

Organ-Preserving Surgery for Testicular Neoplasms

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Testicular Cancer

- **Most common malignancy in men 15-35y**
- **Most curable solid neoplasms**
- **Low mortality rate:**

Effective diagnostic techniques

Tumor markers

Radiosensitive

Chemosensitive

Predictable pattern of spread

Young patients

Classification

Seminoma

- **Classic seminoma (82-85%)**
- **Anaplastic (5-10%)**
- **Spermatocytic (2-12%)**

Nonseminomatous Germ Cell Tumors

- **Embryonal**
- **Choriocarcinoma**
- **Teratoma**
- **Yolk sac**

- **Mixed Tumors**

Classification

Intralobular Germ Cell Neoplasia (carcinoma in situ of the testis)

- The preinvasive precursor of all testicular GCTs (except spermatocytic seminoma)
- 50% develop “invasive” disease within 5 years if left untreated
- 5.2% prevalence of CIS in contralateral testis in patients with testicular cancer, same as the risk for developing GCT in contralateral testis
- Usually evenly distributed throughout the testis

Classification

Risk factors for the development of CIS:

- History of testicular carcinoma
- EGCT
- Cryptorchidism
- Contralateral testis with unilateral testicular cancer
- Atrophic contralateral testis with unilateral testicular cancer
- Somatosexual ambiguity
- Infertility

Classification

Other Testicular Neoplasms

**Sex cord-mesenchyma tumors (Leydig's cell tumors, Sertoli's cell tumors),
Gonadoblastoma, Epidermoid cyst,
Adenocarcinoma of the rete testis,
Adenomatoid tumors**

Secondary Tumors of the testis

**Lymphoma, Leukemic infiltration, Metastatic
(prostate, lung, GI tract, melanoma, kidney)**

Epidemiology

- **Incidence - 0.2%**
- **Age – 20-40y, >60 (spermatocytic seminoma, NSGCT), infancy (NSGCT)**
- **Racial – American whites, jewish people in Israel, Chinese**
- **Genetic factors**
- **Laterality and bilaterality (Rt, 1-3% bil)**

Etiology

Congenital Causes

- **Cryptorchidism (RR 3-14)**

Acquired Causes

- **Trauma**
- **Hormones (DES, oral contraceptives, exogenous estrogen)**
- **Atrophy (non-specific / mumps-associated)**

Signs and Symptoms

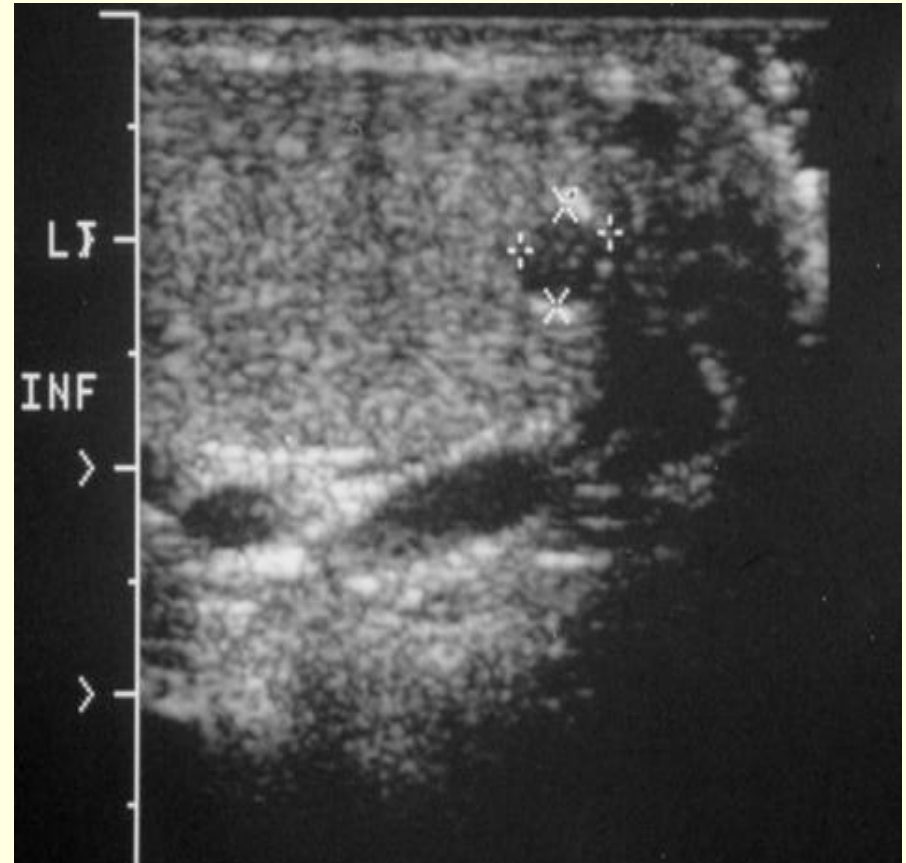
- **Nodule or painless swelling of one gonad**
- **Dull ache / heavy sensation (30-40%)**
- **Acute pain (10%)**
- **Infertility (rare as a presenting complaint)**
- **Metastases (10%) – neck mass, respiratory symptoms, GI disturbances, hemorrhage (retroduodenal metastasis), lumbar back pain, bone pain, central and peripheral nervous system manifestations, lower-extremity swelling, gynecomastia**

