Case Panel: Testicular & Paratesticular Tumors

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June 4, 2022

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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?

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Case #1

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

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Case #1

- However, if the margins were negative, he would be LOW risk (less chemo, no XRT, better prognosis)

- Option 1: Treat per intermediate risk protocol now (RPLND, VAC/VI, XRT)
- Option 2: *Make the margins negative and downgrade treatment (less chemo, no XRT)*

- Treatment: RPLND, cord excision, scar re-excision

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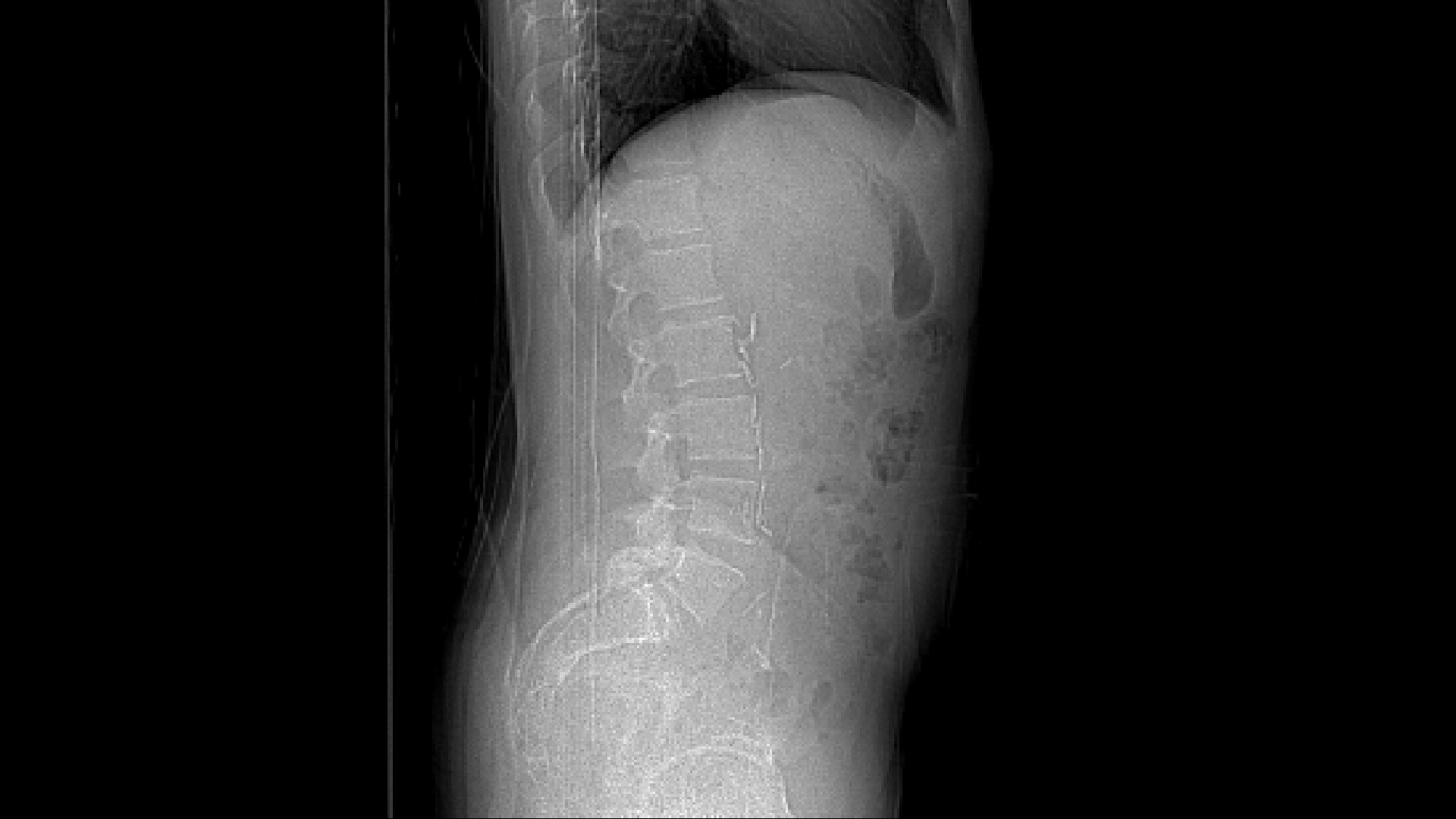

Case #1: Epilogue

- Currently 9 years out from treatment
- Recurrence-free, doing well
- Married last fall, no word on fertility yet …

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Robotic RPLND

- **First described in 2006**
- **Improved blood loss**
  - *Open*: 184-450 ml **vs.** *Lap*: 75ml **vs**. *Robot*: 50-75ml
- **Improved length of stay**
  - *Open*: 6.6 days **vs.** *Lap*: 3.3 days **vs.** *Robot*: 1 day
- **Reduced postoperative ileus**
  - *Open*: 18% **vs.** *Robot*: 2%

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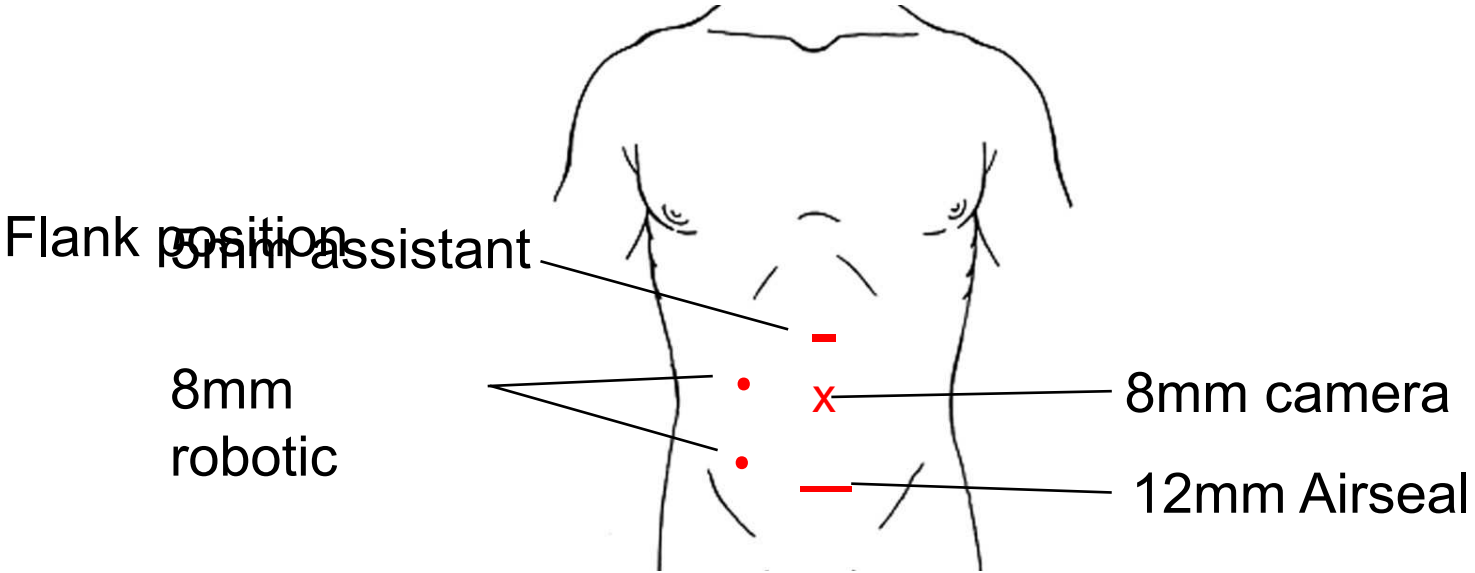
Port Placement (Si)



