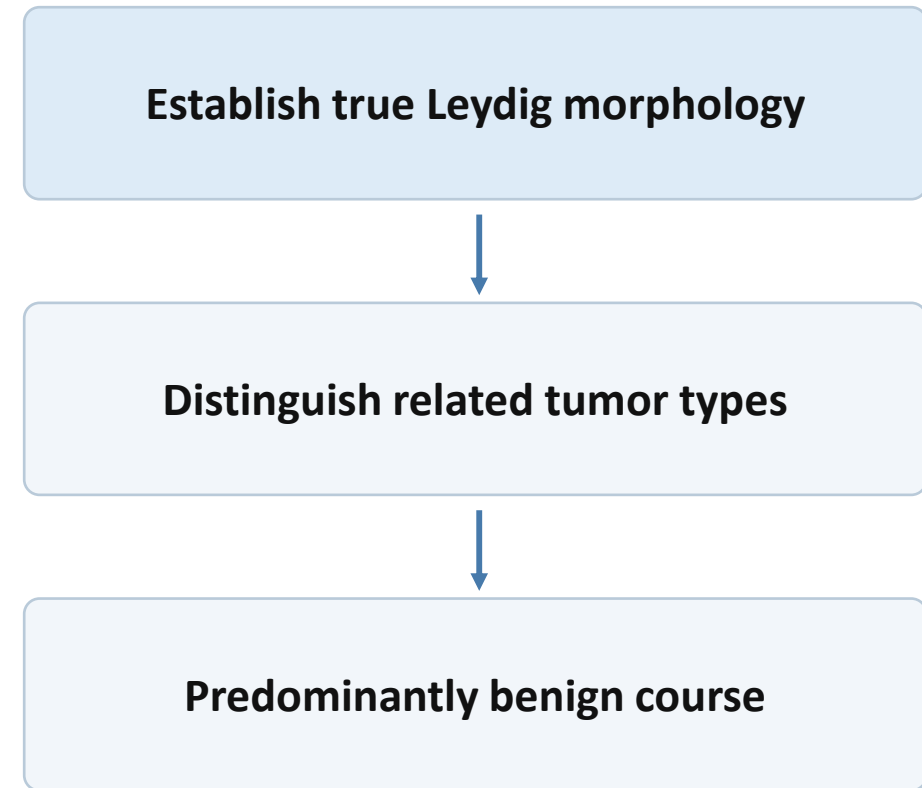
- Leydig cell tumor–associated masculinization is usually milder.
- Sertoli–Leydig tumors may cause striking virilization.
- The relative degree is an association, not a stand-alone diagnostic test.

Leydig versus Sertoli–Leydig tumors

Feature	Leydig cell tumor	Sertoli–Leydig tumor
Cell identity	Large lipid-rich Leydig cells	Sertoli tubules ± Leydig cells
Typical location	Ovarian hilus	Unilateral ovarian tumor
Androgenic effects	Often milder	May be striking
Behavior in source	Almost always benign	Recurrence/metastasis <5%

Behavior of true Leydig cell tumors

- The primary source states that true ovarian Leydig cell tumors are almost always benign.
- This differs from the potentially malignant behavior of granulosa cell tumors.
- Biologic expectations must follow the established histologic category.



Schematic — conceptual relationship, not specimen imagery

Management stated

- Surgical excision is the treatment described for Leydig cell tumors.
- Almost-always-benign behavior provides the stated prognostic context.
- The source excerpt does not specify an operative extent or follow-up protocol.

Applied case: Ovarian hilus and virilization

Hypothetical teaching vignette: An ovarian lesion in the hilus accompanies progressive hirsutism and voice changes. Histology shows large lipid-laden cells with discrete borders.

Discussion prompts

Which ovarian tumor is most strongly suggested?

Which characteristic cytoplasmic structure would support it?

Hypothetical educational case; No patient data

Case resolution: Ovarian Leydig cell tumor

- The ovarian hilar location fits the source description.
- Lipid-laden Leydig-type cells explain the morphologic identity.
- Reinke crystalloids are the characteristic cytoplasmic structures.
- Testosterone output accounts for the virilization.

Morphology exercise: Avoid premature naming

Hypothetical review: An androgenic ovarian mass is submitted without reliable anatomic localization or adequate microscopy.

Discussion prompts

Can the hormonal phenotype alone establish a Leydig cell tumor?

What further information is required from the specimen?