Differential Diagnosis

- **Testicular torsion**
- **Epididymitis / epididymo-orchitis**
- **Hydrocele**
- **Hernia**
- **Hematoma**
- **Spermatocele**

Scrotal Ultrasonography

- **Ultrasonography of the scrotum is basically an extension of the physical examination**



Scrotal Ultrasonography

- **High sensitivity (97%) for detection of intratesticular masses, but low specificity (45%)**
- **Any hypoechoic area seen within the testes is suspicious for cancer**
- **DD: infarction, orchitis, artrophy, hematoma, benign tumors**

Old Axiom

- **Any suspicious testicular mass had to be removed, based on the reported very low prevalence of benign lesions (1%) and the belief that intraoperative biopsies in presence of malignancy would lead to tumor seeding and disease progression**

Rational for Organ-Preserving Surgery

- **Higher proportion than previously described of histologically proven benign testicular lesions**
- **Increasing number of asymptomatic non-palpable small-volume masses**
- **High accuracy of frozen section examination**
- **Increasing attention to the cosmetic, functional and psychological outcome of patients with testicular tumors**

Indications for Organ-Preserving Surgery

- **Small suspicious non-palpable lesions detected by scrotal US**
- **Organ-confined tumors less than 2 cm in size, especially polar tumors**
- **Bilateral testicular tumors / tumor in solitary testis**
- **Negative post-resection biopsies of the tumor bed**
- **Absence of CIS in the remaining testicular parenchyma**
- **Patient's compliance**

Indications for Organ-Preserving Surgery

- **Benign testicular tumors**
- **Malignant testicular tumors**
- **Non-palpable testicular tumors**
- **Testicular tumors in the pediatric age**

Benign Testicular Tumors

■ Epidermoid cysts

Sonographic image similar to that of a simple intratesticular cyst, described as a hypoechoic mass with a well demarcated border or echogenic rim and an echogenic center caused by multiple acoustical reflections from the keratinatous debris



Benign Testicular Tumors

Leydig's cell tumors

- Usually exhibits a benign behaviour with only a minority of metastasizing cases (10%)
- Typical symptoms – adults: gynecomastia, infertility, endocrine abnormality, impotence, children: precocious puberty
- US characteristics
- FSE accuracy 100%
- Normal serum markers level

Malignant Testicular Tumors

Indications and recommendations (German Testicular Cancer Study Group)

- Tumor in solitary testis or bilateral tumors
- Diameter < 2 cm
- Organ confined
- No invasion of the rete testis
- Multiple biopsies of the surgical bed
- Adjuvant radiotherapy to the remaining testicular parenchyma to eradicate concomitant TIN
- Normal pre-operative serum LH and testosterone

Organ Sparing Surgery for Malignant GCT of The Testis (J UROL, 2001)

- **73 patients (mean age 31y) – 17 synchronous, 52 metachronous, 4 in solitary testicle**
- **Median follow-up was 91m (3-191)**
- **Tumor < 75% of the testis volume**
- **Biopsy of the peripheral parenchyma was performed in 68 / 73 (for diagnosis of TIN) and was positive in 56 pts (83%)**
- **46 / 56 → post-operative radiation**
- **10 pts refused radiation, 3 of them developed local recurrence (6m, 12m, 165m)**

Organ Sparing Surgery for Malignant GCT of The Testis (UROL, 2001)

