Incidentally detected non-palpable testicular nodule guidelines of the working group

L Rocher and the ESUR scrotal subcomittee, Hôpitaux Universitaires Paris Sud, site Bicêtre.
Non palpable intratesticular lesions: analysis of current urological knowledge

- May be benign in up to 80%.
- Benign lesions are usually smaller than malignant ones...
### WHO classification of tumours of the testis

#### Germ cell tumours derived from germ cell neoplasia in situ

<table>
<thead>
<tr>
<th>Tumour</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult granulosa cell tumour</td>
<td>Granulosa cell tumour</td>
</tr>
<tr>
<td>Juvenile granulosa cell tumour</td>
<td>Granulosa cell tumour</td>
</tr>
<tr>
<td>Tumours in the fibroma-thecoma group</td>
<td>Fibroma-thecoma</td>
</tr>
<tr>
<td>Mixed and unclassified sex cord-stromal tumours</td>
<td>Mixed and unclassified sex cord-stromal tumours</td>
</tr>
<tr>
<td>Mixed sex cord-stromal tumour</td>
<td>Mixed sex cord-stromal tumour</td>
</tr>
<tr>
<td>Unclassified sex cord-stromal tumour</td>
<td>Unclassified sex cord-stromal tumour</td>
</tr>
<tr>
<td>Tumour containing both germ cell and sex cord-stromal elements</td>
<td>Tumour containing both germ cell and sex cord-stromal elements</td>
</tr>
<tr>
<td>Gonadoblastoma</td>
<td>Gonadoblastoma</td>
</tr>
</tbody>
</table>

#### Germ cell tumours unrelated to germ cell neoplasia in situ

<table>
<thead>
<tr>
<th>Tumour</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serous cystadenoma</td>
<td>Serous cystadenoma</td>
</tr>
<tr>
<td>Serous tumour of borderline malignancy</td>
<td>Serous cystadenoma</td>
</tr>
<tr>
<td>Serous cystadenocarcinoma</td>
<td>Serous cystadenocarcinoma</td>
</tr>
<tr>
<td>Mucinous cystadenoma</td>
<td>Mucinous cystadenoma</td>
</tr>
<tr>
<td>Mucinous borderline tumour</td>
<td>Mucinous borderline tumour</td>
</tr>
<tr>
<td>Mucinous cystadenocarcinoma</td>
<td>Mucinous cystadenocarcinoma</td>
</tr>
<tr>
<td>Endometroid adenocarcinoma</td>
<td>Endometroid adenocarcinoma</td>
</tr>
<tr>
<td>Clear cell adenocarcinoma</td>
<td>Clear cell adenocarcinoma</td>
</tr>
<tr>
<td>Brenner tumour</td>
<td>Brenner tumour</td>
</tr>
<tr>
<td>Juvenile xanthogranuloma</td>
<td>Juvenile xanthogranuloma</td>
</tr>
<tr>
<td>Haemangiolipoma</td>
<td>Haemangiolipoma</td>
</tr>
</tbody>
</table>

#### Steroid cell tumours

<table>
<thead>
<tr>
<th>Tumour</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leydig cell tumour</td>
<td>Leydig cell tumour</td>
</tr>
<tr>
<td>Malignant Leydig cell tumour</td>
<td>Malignant Leydig cell tumour</td>
</tr>
<tr>
<td>Sertoli cell tumour</td>
<td>Sertoli cell tumour</td>
</tr>
<tr>
<td>Malignant Sertoli cell tumour</td>
<td>Malignant Sertoli cell tumour</td>
</tr>
<tr>
<td>Large cell calcifying Sertoli cell tumour</td>
<td>Large cell calcifying Sertoli cell tumour</td>
</tr>
<tr>
<td>Intratubular large cell hyalinizing Sertoli cell neoplasia</td>
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</tr>
</tbody>
</table>

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*World Health Organization classification of germ cell tumours of the testis. Reproduced with permission from the World Health Organization national Agency for Research on Cancer (1).*

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### Germ cell tumours of unknown type

- Regressed germ cell tumours
  - 9080/1

### Germ cell tumours unrelated to germ cell neoplasia in situ

#### Pure tumours

- Leydig cell tumour
  - 8650/1
- Malignant Leydig cell tumour
  - 8650/3
- Sertoli cell tumour
  - 8640/1
- Malignant Sertoli cell tumour
  - 8640/3
- Large cell calcifying Sertoli cell tumour
  - 8642/1
- Intratubular large cell hyalinizing Sertoli cell neoplasia
  - 8643/1

#### Pure tumours

- Spermatocytic tumour
  - 9063/3
- Teratoma, prepubertal type
  - 9084/0
- Dermoid cyst
- Epidermoid cyst
- Well-differentiated neuroendocrine tumour (monodermal teratoma)
  - 8240/3
- Mixed teratoma and yolk sac tumour, prepubertal type
  - 9085/3
- Yolk sac tumour, prepubertal type
  - 9071/3