Hypothetical educational case; No patient data

Morphology exercise: Reasoning answer

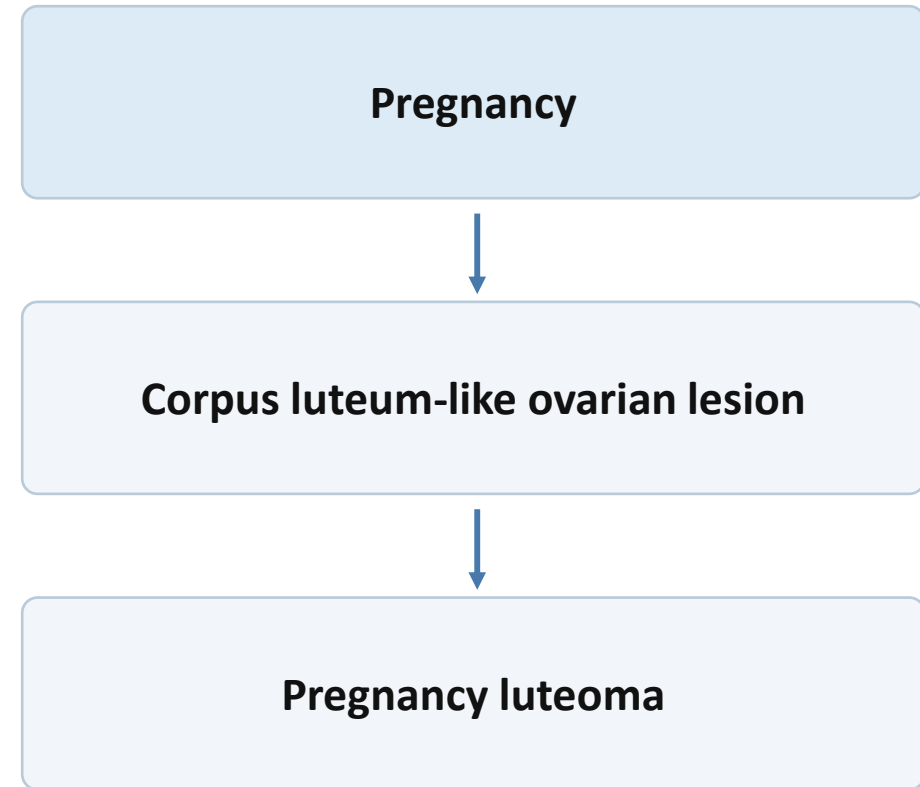
- No: Androgenic activity is shared by more than one ovarian sex cord–stromal neoplasm.
- Establish the tumor location and inspect the differentiated cell populations.
- Look for the defining Leydig cell features before applying the category.

Pregnancy luteoma: Clinical context

- Pregnancy luteoma is a rare ovarian tumor discussed in the source.
- It closely resembles the corpus luteum of pregnancy.
- The gestational setting is part of the essential interpretation.

The corpus luteum is the morphologic comparator

- Pregnancy luteoma closely resembles the corpus luteum of pregnancy.
- The name and pregnancy context help establish the appropriate comparison.
- The excerpt does not supply detailed formal microscopic criteria.



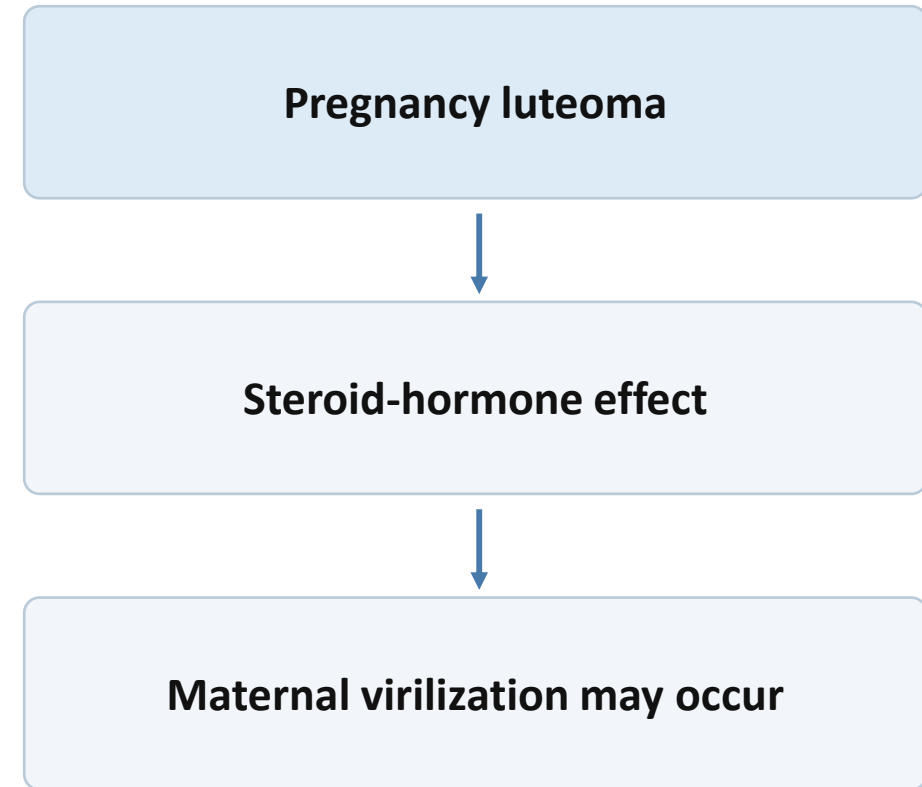
Schematic — conceptual relationship, not specimen imagery

Gestational context is diagnostically important

- A lesion occurring during pregnancy has a different clinical setting from the hilar Leydig tumor.
- A luteal resemblance is explicitly emphasized in the source.
- Assess a gestational ovarian mass without importing unsupported criteria.