- **Postoperative serum testosterone was normal in 62 pts (85%)**
- **Low testosterone levels in 7 pts (4 with tumor diameter > 20 mm, 3 warm ischemia)**
- **Secondary testicular ablation was performed in 9 pts (12.3%) – 4 d/t local recurrence, 4 d/t atrophy**

Organ Sparing Surgery for Malignant GCT of The Testis (J UROL, 2001)

- **Local recurrence -**

3 / 4 pts had positive biopsies for TIN but refused for radiotherapy

1 / 4 had a residual focus of mature teratoma

- **Systemic progression – 3 pts (2 embryonal carcinoma, 1 TIN refused radiation)**

Organ Sparing Surgery for Malignant GCT of The Testis (UROLOG, 2001)

- **98.6% survival without evidence of disease**
- **Normal endogenous serum testosterone levels in 85%**
- **50% successful parenting rate**

Non-Palpable Testicular Tumors

- **Palpable tumors malignancy rates > 90%**
- **Non-palpable tumors are benign in 50-80% of cases**

Investigator	Benign (n)	Malignant (n)	No Tissue Diagnosis (n)	Total (n)
Hopps and Goldstein ⁸	2	2		4
Corrie et al, ⁵	3	0	2	5
Horstman et al, ⁶	7	2		9
Comiter et al, ⁴	2	13		15
Jarvi et al. ¹³	3	0	0	3
Buckspan et al. ⁷	4	0		4
Present study	6	2	1	9
Total	27	19	3	49

Testicular Tumors in Pediatric Age

- **Higher incidence of benign testicular lesions compared to adults**
- **Malignant cases are not frequently associated with concomitant TIN or distant metastases**
- **Most are of pure cell type**
- **Characteristic histological features (benign)**
- **Fertility and semen quality correlate well with testis volume**
- **Psychological and cosmetic advantages**
- **Pre-pubertal Teratomas, simple cysts, epidermoid cysts, Leydig's cell tumors**

Surgical Technique

- **Inguinal exploration of the testis, spermatic cord vessels occlusion (delicate clamp), tumor identification (palpation or intraoperative ultrasound), incision of tunica albuginea above the tumor, enucleation of tumor with a small margin of the adjacent parenchyma (2-5mm), cold ischemia (12°-15°c). Tumor and biopsies from tumor bed are sent for frozen section analysis**