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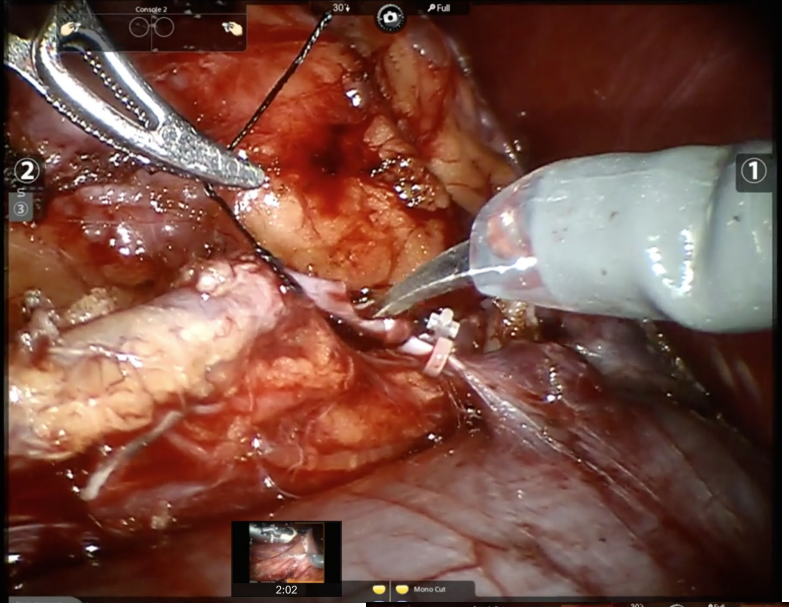
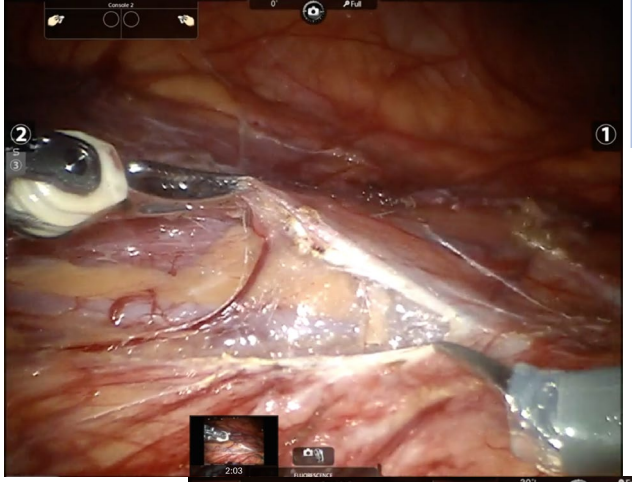
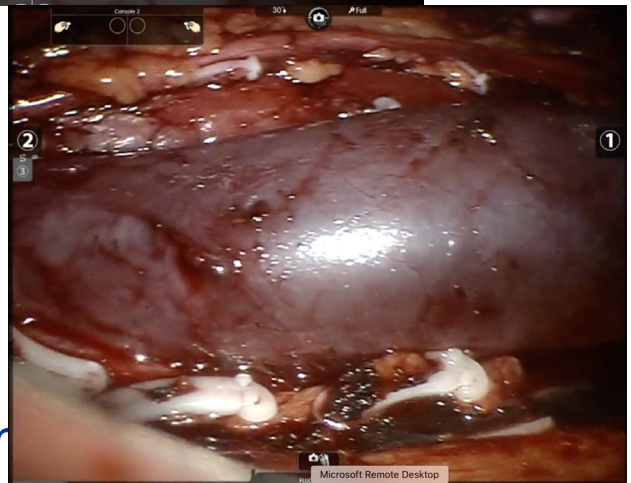
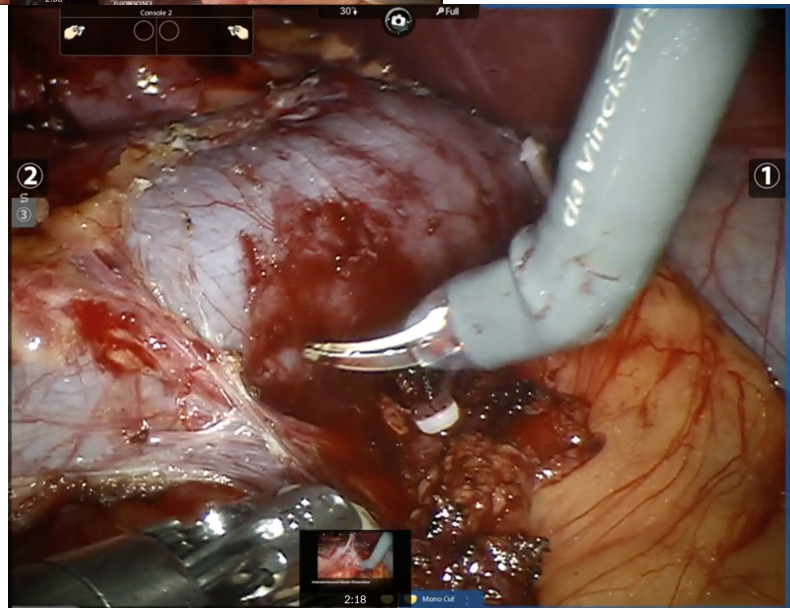
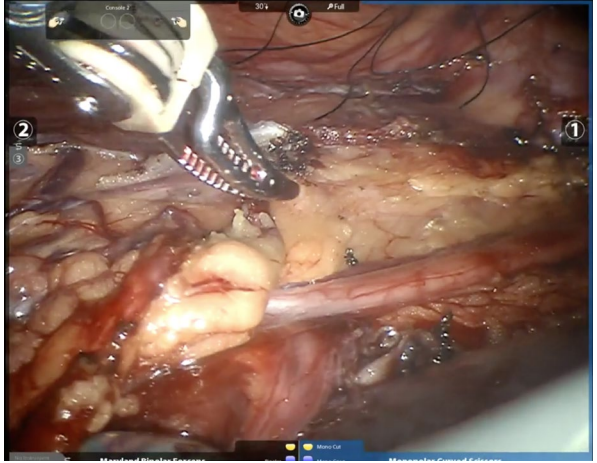








Duke Children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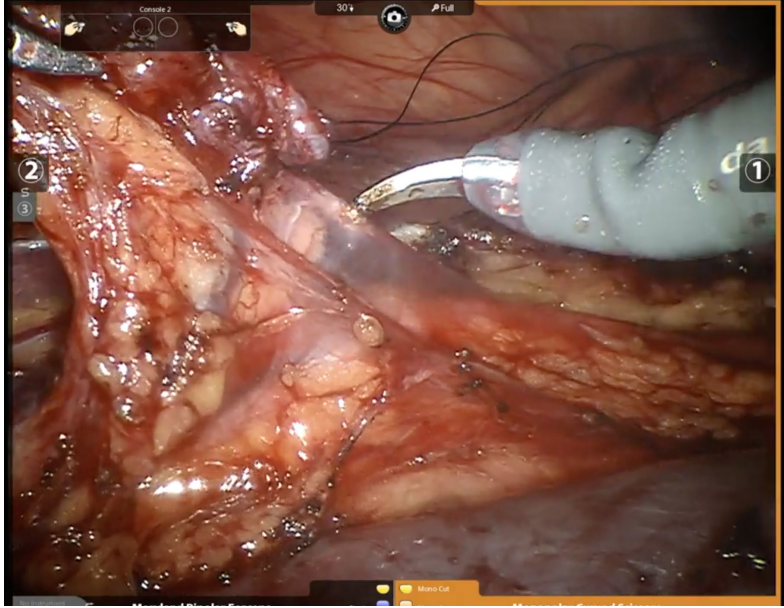
Mono Cut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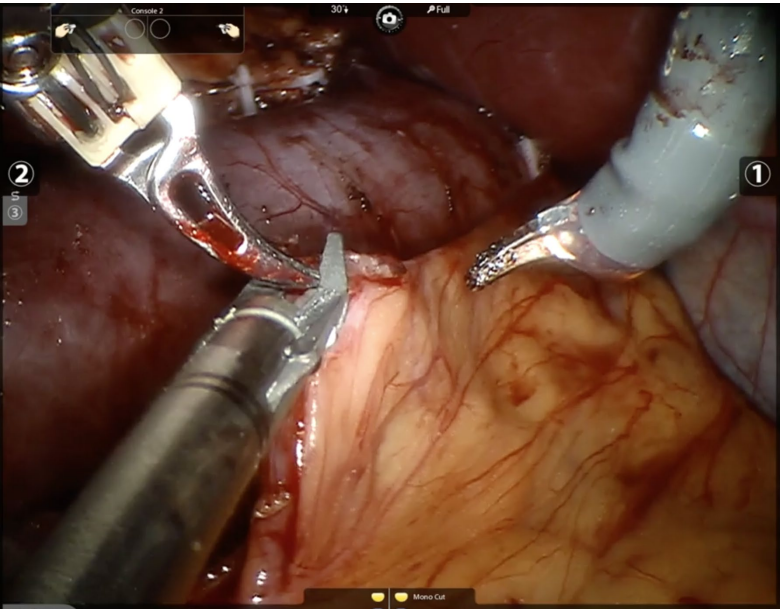
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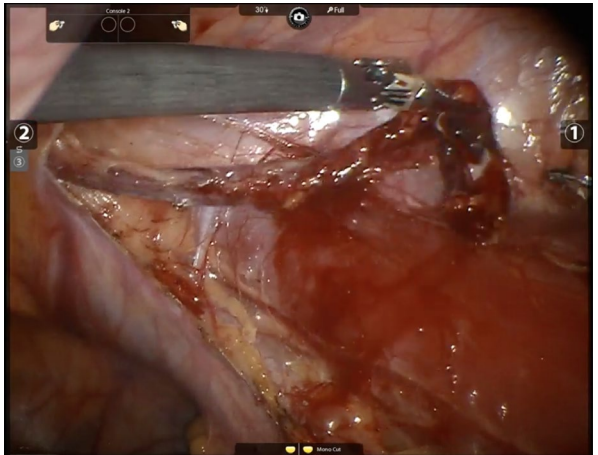
Console 2
30°
Full
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Mono Cut

