



# Overview of Paratesticular RMS

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- **The views expressed herein are mine, not the groups I work with**
  - Children’s Oncology Group surgery committee
  - COG soft tissue sarcoma committee
  - COG long-term follow-up kidney & testis task forces
  - INSTRuCT collaborative
  - Societe Internationale d’Oncologie Pediatrique
  - IGHG nephrotoxicity panel
  
- **I have no financial (or other) conflicts of interest**



- **Paratesticular Rhabdomyosarcoma**
  - Epidemiology
  - Staging
  - Prognosis
  - Management
  - Collaborative group data

# Case #1



**HPI:** 25 year old man with new testicular lump

**PMH:** Otherwise healthy

**PE:** Gen: Alert, in good spirits, NAD

Abd: Benign

GU: Firm but not fixed scrotal mass separate from the testis, ~7 cm, normal contralateral testis

**Staging CT reveals no signs of metastasis**

**What next?**

# Case #1



- **Management:** Left scrotal orchiectomy
- **Final Diagnosis:** Embryonal rhabdomyosarcoma, positive cord margin
- **Subsequently referred to your friendly local COG center**



# RMS Epidemiology

# Epidemiology of Pediatric Tumors



- **Leukemia (~5,300/year)**
- **Brain tumors (~4,000/year)**
- **Neuroblastoma (~750/year)**
- **Wilms tumor (~500/year)**
- **Rhabdomyosarcoma (~350/year)**
- **Hepatoblastoma (~350/year)**
- **Testis tumors (~200/year)**



- 3<sup>rd</sup> most common solid, non-cranial tumor
- Incidence: **350 new cases annually**
- **15-20% arise from GU system**
- **Bimodal age distribution**
  - Peak incidence < 2 years of life, then adolescence
  - 2/3 of cases occur in children younger than 6 years



# Staging, Group, and Risk Category

# RMS: Staging



- To put it nicely, RMS staging is confusing
- **Simplistic version:**
  - Preop STAGE
  - Postop GROUP } → Clinical Risk Group

# RMS: Staging



- **Stage 1**

- Favorable site, any size, N0/1
  - Paratesticular

- **Stage 2**

- Unfavorable site, < 5 cm, N0
  - Bladder/prostate

- **Stage 3**

- Unfavorable site, >5 cm, N1

- **Stage 4**

- Widespread metastatic disease

# Group & Surgical Role



- **Group I – Organ-confined, negative margins**
- **Group II – Gross total resection but microscopic + margin, piecemeal resection, + LN**
- **Group III – Incomplete resection**
- **Group IV – Distant metastatic disease**

# Sarcoma Risk Categorization



- **Sarcoma risk assessment based on location, biology, & surgical outcomes**
  - Low, intermediate, and high-risk
- **Risk group depends on:**
  - Stage (location)
  - **Group** (spread, extent of surgical resection)
  - Genetics (fusion vs. non-fusion)
- **Risk defines local control & chemo**

Risk group	Stage	Clinical group	Age	Fusion status	
Low	1	I, II, III (orbit only)	Any	FOXO1-	
	2	I, II		FOXO1+	
Intermediate	1	III (non-orbit)	Any	FOXO1-	
	1, 2, 3	I, II, III		FOXO1+	
	2, 3	III		FOXO1-	
High	3	I, II	Any	FOXO1-	
	4	IV		<10 years	FOXO1-
	4	IV		≥10 years	FOXO1-
					FOXO1+



# Surgical Goals for RMS

# Goals of RMS Surgery



## 1. Diagnosis

- Get Information
- Biopsy, lymph node dissection

## 2. Prognosis

- Establish Local Control (along with Rad Onc)
- To excise the tumor with negative margins (R0/R1), **unless this would result in unacceptable loss of function or form**
- To increase survival & decrease late effects

# Terminology



- **R0 – Complete excision with negative margins**
- **R1 – Complete excision with microscopic positive margins**
- **R2 – Incomplete excision with grossly positive margins**

# Terminology



- **PRE = Pretreatment ReExcision**
  - wide local re-excision with negative margins BEFORE chemotherapy
- **DPE = Delayed Primary Excision**
  - wide local re-excision AFTER chemo
  - Goal of DPE must be complete excision
  - If complete excision not feasible, DO NOT attempt
- **SLO = “second look” procedure**
  - Previously common, now discouraged



- **PRE – initial biopsy, then excision, then chemo**
  - Shown to improve survival
  - If possible (e.g., bladder dome tumor), do it
- **DPE – initial biopsy, then chemo, then excision**
  - Hypothesized to improve survival, current data not convincing<sup>1</sup>
  - Reasonable if low morbidity



- **Sentinel node biopsy or regional lymphadenectomy required**
  - For PT-RMS, ipsilateral RPLND required\*:
    - >10 years old
    - N1 disease