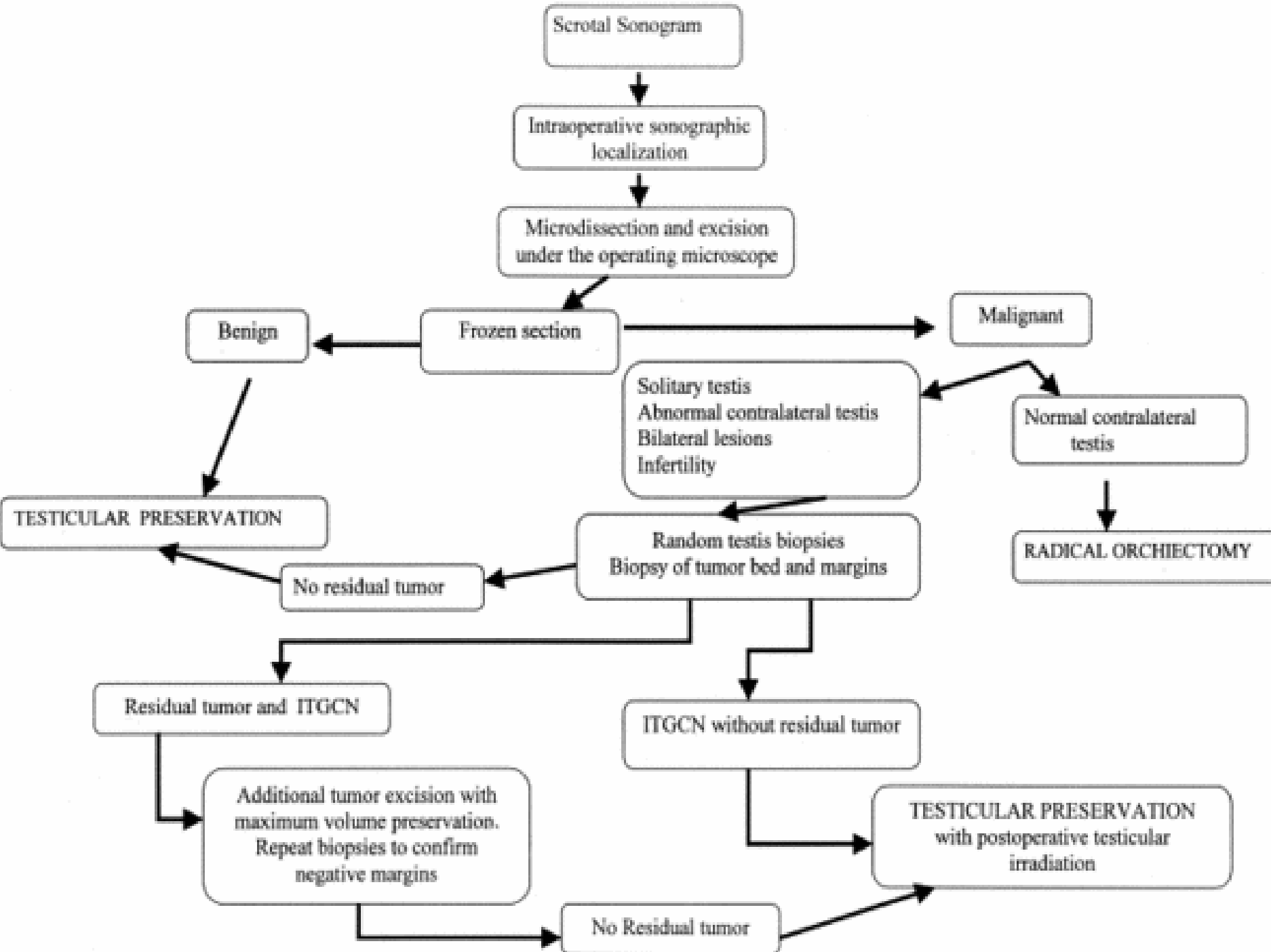
Surgical Technique

- **Benign pathological findings → close**
- **Malignant pathological findings → perform radical orchiectomy (normal contralateral testis) or obtain multiple biopsies of the remaining parenchyma to rule out concomitant foci of malignancy or testicular intralobular germ-cell neoplasia (bilateral malignancy / neoplasm within a solitary testis)**
- **When elevated serum markers fail to normalize after tumor enucleation, immediate ablation of the residual testis is mandatory**

Management of nonpalpable testicular tumors

- Urology Volume 63, Issue 6, 2004

Treatment algorithm for management of nonpalpable testicular mass



Scrotal Sonogram

Intraoperative sonographic localization

Microdissection and excision under the operating microscope

Benign

Frozen section

Malignant

Solitary testis
Abnormal contralateral testis
Bilateral lesions
Infertility

Normal contralateral testis

TESTICULAR PRESERVATION

Random testis biopsies
Biopsy of tumor bed and margins

RADICAL ORCHIECTOMY

No residual tumor

Residual tumor and ITGCN

ITGCN without residual tumor

Additional tumor excision with maximum volume preservation.
Repeat biopsies to confirm negative margins

TESTICULAR PRESERVATION with postoperative testicular irradiation

No Residual tumor

Role of Frozen Section Examination

- **Highly reliable method to characterize testicular masses**
- **Sensitivity of 81% for benign lesions, 100% for malignant tumors**
- **10% failure to differentiate seminomatous from non-seminomatous forms**
- **Non-conclusive diagnosis is rare**
- **Pitfall – accuracy may be related to the expertise of the uropathologist**

Functional Outcome After Testis-Sparing Surgery

- **Testicular ischemia during spermatic cord clamping: no irreversible damage for cord clamping < 30 minutes (cold or warm)**
- **Radiotherapy to eradicate concomitant TIN can be safely postponed**
- **Antiserum sperm antibodies (autoimmune infertility)**

Leydig Cell Impairment

- **Leydig cell dysfunction in patients with testicular tumors:**

LH ↑ in both benign & malignant tumors, but testosterone ↓ only in malignant tumors

- **Leydig cell function is markedly altered in patients after RO for testicular cancer with CIS in the contralateral testis**

A Final Word

- **If fertility is eliminated and the cosmetic advantage gained by the remnant testis can be overcome by the implantation of a prosthesis, retained endocrine function remains the main advantage of testis sparing. If such an advantage cannot be achieved, it is possible that organ preservation entails more risk than benefit**





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