Case #2

HPI: 14 year old boy with back & abdominal pain

PMH: Otherwise healthy

PE: Gen: Alert, NAD

Abd: palpable epigastric mass

GU: Large, firm scrotal mass, ~10 cm, not readily distinguishable from testis, normal contralateral testis

Staging CT:

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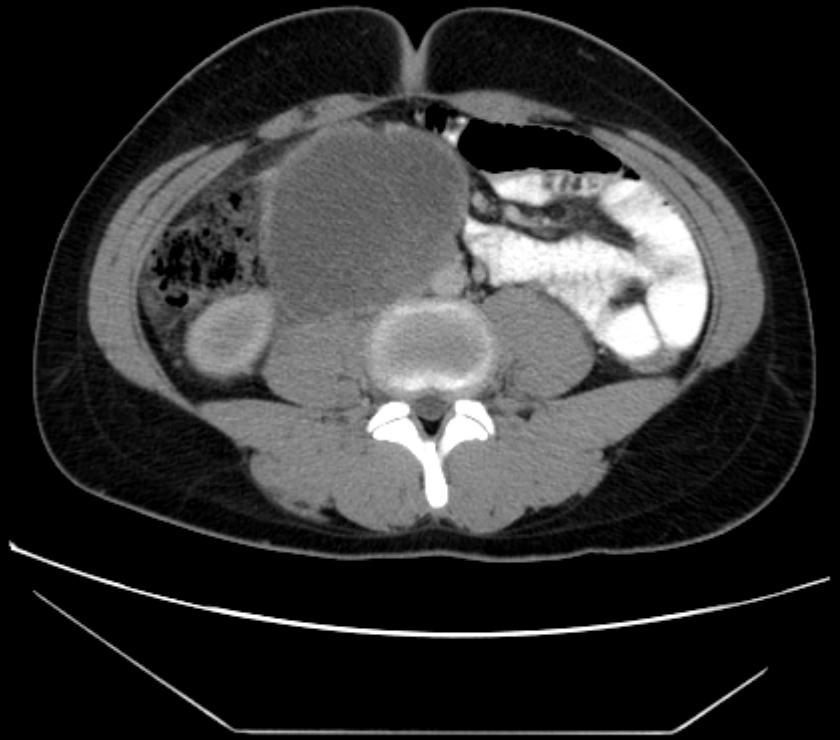
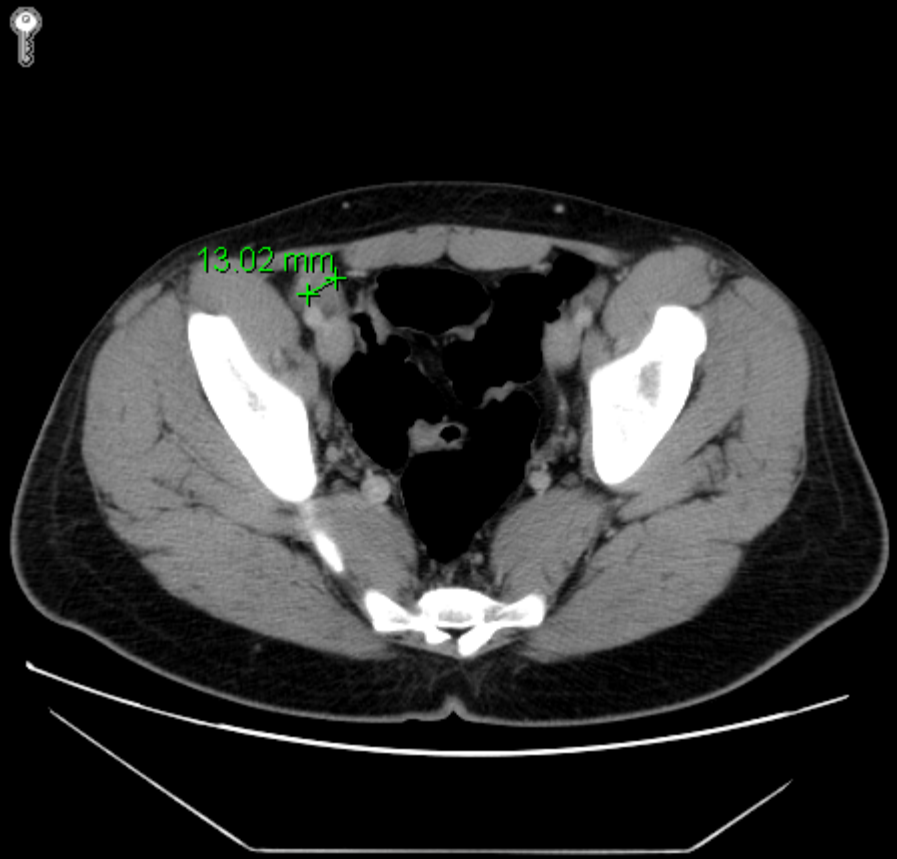
Case 2 – 14 year old

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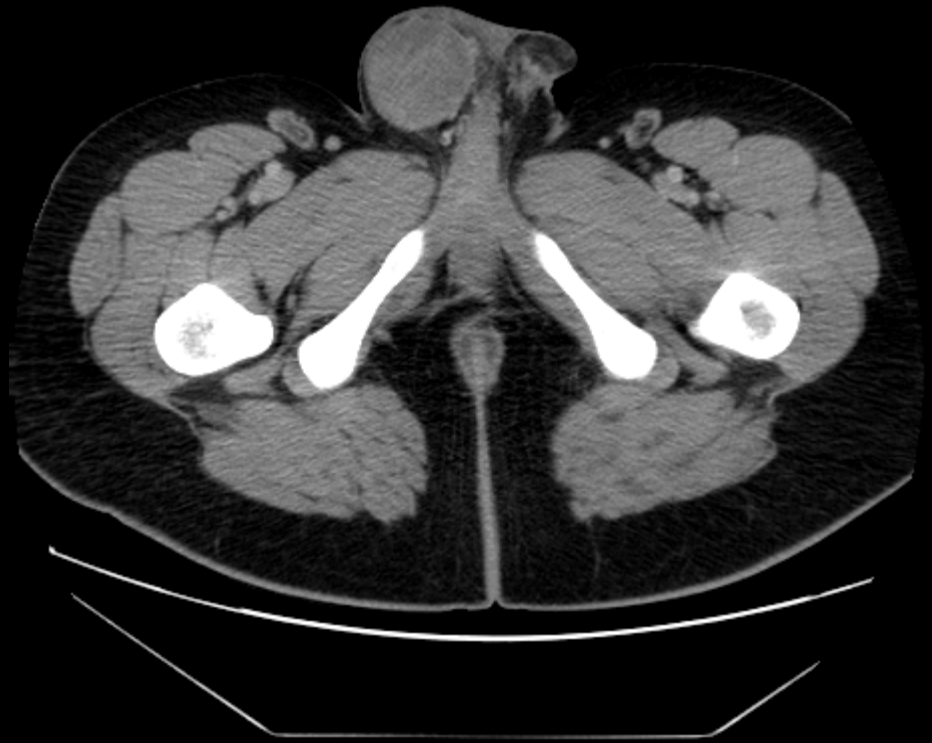

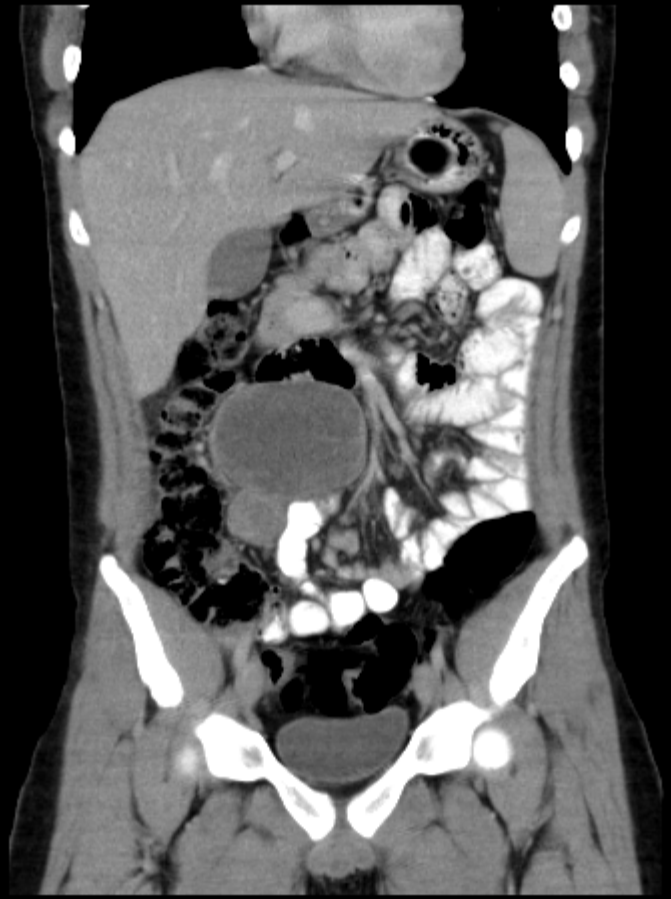

Case #2

- **Radical orchiectomy**
  - Path reveals embryonal RMS
  - Stage III, Group 3, Intermediate risk