# Current RMS Research: PT-RMS

# Who's who?



- **COG** = Children's Oncology Group
- **SIOP** = International Society of Pediatric Oncology
  - **MMT** = Malignant Mesenchymal Tumor study
- **EpSSG** = European Sarcoma Study Group
- **CWS** = Cooperative Weichteilsarkom Studiengruppe
- **INSTRuCT** = International Soft Tissue Sarcoma Database Consortium

# Background



- **Historic 5-year EFS  $\geq 85\%$  for PT-RMS**
- **IRS-IV vs. IRS-III:  $\uparrow$  RPLN relapse**
  - Differed in RPLN assessment
  - Imaging (IRS-IV) vs RPLND (IRS-III)
  - Particularly true in pts  $\geq 10$  yo
- **SIOP-MMT, EpSSG**
  - $\uparrow$  RPLN relapse in pts  $\geq 10$  yo
- **RPLND recommended for pts  $\geq 10$  yo**
  - SEER data suggests survival benefit

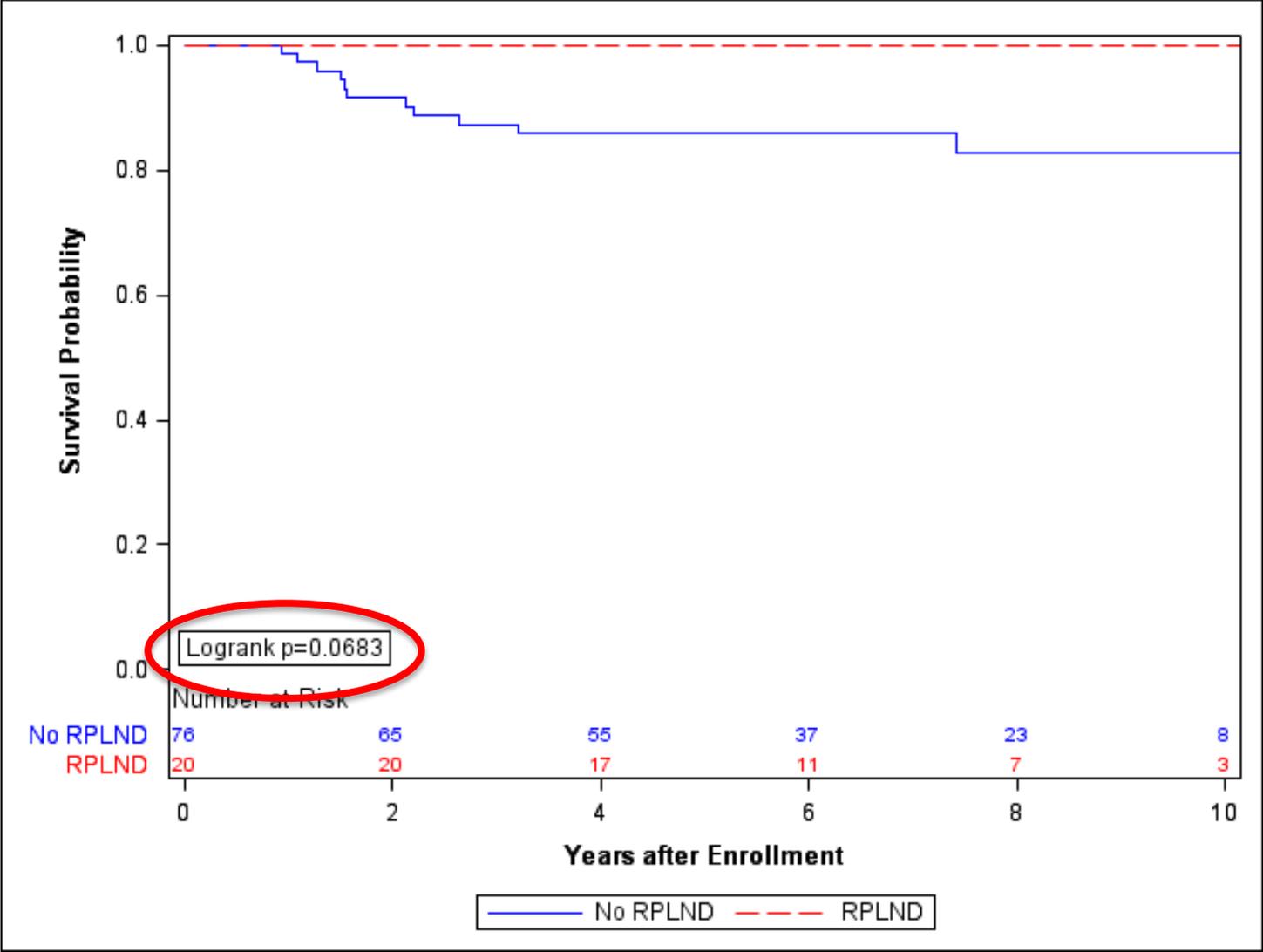
# COG Data: PT-RMS



- **279 patients**
  - 121  $\geq 10$  years old
    - 92% low risk
    - 78% negative resection margins
    - 90% N0 on imaging
  - **5-year EFS 92%**
  - **5-year OS 98%**