Pregnancy luteoma can produce androgenic effects

- The source records virilization in pregnant patients.
- This supports possible hormonal function during gestation.
- The source does not quantify the frequency or biochemical hormone levels.



Schematic — conceptual relationship, not specimen imagery

Maternal virilization during pregnancy

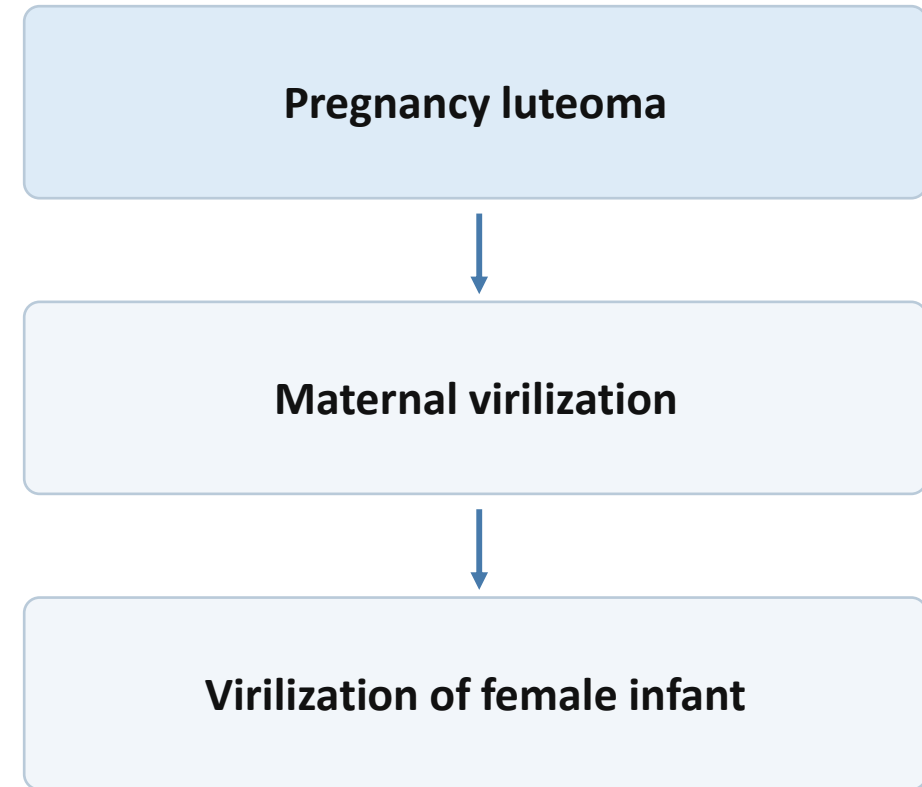
- Virilization in the pregnant patient is an important possible manifestation.
- The association does not establish that every pregnancy luteoma is hormonally active.
- Clinical interpretation requires pregnancy context and lesion identification.

Female infants may also be virilized

- The source specifically mentions virilization in female infants.
- Maternal and infant effects may coexist in the same pregnancy.
- The excerpt does not specify predictors or severity of fetal effects.

Two clinical recipients of a gestational endocrine effect

- A pregnancy luteoma can affect the pregnant patient.
- It may also be associated with virilization in a female infant.
- This diagram represents the clinical association, not a verified hormone-transfer pathway.



Schematic — conceptual relationship, not specimen imagery

Pregnancy luteoma versus Leydig cell tumor

Domain	Pregnancy luteoma	Leydig cell tumor
Clinical context	Pregnancy	Ovarian hilus
Morphologic clue	Corpus luteum resemblance	Reinke crystalloids; lipid-rich cells
Possible endocrine effect	Virilization of pregnant patient / female infant	Testosterone-predominant masculinization
Behavior in excerpt	Not detailed	Almost always benign

Limits of the source on pregnancy luteoma

- The supplied excerpt does not state diagnostic IHC or molecular markers.
- It does not specify lesion regression, natural history or detailed treatment.
- These cannot be presented as verified Robbins statements from this excerpt.

Applied case: Virilization in pregnancy

Hypothetical teaching vignette: During pregnancy, an ovarian lesion resembles the corpus luteum. The pregnant patient has virilizing features; A female infant is also affected.

Discussion prompts

Which named lesion is consistent with the description?

Which two clinical subjects may be affected?