### Sex cord–stromal tumours

#### Pure tumours

- 8650/1
- Malignant Leydig cell tumour
  - 8650/3
- Sertoli cell tumour
  - 8640/1
- Malignant Sertoli cell tumour
  - 8640/3
- Large cell calcifying Sertoli cell tumour
  - 8642/1
- Intratubular large cell hyalinizing Sertoli cell neoplasia
  - 8643/1

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*The morphology codes are from the International Classification of Diseases for Oncology (ICD-O) (917A). Behaviour is coded 0 for benign tumours, 1 for unspecified, borderline, or uncertain behaviour, 2 for carcinoma in situ and grade Ib intraepithelial neoplasia, and 3 for malignant tumours.*
Two main risks

• Lead the surgeon to perform an orchiectomy for benign tumors or pseudo tumoral lesions

• Neglect sinister findings, reflecting tumoral status

One basic exam... and others under evaluation

◊ Color-Doppler Ultrasound
Caracterization based on B mode and Color Doppler: how we do it?

- Spherical lesions: nodules
  - cystic
  - mixed
  - indeterminate
  - solid

- Areas
  - No comprehensive anatomical repartition
  - Ghost-like area
  - Striated
    - Converging to the hilum
Non tumoral cystic or cystic-like lesions

Tubular ectasia

Simple cyst

Intra-testicular varicocele

No surgery, no tumoral markers, no CT, no follow up
Multilocular cysts: no real recommendations not included in the WHO tumoral list

- Lymphangioma
- Mesothelial cysts

Follow up?
Mixed solid and cystic lesions

Non seminomatous germ cell tumors>>> seminomatous germ cell tumors

Tumoral markers/ whole-body CT /sperm preservation
“Cystic” but hard and pasty lesions: dermoid/epidermoid cysts: mostly palpable!!

Typical aspect
Avascular
Concentric layers (onion skin)
Recommendation
Partial surgery
Dermoid cyst

Avascular echoic content (keratin)
Septations
Orchidectomy performed:
Dermoid cyst

Partial surgery and no follow-up

WHO 2016: germ cell tumors unrelated to neoplasia in situ, pre pubertal type of teratomas
“cystic” but hard and pasty lesions: malignant post pubertal type teratomas

- Multilocular pattern +++, non spherical lesion

WHO 2016: derived from germ cell tumors related to neoplasia in situ, post pubertal teratoma type

→ Orchietomy
Solid lesions: examples of obviously malignant lesions, even if incidentally discovered

- Orchietomy
- Tumoral markers/body CT/sperm conservation
Hypoechoic vascularized solitary nodule

- size
- Echogenicity: very hypoechoic or not?
- Borders: blurred, lobulated, well defined
- Echotexture of the parenchyma
- Vascular architecture
- Calcifications: microlithiasis, grouped microliths, macrocalcifications
solid hypoechoic vascularized sporadic nodule

AND
- slightly hypoechoic
- Peripheral vessels
- Without microliths
- Without macrocalcification
- Without hypoechoic areas

OR
- Very hypoechoic
- Grouped microliths
- Vessels crossing the lesion
- Macrocalcification
- Hypoechoic areas

High suspicion of Leydig cell stromal tumor

Follow-up if <5 mm
- Tumorectomy if >10 mm
- Discussion if 5 to 10 mm

High suspicion of Seminoma

Discuss tumorectomy/orchiectomy
- With frozen section analysis
Sporadic Leydig cell tumors of increasing size
Why should we follow up small LCT? 31 Y infertility OAT, tumorectomy

- Fibrous Leydig cell tumor, 4 mm
Malignant seminomatous germ cell tumors
Several unilateral nodules

- **CAUTION! ESPECIALLY IF**
  - No Klinefelter disease (generally bilateral involvement)
  - Calcifications
  - Microlithiasis
  - Heterogeneous and hypoechoic areas
Hypofertility screening

July 2016

Stage 1 Seminoma

November 2016
53 years old, Right Orchietomy during childhood for teratoma
2002 : left nodule : tumorectomy : Leydig cell tumor
Follow up

Seminomatous germ cell tumors .....

2nd ESUR Teaching Course Multimodality Imaging Approach to Scrotal and Penile Pathologies
Klinefelter Syndrome

- Very small testis (2-3 ml)
- Hypoechoic nodules: Leydig cell tumours/hyperplasia
- Hypervascularization
- Microlithiasis
- Nodules and hypervascularization decreased after androgen substitution


Leydig cell hyperplasia in non Klinefelter syndrome
Bilateral multiple micro or macro nodules with regular distribution

- In sensitive testis (normal volume) with epididymal abnormality or tunics: think of Sarcoidosis

Normal size peritesticular (epididymal or tunics involvement) pulmonary or neurological disease
Striated or ribbon-like: benign pattern
Ghostly focal lesion: think of Burn-out germ cell tumors

scar of germ cell tumor without malignant cells on the removed testis, with or without retroperitoneal or mediastinal lymph node metastases

Exemples of burned out tumors discovered on infertility screening

Other modalities

- US Elastography
- Contrast enhanced Sonography
- Ultra sensitive Doppler
- Multiparametric MRI
US Elastography

  - “Because of its higher specificity, RTE can provide additional information in cases with indeterminate US findings”.