- **What next?**

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Case #2

- **After much tumor board discussion: RPLND**
- **Technically challenging, but R0 resection**
- **2 weeks postop, called in complaining of parasthesias and back pain**
  - Serum Ca 22

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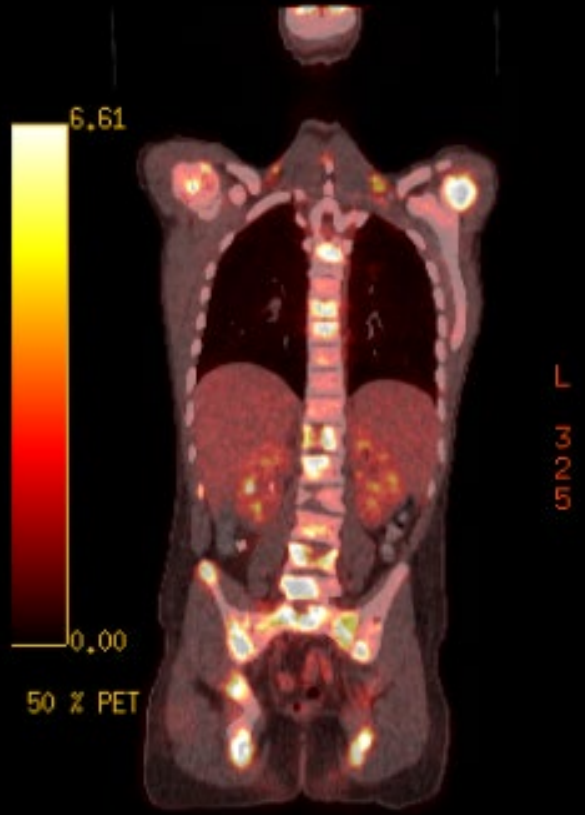
6.61
0.00
50 % PET
L
3
2
5
3.9/
m=0.00 M=6.61 g/ml
1104
V=4.96

Case #2: Epilogue

- Started on bisphosphonates, VAC
- Did not tolerate VAC, transitioned to hospice
- Died 2 months later

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Case #4

- **HPI:** 17-year-old male with abdominal pain