Hypothetical educational case; No patient data

Case resolution: Pregnancy luteoma

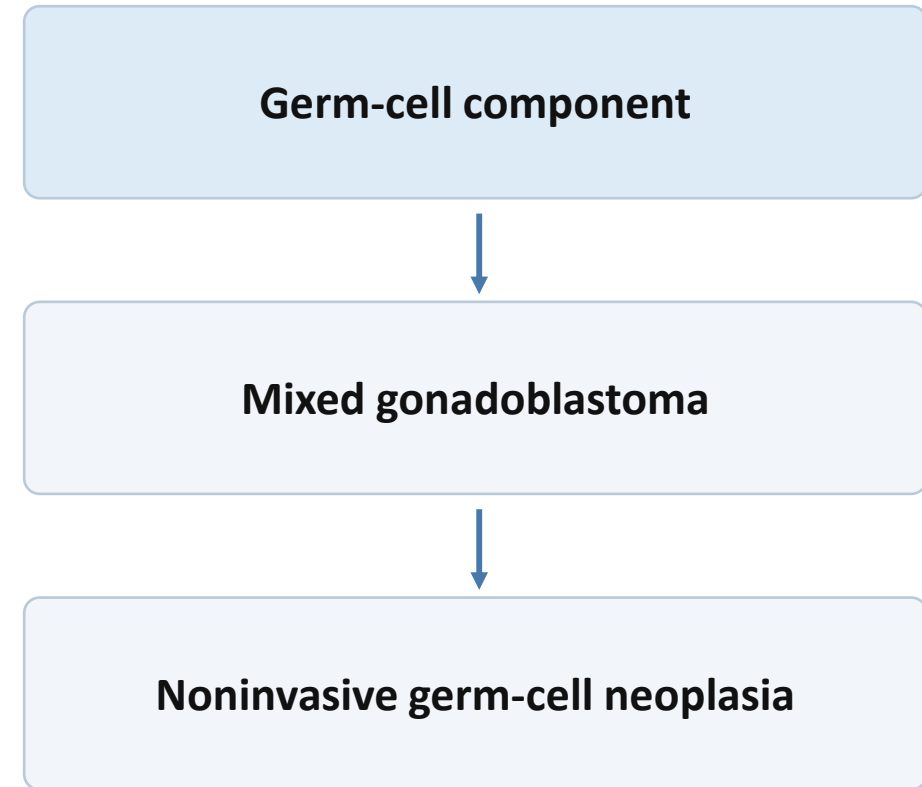
- The pregnancy context and corpus luteum resemblance match pregnancy luteoma.
- Virilization may affect the pregnant patient.
- The source also describes possible virilization of female infants.
- A clinical example cannot establish incidence or treatment response.

Gonadoblastoma: A mixed-cell lesion

- Gonadoblastoma is an uncommon gonadal tumor.
- Its composition combines germ cells and sex cord–stromal derivatives.
- Its mixed lineage is the central morphologic concept.

Component one: Germ cells

- Germ cells constitute one essential population in gonadoblastoma.
- The diagnosis is therefore not purely sex cord–stromal.
- The source ultimately places gonadoblastoma among noninvasive germ-cell neoplasias.



Schematic — conceptual relationship, not specimen imagery

Component two: Immature Sertoli-like cells

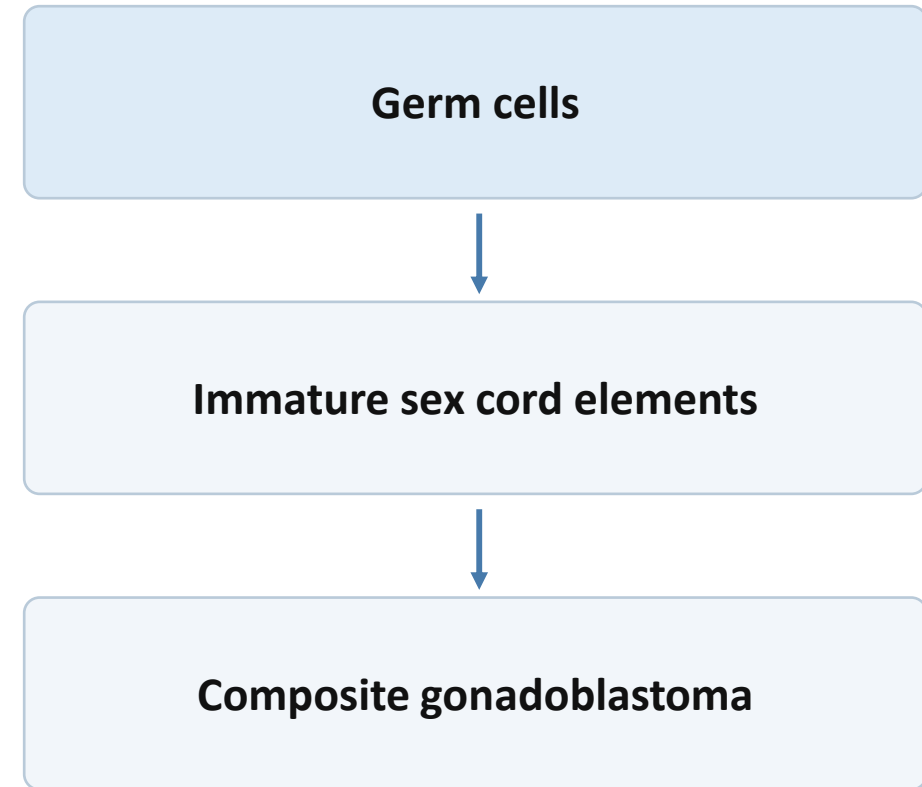
- Some sex cord–stromal derivatives resemble immature Sertoli cells.
- This provides one element of the mixed gonadal differentiation.
- Cell resemblance does not make gonadoblastoma a pure Sertoli tumor.