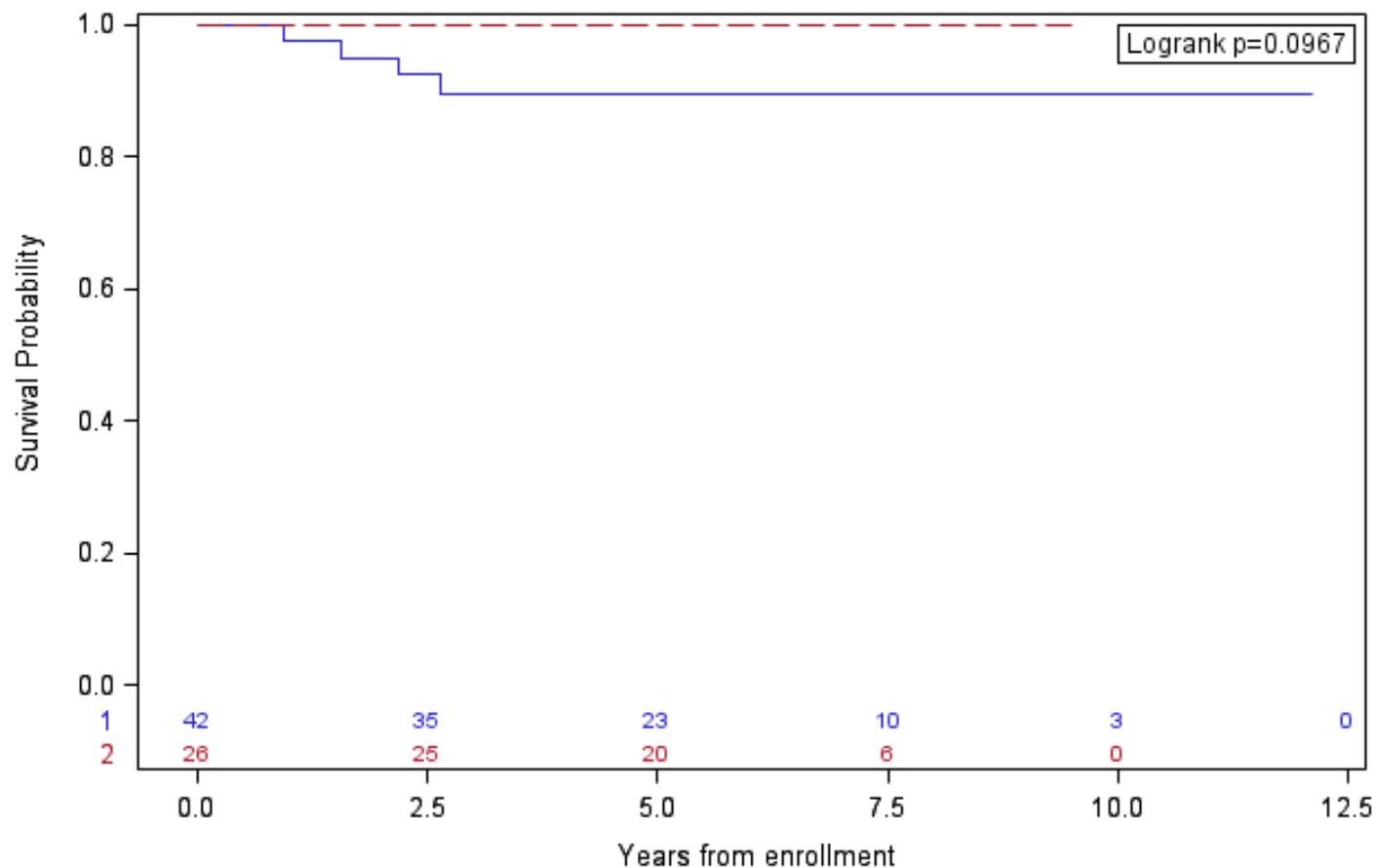


- **Only 21%  $\geq 10$ yo underwent RPLND**
  - 29% underwent sampling
  - 10% technique unknown
  - 40% no nodes sampled
- **Imaging alone missed 52% of pathologically positive RPLN pts**