- **PMH:** otherwise healthy
- **ROS:** 15-lb weight loss
- **PE:**
  - Gen: uncomfortable
  - Abd: palpable midline mass
  - GU exam: small firm nodule in right testis, normal left testis

- **Next steps?**

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Case #4 - labs

- LDH – 2,013
- β-HCG – 246
- AFP – 35,042

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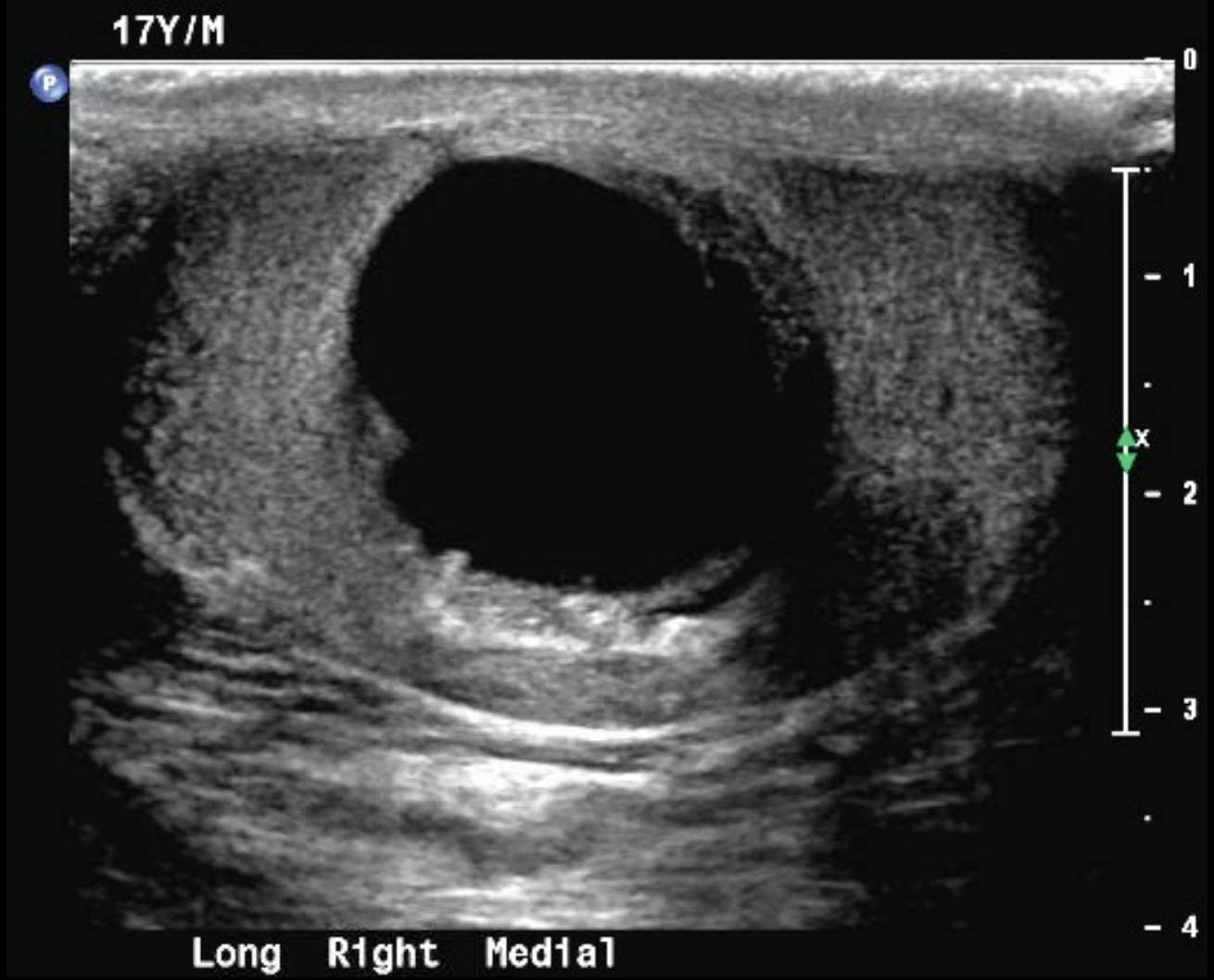
17Y/M
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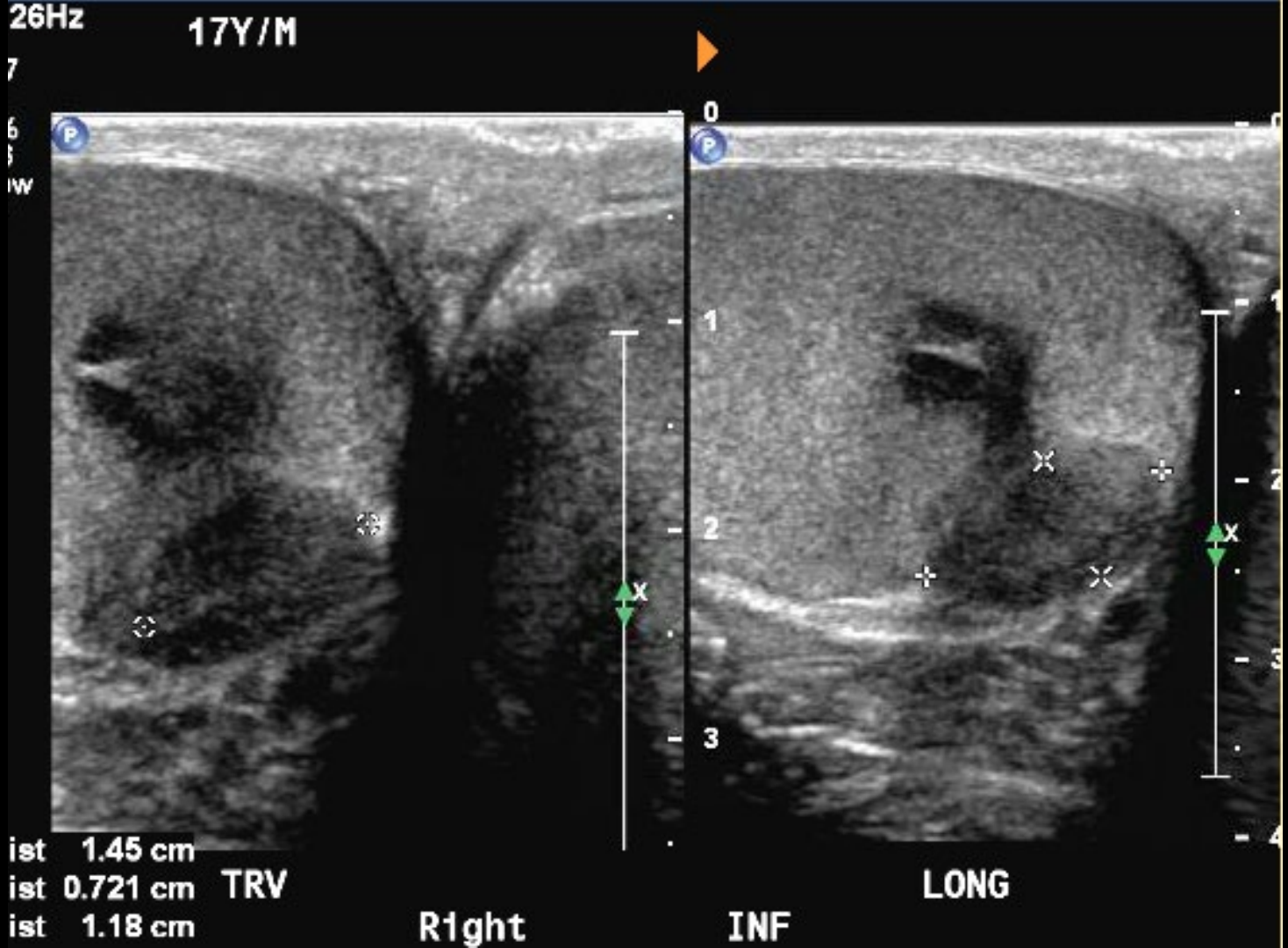
Long Right Medial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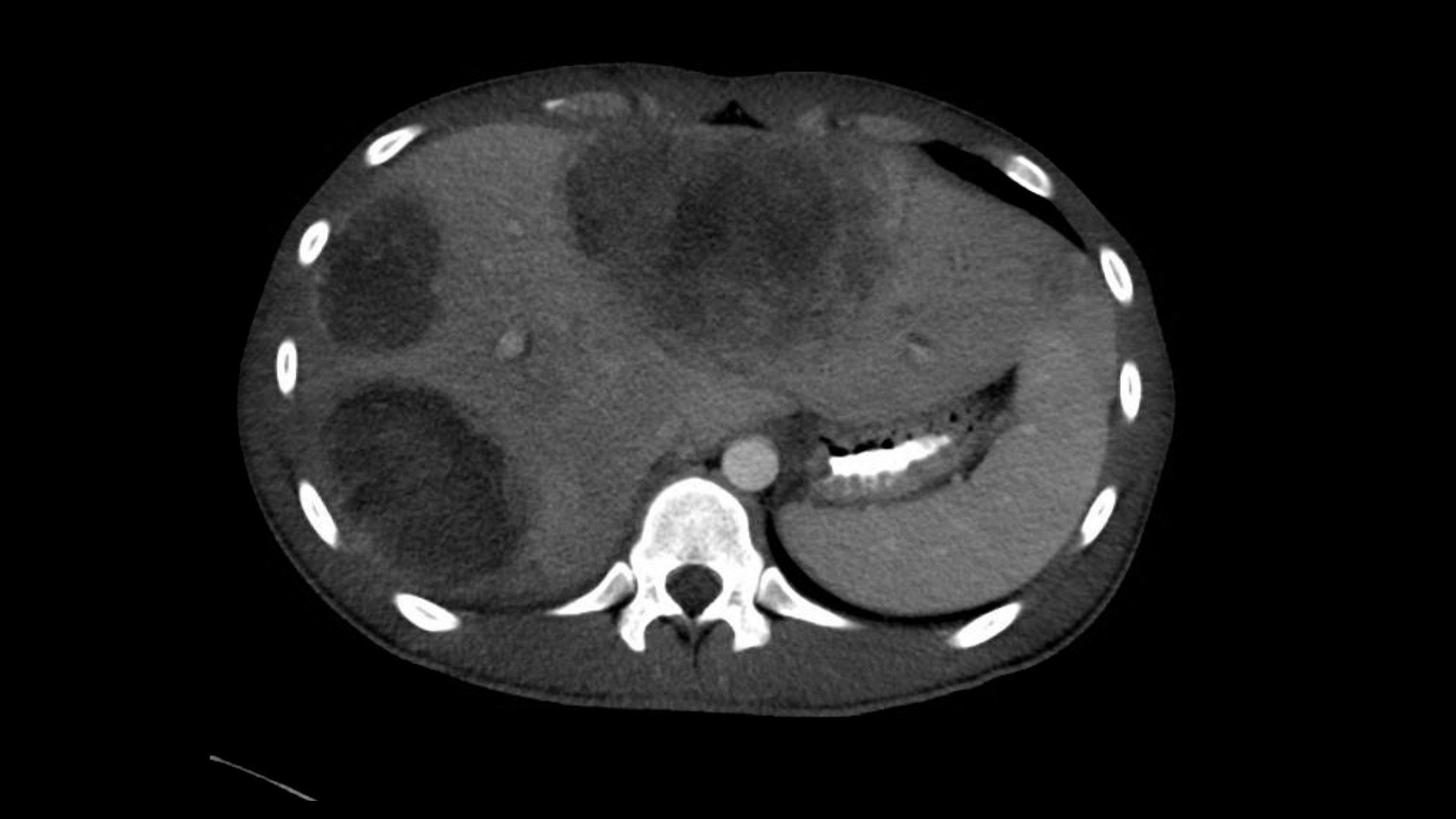