Component three: Immature granulosa-like cells

- Other stromal derivatives resemble immature granulosa cells.
- Both male-type and female-type sex cord resemblance may be present.
- The mixed pattern matters more than assigning a single differentiated lineage.

Gonadoblastoma: Composite rather than pure lineage

- A correct conceptual model includes both germ cells and sex cord cells.
- Sertoli-like and granulosa-like differentiation describes the latter population.
- The graphic is a lineage schematic, not a histologic section.



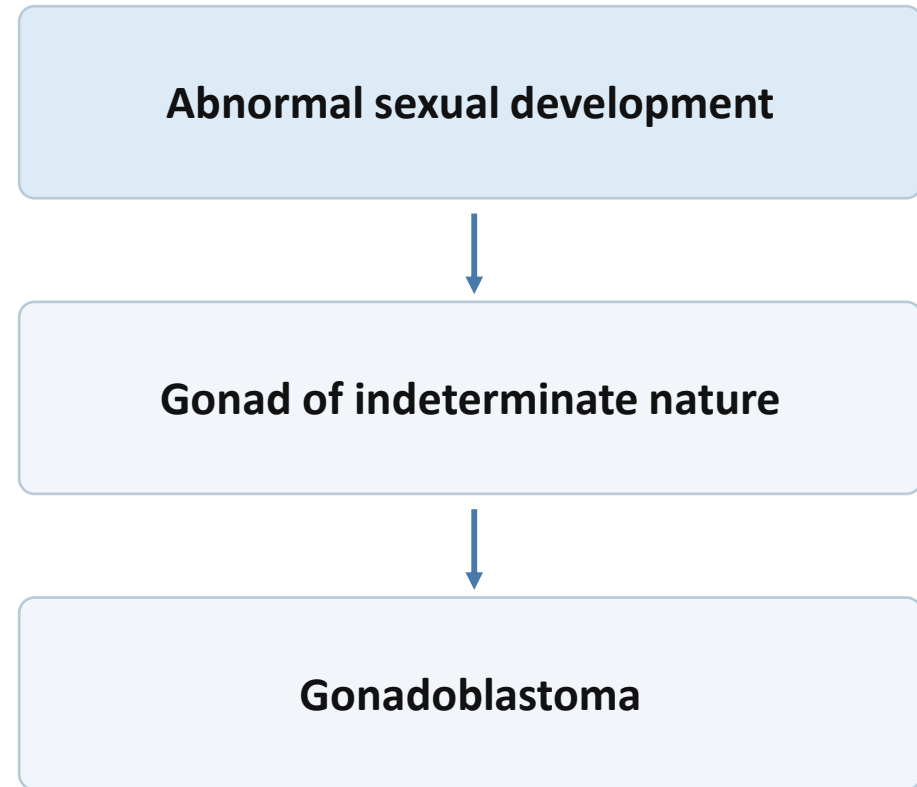
Schematic — conceptual relationship, not specimen imagery

Association with abnormal sexual development

- The source associates gonadoblastoma with abnormal sexual development.
- Gonads of indeterminate nature are a recognized context.
- This clinical setting distinguishes it from the usual presentation of a hilar Leydig tumor.

Indeterminate gonads: An essential setting

- Gonadoblastoma may arise in a gonad whose nature is indeterminate.
- The source emphasizes the relationship to atypical gonadal development.
- Clinical anatomy should be documented alongside the histologic diagnosis.



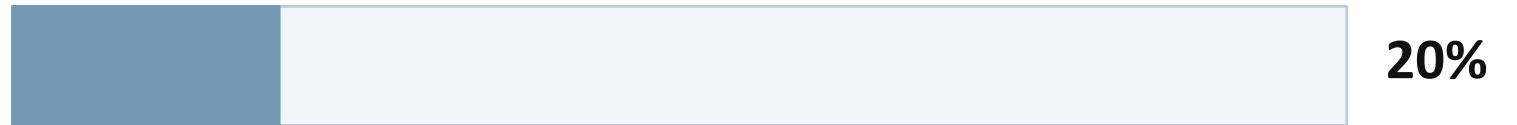
Schematic — conceptual relationship, not specimen imagery

Phenotypic distribution reported

Phenotypic females



Phenotypic males



The percentages describe the patients statement. They are not percentages of all ovarian tumors.

Phenotypic females: Interpretation

- The source describes 80% of patients as phenotypic females.
- Phenotypic appearance does not negate an associated disorder of gonadal development.
- Phenotype and gonadal histology supply different diagnostic information.