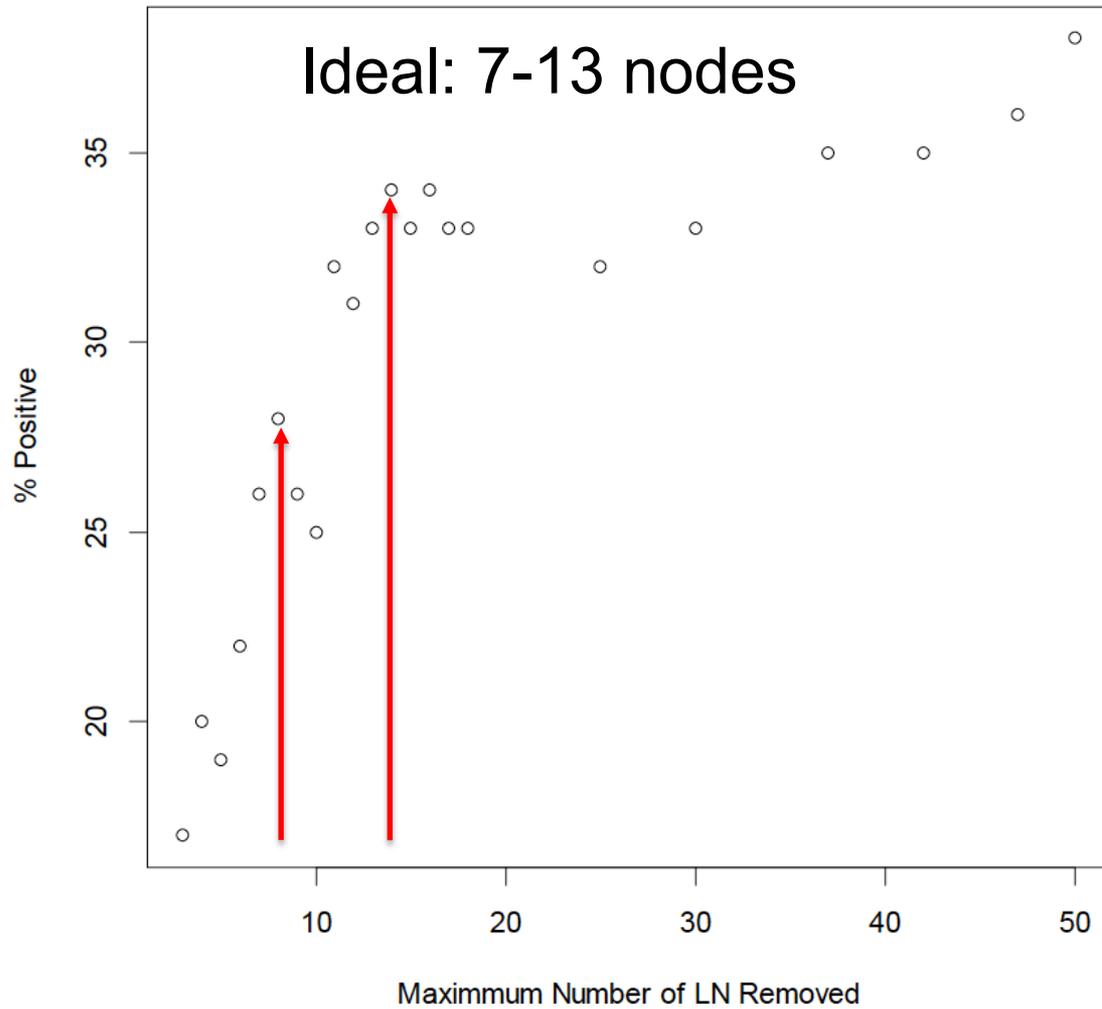


# Product-Limit Survival Estimates

With Number of Subjects at Risk



group — 1: Retroperitoneal sampling — 2: Template RPLND



# What about the scrotum?



- **Inguinal resection in 232 pts (86%)**
- **Trans-scrotal resection in 47 pts**
- **Tumor abutted tunica vaginalis in 29 pts**
- **24 pts received RT/hemiscrotectomy**
- **No survival difference for either modality**





**Based on these data,  
What do international experts  
recommend?**

# Treatment Guidelines



- **COG**
  - RPLND for N1 or patients  $\geq 10$  yo
  - Scrotal resection only for direct invasion
- **EpSSG**
  - RPLND for N1 or patients  $\geq 10$  yo
  - “No clear benefit” to hemiscrotectomy as PRE/DPE
- **INSTRuCT**
  - COG STS + EpSSG + CWS + SIOP MMT
  - RPLND for N1 or patients  $\geq 10$ yo and  $\geq 5$ cm, optional for  $< 5$ cm
  - Scrotal resection only for direct invasion

# Conclusions



- **PT-RMS is a rare tumor with excellent outcomes**
  - Data are sparse, but guidelines consistent
- **Imaging alone insufficient to detect + nodes**
- **RPLND recommended for  $\geq 10$  yo & N1 patients**
  - 7-13 retroperitoneal nodes required
- **Technique (open vs. sentinel vs. MIS) less important than node count**