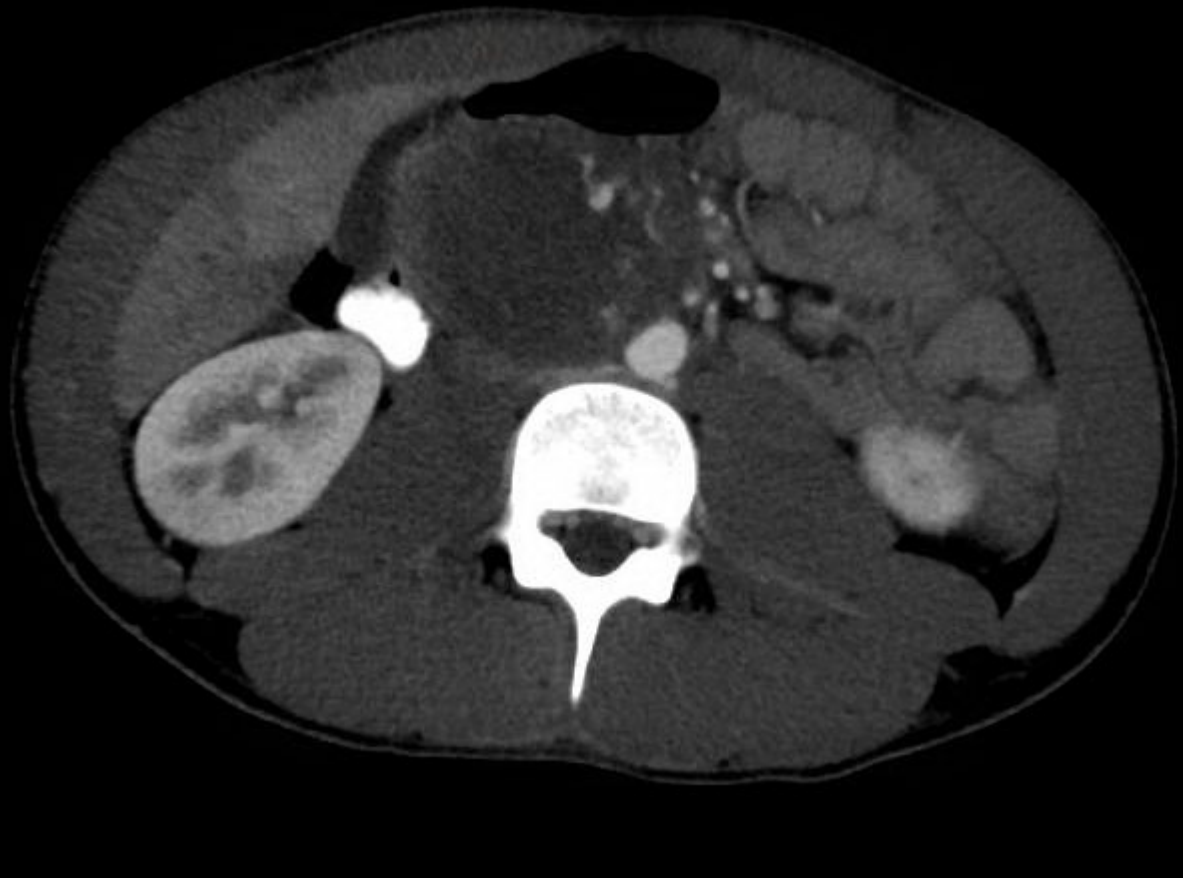

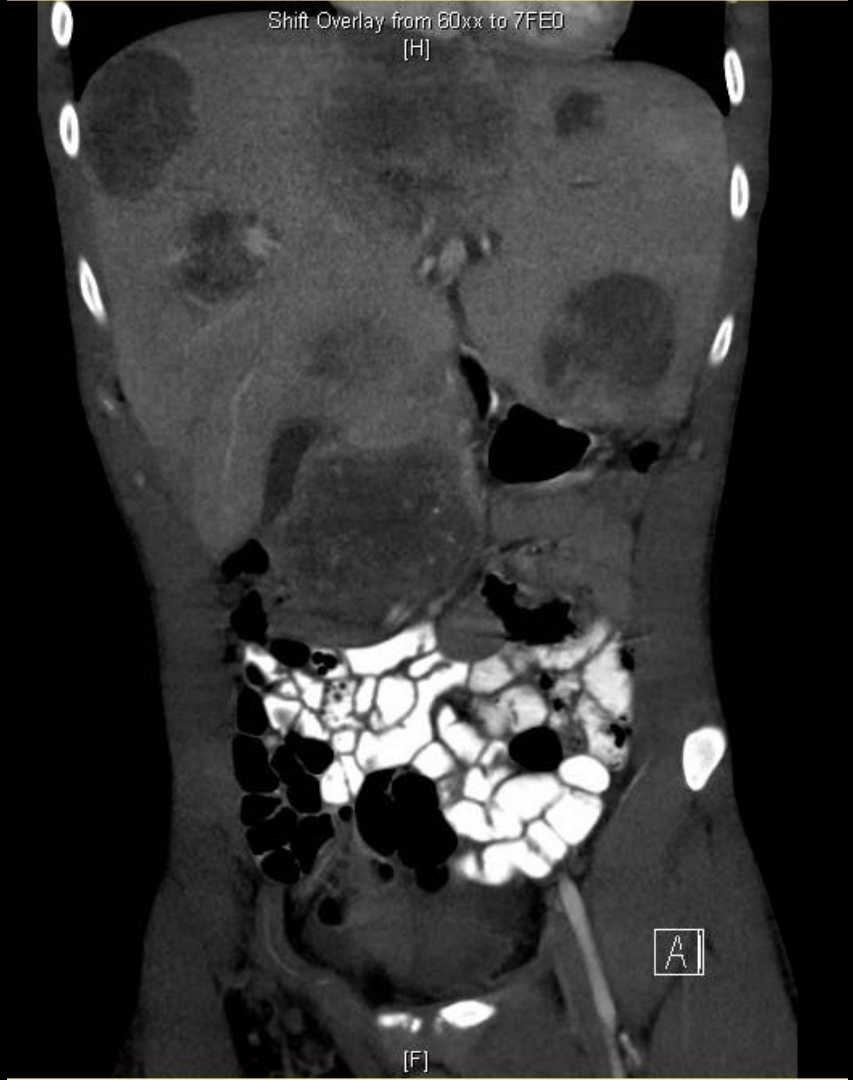
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Case #4

- **Management**:
  - Right Radical (Inguinal) Orchiectomy
- **Diagnosis:** Non-seminomatous germ cell tumor
- **What next?**

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Case #4: Further mgmt

- **Chemotherapy (BEP)**
  - ~90% response with significant tumor remaining in the lung, retroperitoneum, liver

- **Management:**
  - Thoracoscopic tumor resection (fibrosis)
  - Right hepatectomy (fibrosis)
  - Retroperitoneal lymph node dissection (teratoma)

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Case #4: Epilogue

- 10 years out from surgery
- Continues to have anejaculation
- Married, undergoing fertility eval for possible TESE/ICSI

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Survivorship Issues

- **↑ survival means ↑ survivorship issues**
  - Quality of life
  - Body image
  - Sexual function
  - Endocrine function
  - Fertility
- **Orchiectomy, RPLND, Chemotherapy, XRT**
  - All have significant impact on current & future testis function
- **Testicular prosthesis**
- **Sperm vs tissue cryopreservation**

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Case #3

- 4 yo M with L scrotal mass, progressively enlarging over past month. NT. No systemic symptoms. No other complaints.

- No medical or surgical history. Neg FHx.

- PCP ordered US which showed complex 2.5 cm mass without flow. This was entirely separate from the testes, which were normal.