Phenotypic males: Distinctive associated anatomy

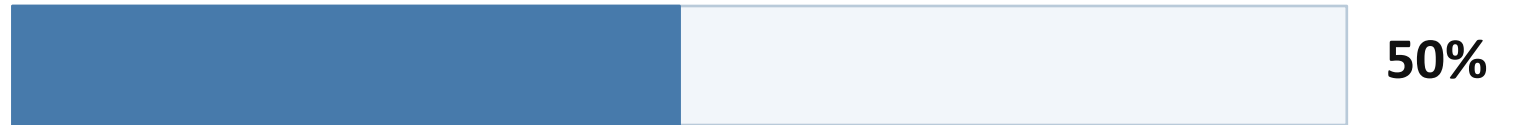
- The source states that 20% are phenotypic males.
- The described setting includes undescended testes.
- Female internal secondary organs are also described in these patients.

Avoid oversimplifying gonadal phenotype

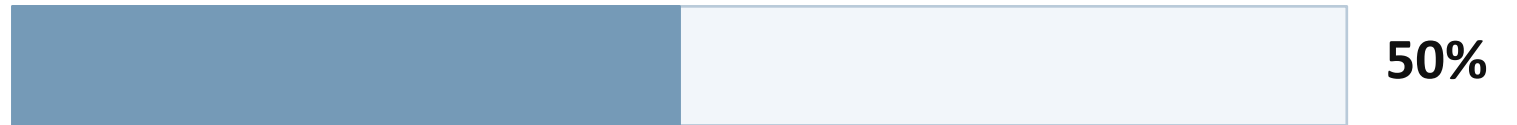
- Both phenotypic females and phenotypic males are represented in the source.
- The shared diagnostic context is abnormal sexual development / indeterminate gonads.
- External phenotype alone is insufficient to infer the tumor's cell populations.

Coexistent dysgerminoma is common in the excerpt

With dysgerminoma



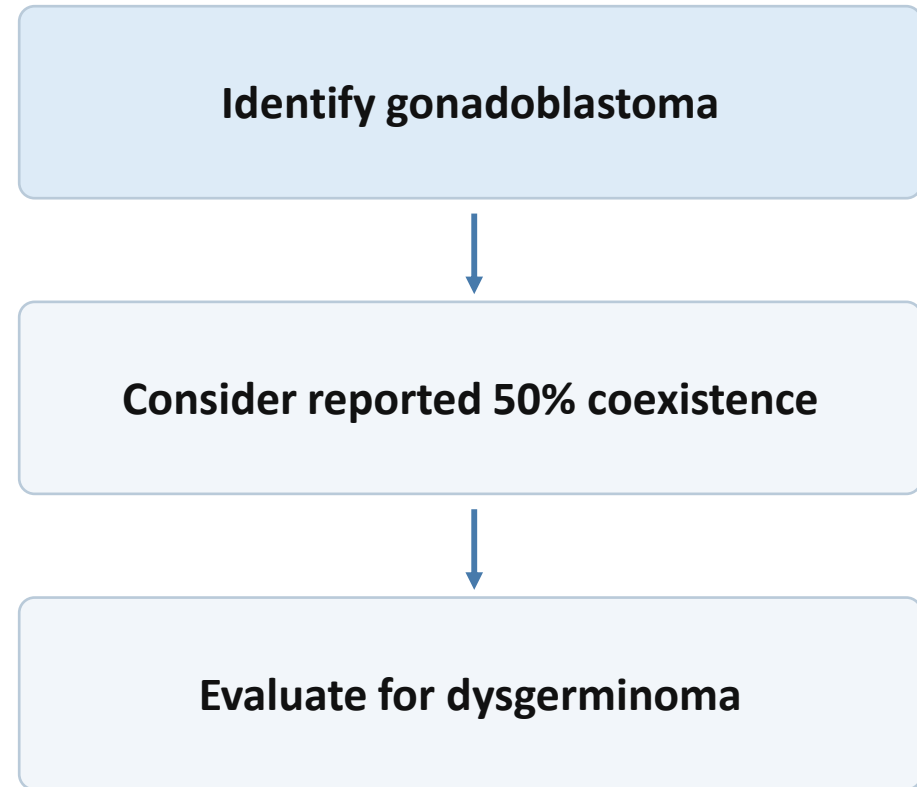
Other cases



The source reports dysgerminoma in 50% of gonadoblastoma cases. The second bar category denotes the remainder and does not define its histology.

Why coexistent dysgerminoma matters

- The source reports a substantial association with dysgerminoma.
- A mixed neoplasm should not be assumed to consist only of the gonadoblastoma component.
- Careful evaluation for a concurrent germ-cell tumor follows logically.