  - “Elastography can better differentiate benign from malignant testicular lesions. Follow up can be reduced for elastic testicular lesions at Elastography.”

  - “Multiparametric US allows for a reliable differentiation of benign and malignant intratesticular lesions and can potentially be useful in deciding whether orchiectomy can be replaced with follow-up or less invasive organ-sparing strategies”.
Personnal data, submitted
Benign lesions may be hard!

- Adrenal rests
- Dermoid cyst
Contrast enhanced Sonography

- Isidori AM, Differential Diagnosis of Nonpalpable Testicular Lesions: Qualitative and Quantitative Contrast-enhanced US of Benign and Malignant Testicular Tumors. Radiology. 2014
  MT: rapid wash in and wash out
  LCT: prolonged wash out

  LCT: shorter filling time, circumferential vessels

Leydig cell tumors
Contrast enhanced sonography and characterization

40 patients (16 LCT, 15 MT, 9 BOT)

LCT
- Useful in distinguishing BOT from others
- No quantitative parameters allowing reliable distinction between LCT and MT

GCT

Burned-out tumeur

Ultrasensitive Doppler

Normal

Seminoma

Leydig cell tumors

Dermoid cyst

Multiparametric MRI

MRI of the scrotum: Recommendations of the ESUR Scrotal and Penile Imaging Working Group

Athina C. Tsili¹ · Michele Bertolotto² · Ahmet Tuncay Turgut³ · Vikram Dogra⁴ · Simon Freeman⁵ · Laurence Rocher⁶ · Jane Belfield⁷ · Michal Studniarek⁸ · Alexandra Ntorkou¹ · Lorenzo E. Derchi⁹ · Raymond Oyen¹⁰ · Parvati Ramchandani¹¹ · Mustafa Secc¹² · Jonathan Richenberg¹³
Incidentally detected non-palpable testicular tumours in adults at scrotal ultrasound: impact of radiological findings on management Radiologic review and recommendations of the ESUR scrotal imaging subcommittee

Laurence Rocher 1,2, Parvati Ramchandani 3, Jane Belfield 4, Michele Bertolotto 5, Lorenzo E. Derchi 6, Jean Michel Correas 7, Raymond Oyen 8, Athina C. Toli 9, Ahmet Tuncay Turgut 10, Yikram Dugra 11, Karim Fizza 11, Simon Freeman 12, Jonathan Richenberg 13

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Abstract

Objectives: The increasing detection of small testicular lesions by ultrasound (US) in adults can lead to unnecessary orchietomies. This article describes their nature, reviews the available literature on this subject and illustrates some classical lesions. We also suggest recommendations to help characterization and management.

Methods: The ESUR scrotal imaging subcommittee searched for original and review articles published before May 2015 using the Pubmed and Medline databases. Key words used were ‘testicular ultrasound’, ‘contrast-enhanced sonography’, ‘sonoechotomography’, ‘magnetic resonance imaging’, ‘testis-sparing surgery’, ‘testis imaging’, ‘Leydig cell tumour’, ‘testicular cyst’. Consensus was ob-

Table 1  Indicative reassuring and sinister patterns based on ultrasound (US) findings

<table>
<thead>
<tr>
<th>US patterns leading to benignity</th>
<th>US patterns leading to malignity</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Unique</td>
<td>• Multiple</td>
</tr>
<tr>
<td>• &lt;0.5 cm</td>
<td>• &gt;1 cm</td>
</tr>
<tr>
<td>• Simple cyst</td>
<td>• Mixed cystic and solid</td>
</tr>
<tr>
<td>• Well-defined hypo/hyper echoic</td>
<td>• vascularized</td>
</tr>
<tr>
<td>nodule</td>
<td>• Irregular margins</td>
</tr>
<tr>
<td>• Onion skin pattern (epidermoid</td>
<td>• Heterogeneous echotexture</td>
</tr>
<tr>
<td>cyst)</td>
<td>• Hypoechoic areas associated</td>
</tr>
<tr>
<td>• Normal parenchyma echotexture</td>
<td>• with the nodule</td>
</tr>
<tr>
<td>apart from the nodule</td>
<td>• Microliths</td>
</tr>
<tr>
<td>• No microliths</td>
<td>• Macrocalcifications</td>
</tr>
<tr>
<td>• No macrocalcifications</td>
<td>except in Klinefelter syndrome</td>
</tr>
</tbody>
</table>
Conclusion 1: Color-Doppler+++ Vidéos+++  

Suspect LCT  

Body CT  
Tumoral markers  
MP MRI  
Stiffness ≤5 mm  

No follow up, no surgery  

Follow up selected patients: x4/y, puis x2/y...  
Time of MAP?  

Suspect LCT  

Infertility  
Body CT  
Tumoral markers  
MP MRI  
Stiffness ≤5 mm  

Partial surgery  

Karyotype XXY  
Vol < 3 ml  
Symmetrical findings  

Follow up if nodule > 3 mm
Conclusion 2

Suspect BOT

MP US and MP IRM
Body CT
Tumoral markers
Fertility preservation

Orchidectomy!

Suspect SGCT

Body CT
Tumoral markers
Fertility preservation

Orchidectomy!