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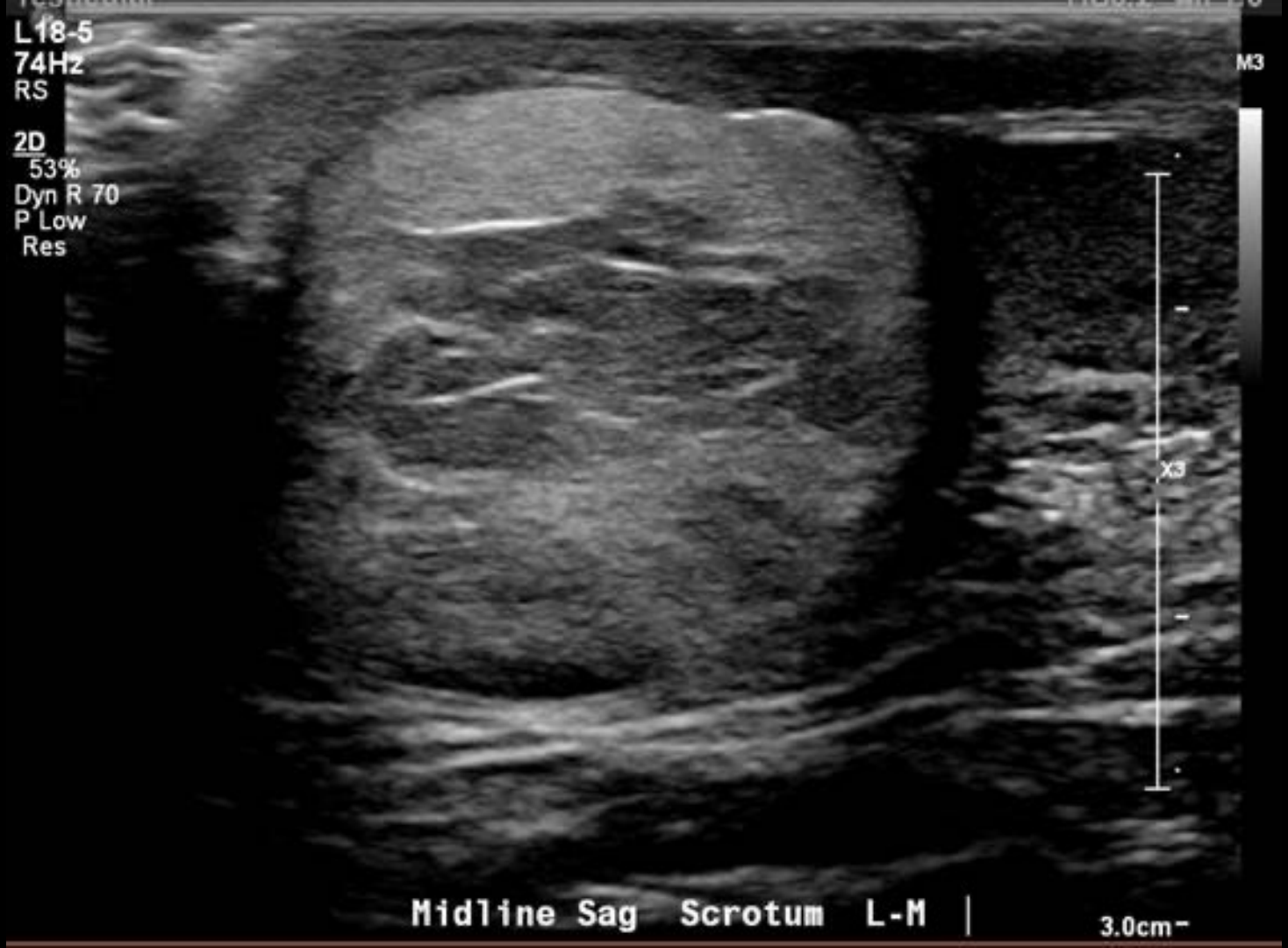
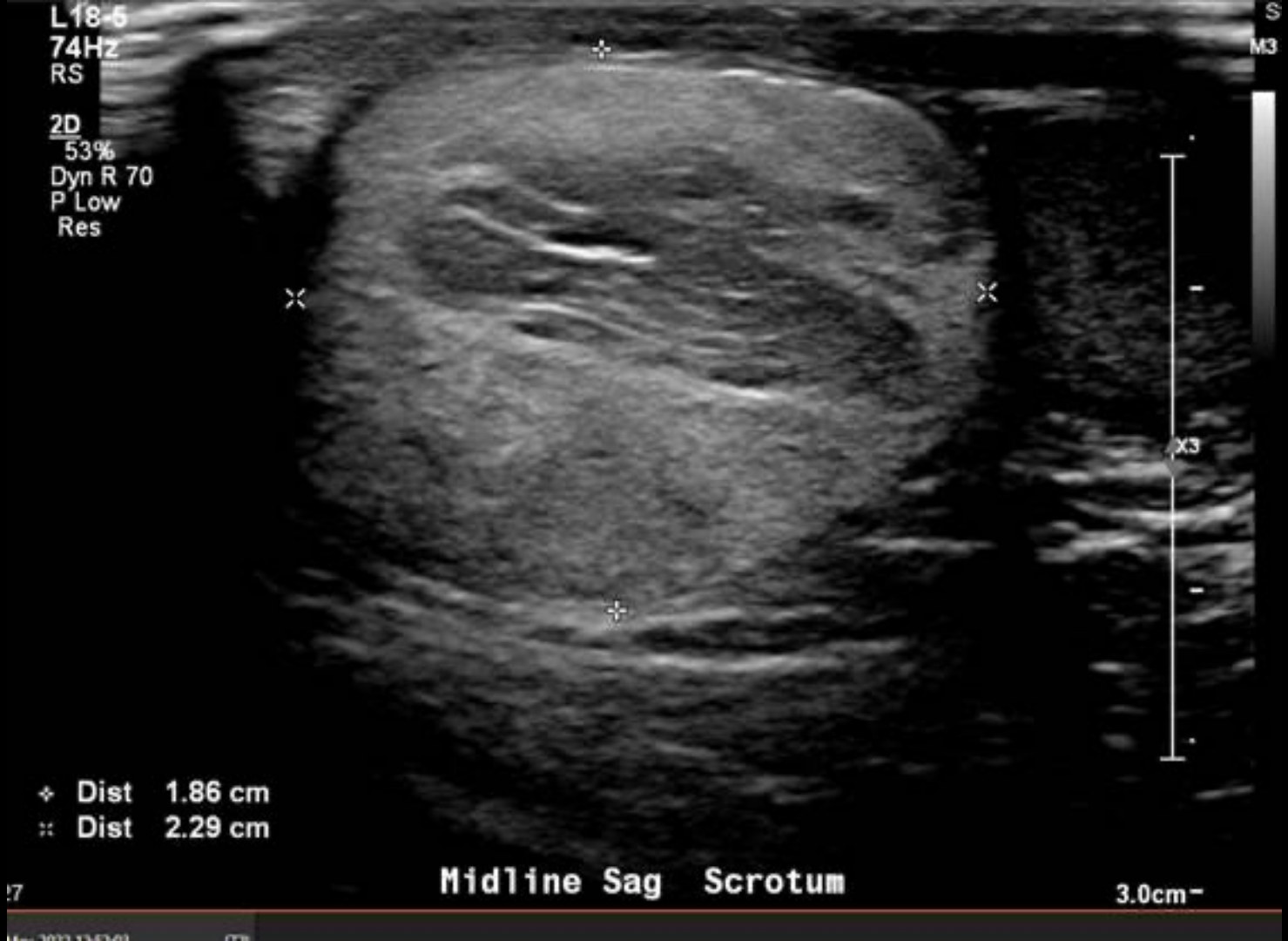
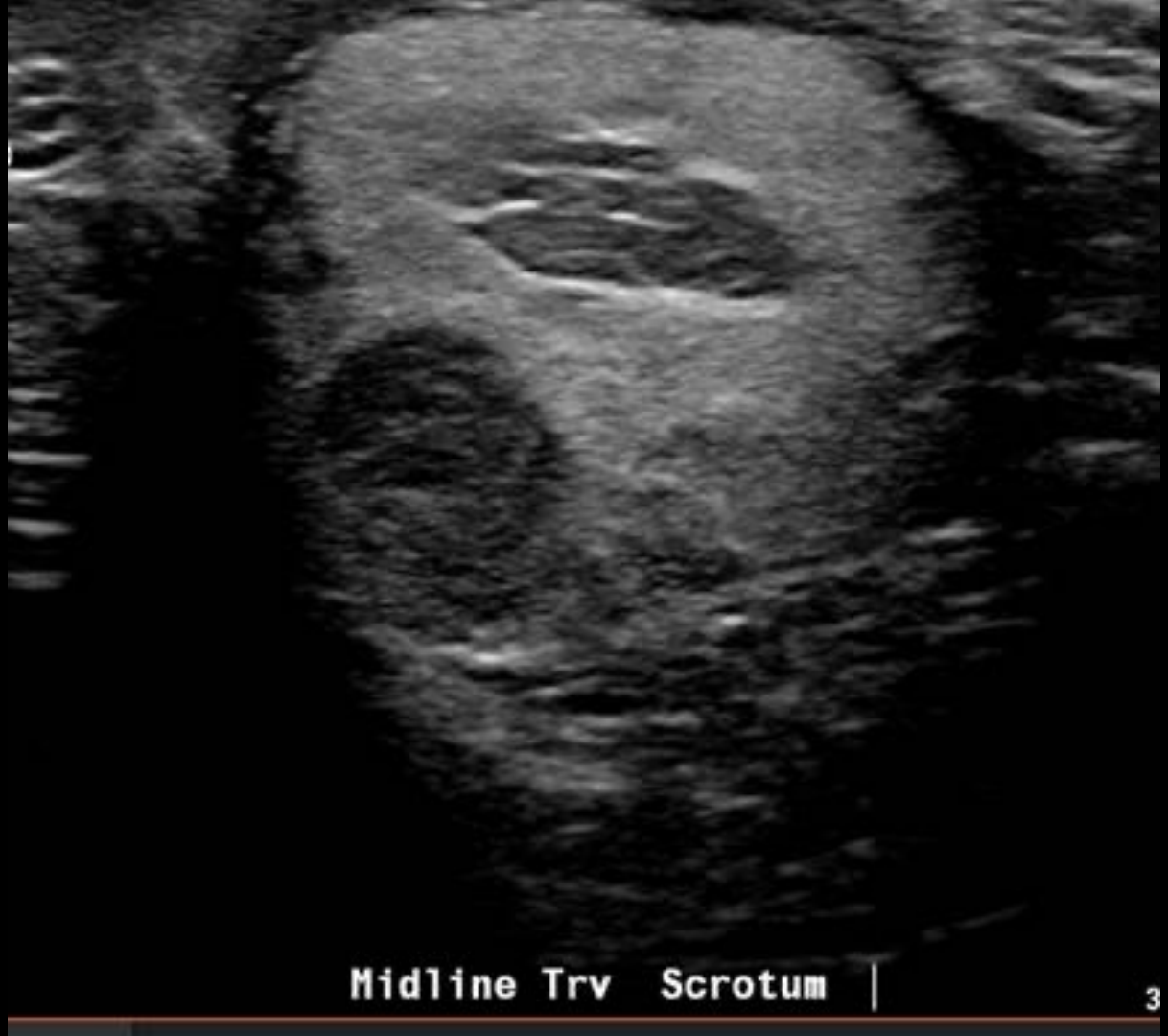

L18-5
74Hz
RS
2D
53%
Dyn R 70
P Low
Res
M3
X3
Midline Sag Scrotum L-M
3.0cm


L18-5
74Hz
RS
2D
53%
Dyn R 70
P Low
Res
S
M3
X3
Dist 1.86 cm
Dist 2.29 cm
Midline Sag Scrotum
3.0cm


Midline Trv Scrotum

Case #3: Management

- STMs normal, all other labs normal.

- Left inguinal exploration, delivered testis, draped per AGCT studies. Mass was well circumscribed, separate from testis/tunica vaginalis. Excised and sent for frozen.
- Frozen: benign appearing spindle cell tumor. Finished orchiopexy and closed.

- Final path **benign maturing lipoblastoma**

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Case

- 17 yo Male presents with abdominal pain, weight loss and a right testicular mass.
  - Tumor Markers:
    - β-HCG = 90,500, AFP = 2,350, LDH = 1500
  - Staging Imaging:
    - Retroperitoneal, Supraclavicular, Pulmonary and Hepatic involvement
  - Right Inguinal Orchiectomy:
    - pT2 (+LVI): 40% Yolk Sac, 30% Embryonal Ca, 15% Choriocarcinoma, 15% Teratoma
- COG Stage IV, AJCC Group Stage IIIc (no stage IV designation exists)

Case

- Underwent 4 cycles of BEP Chemotherapy
  - Treated by an outside Pediatric Oncologist
- Serum Tumor Markers normalized
- 2cm para-caval and 3cm inter-aorto-caval residual masses on CT
  - PET done - Not PET avid
- Told by his Pediatric Oncologist that it could be observed . . .

Audience Question #1

What is the role for PET Scan in Germ Cell Tumors?

a) Should be used routinely at the time of initial staging at diagnosis in all Germ Cell Tumors (GCTs).

b) Should be used only for post chemotherapy assessment of residual masses in Seminoma GCTs.

c) Should be used for post chemotherapy assessment of residual masses in Non Seminoma GCTs.

d) Should never be used in GCTs.