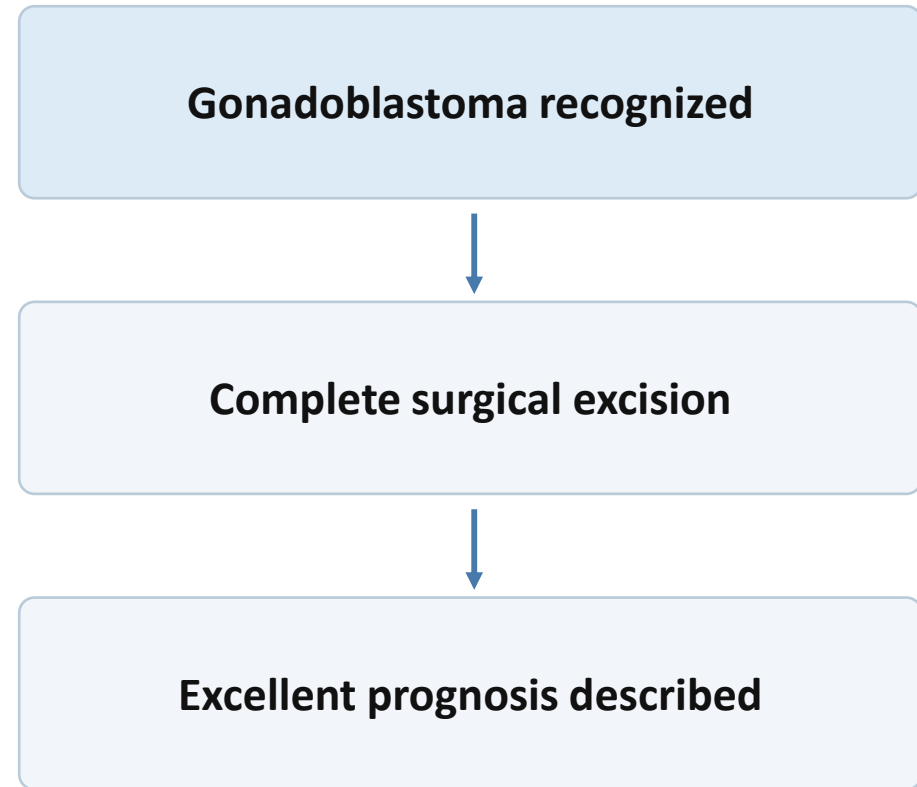
Schematic — conceptual relationship, not specimen imagery

Classification: Noninvasive germ-cell neoplasia

- The source explicitly classifies gonadoblastoma as a noninvasive germ-cell neoplasia.
- Its sex cord elements do not remove the importance of the germ-cell population.
- Do not label this mixed lesion as a conventional pure sex cord–stromal tumor.

Favorable outcome requires complete excision

- The source states that prognosis is excellent if the tumor is completely excised.
- This is a conditional statement about the lesion's behavior.
- Coexisting dysgerminoma must be recognized rather than ignored.



Schematic — conceptual relationship, not specimen imagery

Applied case: An indeterminate gonad

Hypothetical teaching vignette: Histology from a gonad of indeterminate type shows germ cells intermingled with sex cord elements resembling immature Sertoli and granulosa cells.

Discussion prompts

What named neoplasm matches this mixed pattern?

Which germ-cell tumor may coexist?

Hypothetical educational case; No patient data

Case resolution: Gonadoblastoma

- The combination of germ cells and immature sex cord elements is defining.
- The described setting of abnormal gonadal development is supportive.
- Dysgerminoma is the important associated neoplasm.
- The source reports excellent prognosis after complete excision.

Three lesions: Diagnostic morphology

Feature	Leydig tumor	Pregnancy luteoma	Gonadoblastoma
Composition	Large Leydig cells	Corpus luteum-like	Germ + sex cord cells
Clue	Reinke crystalloids	Pregnancy resemblance	Immature Sertoli / granulosa-like cells
Context	Ovarian hilus	Gestation	Abnormal gonadal development

Three lesions: Clinical and prognostic priorities

Entity	Characteristic association	Outcome statement
Leydig cell tumor	Testosterone → masculinization	Almost always benign; excision
Pregnancy luteoma	Maternal / female infant virilization may occur	Not provided in excerpt
Gonadoblastoma	Indeterminate gonad; dysgerminoma often coexists	Excellent after complete excision

Granulosa cell tumor: An estrogenic comparator

- Granulosa tumors may elaborate estrogen and produce hyperestrogenic effects.
- Endometrial hyperplasia and carcinoma are important associations.
- Late recurrence is possible even 10–20 years after resection.
- This behavior contrasts with the almost-always-benign true Leydig cell tumor.

Fibroma/thecoma: Stromal comparators

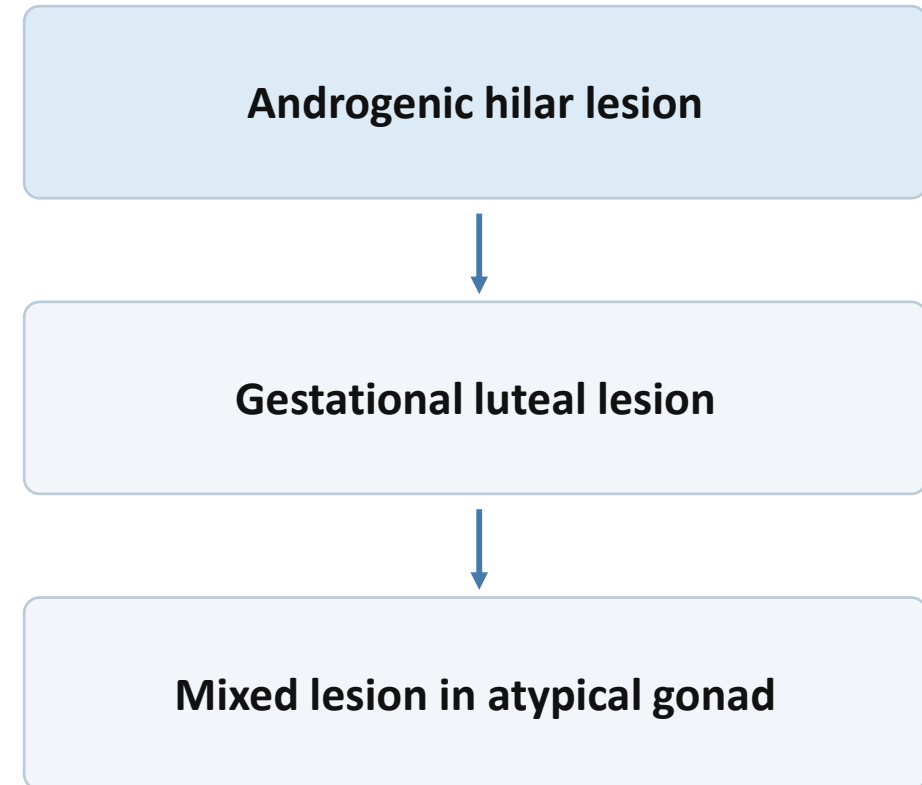
Tumor	Cells / gross clue	Endocrine pattern
Fibroma	Fibroblasts; typically firm gray-white mass	Generally hormonally inactive
Thecoma	Plump lipid-containing spindle cells	May be hormonally active
Leydig cell tumor	Hilar lipid-rich Leydig cells + crystalloids	Predominantly testosterone

Sertoli–Leydig tumor: Key comparison

- Sertoli–Leydig tumors resemble testicular Sertoli and Leydig differentiation.
- Well-differentiated examples may have Sertoli cell tubules.
- Virilization is often more marked than in pure Leydig cell tumors.
- The source reports recurrence or metastasis in fewer than 5%.

Clinical reasoning: Three different entry points

- Androgenic symptoms outside pregnancy suggest a functional ovarian tumor such as Leydig or Sertoli–Leydig.
- Virilization during pregnancy and corpus luteum resemblance suggest pregnancy luteoma.
- Abnormal gonadal development with mixed germ/sex cord elements suggests gonadoblastoma.



Schematic — conceptual relationship, not specimen imagery

Integrated case: What is not established?

Hypothetical teaching vignette: A unilateral ovarian mass causes virilization, but the pathology report contains only “steroid-producing tumor” and no descriptive morphology.

Discussion prompts

Can Leydig cell tumor be definitively assigned?

What discriminators would you request?

Hypothetical educational case; No patient data

Integrated case: Answer and next evidence

- Do not equate androgenic phenotype with a specific histologic entity.
- Request site, cellular differentiation and characteristic structures.
- Evaluate for Leydig-type cells/Reinke crystalloids versus Sertoli-type tubules.
- Use clinical pregnancy status and gonadal-development context where relevant.

Final high-yield diagnostic matrix

Question	Best-supported response
Hilar tumor with Reinke crystalloids?	Ovarian Leydig cell tumor
Corpus luteum-like lesion of pregnancy?	Pregnancy luteoma
Germ cells plus immature sex cord elements?	Gonadoblastoma
Gonadoblastoma-associated malignancy?	Coexistent dysgerminoma (reported 50%)

Five distinctions worth retaining

- Leydig tumor: Unilateral/hilar, lipid-laden cells, Reinke crystalloids, testosterone.
- Pregnancy luteoma: Corpus luteum resemblance; Maternal and fetal virilization possible.
- Gonadoblastoma: Germ cells plus immature sex cord derivatives.
- Gonadoblastoma: Associated atypical gonadal development; Dysgerminoma reported in half.
- Only gonadoblastoma is explicitly called a noninvasive germ-cell neoplasia here.

References and source boundaries

Robbins, Cotran & Kumar. Pathologic Basis of Disease. 11th ed. Elsevier; 2026.

Chapter 22, The Female Genital Tract: Sex Cord–Stromal Tumors, pp. 931–933.

Primary section: Other Sex Cord–Stromal Tumors, p. 933.

Selected comparisons: Granulosa tumors, Fibromas/Thecomas, Sertoli–Leydig tumors, pp. 931–933.

Source boundary: original chapter PDF and authentic histology assets were not available for verification or insertion. No unsupported IHC panel, cutoff, treatment protocol or classification update is asserted.