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Role of PET in GCTs

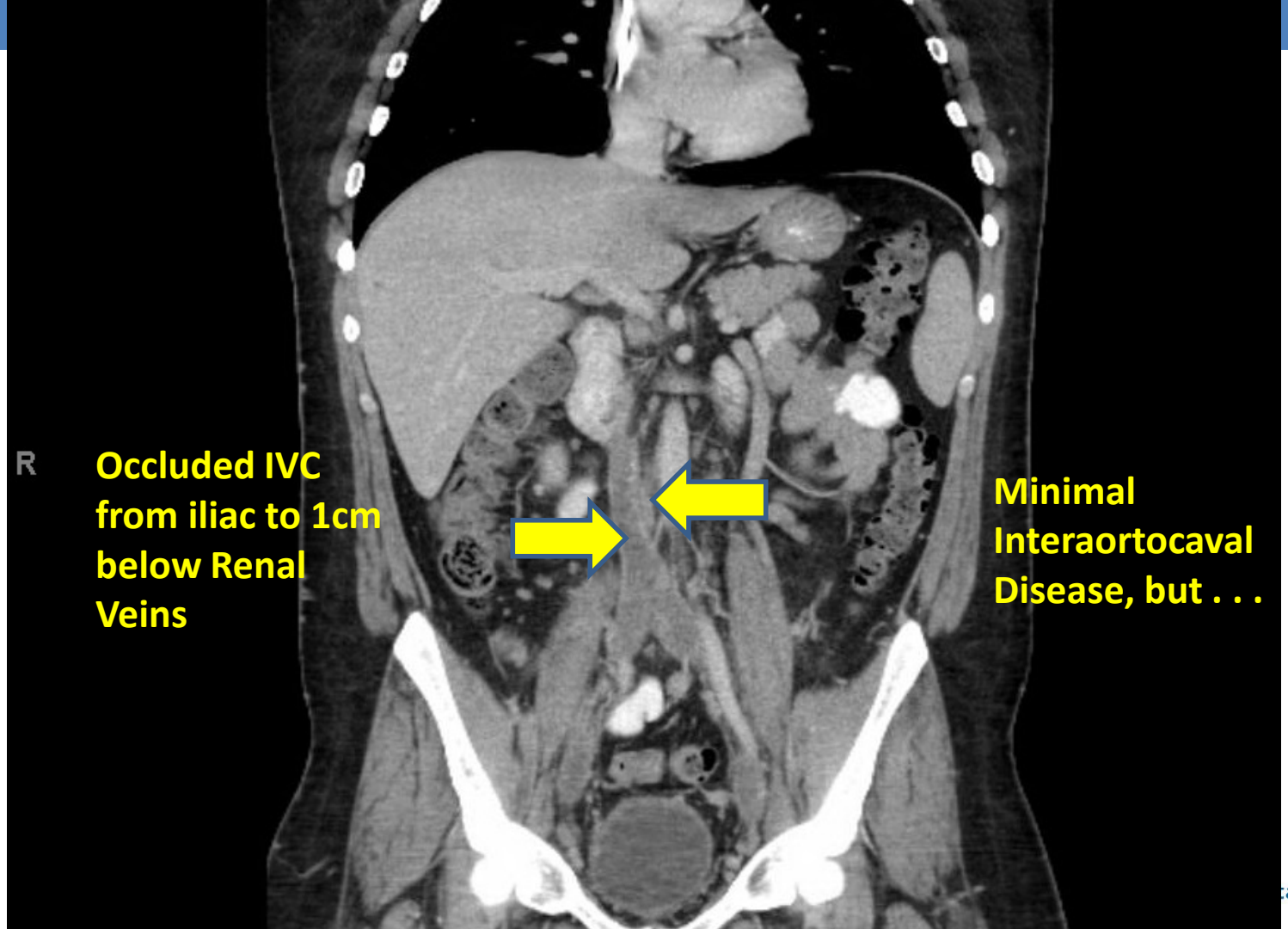
- Non-seminoma GCTs often have occult Teratoma in the residual post-chemotherapy mass.
  - Histology of post chemotherapy residual masses:

	Non-Seminoma	Seminoma
Necrosis	40% of cases	85% of cases
Teratoma	45% of cases	<1% of cases
Active GCT elements	15% of cases	15% of cases

- PET cannot reliably distinguish Teratoma from Necrosis
- Thus, all post-chemotherapy NS-GCT residual masses >1cm should be resected once serum markers have normalized.
- However, Seminoma GCT residuals have Teratoma <1% of cases so PET is able to distinguish Necrosis from Active Seminoma and is clinical useful.

1 year later . . .

- Markers on the rise again . . .
  - β-HCG = 72, AFP = 222, LDH = 503
- Now, 3cm para-caval & 5cm inter-aorto-caval masses
- Received salvage chemotherapy (TIP x 3 cycles)
- Markers re-normalized
- Post-salvage chemotherapy imaging . . .


R
Occluded IVC from iliac to 1cm below Renal Veins
Minimal Interaortocaval Disease, but . . .

Surgery

- Post-Chemotherapy Bilateral RPLND with intra-operative assessment of IVC Thrombus . . .
- Of note, patient has massive venous collaterals in abdominal skin on physical exam as well as venous collaterals seen on CT.

Audience Question #2

What is the best option for management of infra-renal IVC tumor thrombus in this case?

a) Cavotomy with Tumor thrombectomy.

b) Resection of Infra-renal IVC with deep vein reconstruction.

c) Resection of Infra-renal IVC *en-bloc* with tumor thrombus without reconstruction.

d) Resection of Intra-renal IVC with an externally supported PTFE graft for reconstruction.

Audience Question #2

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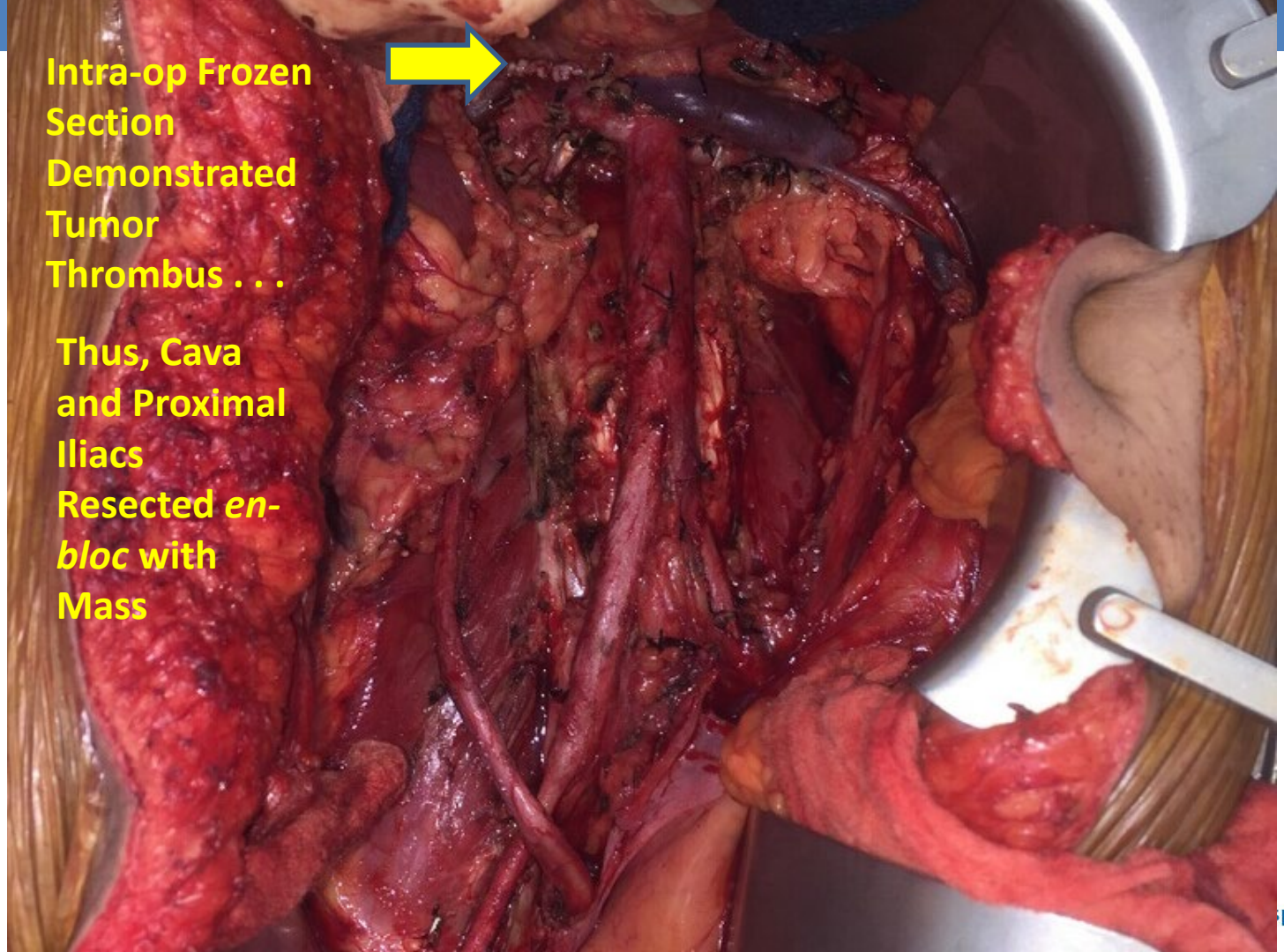
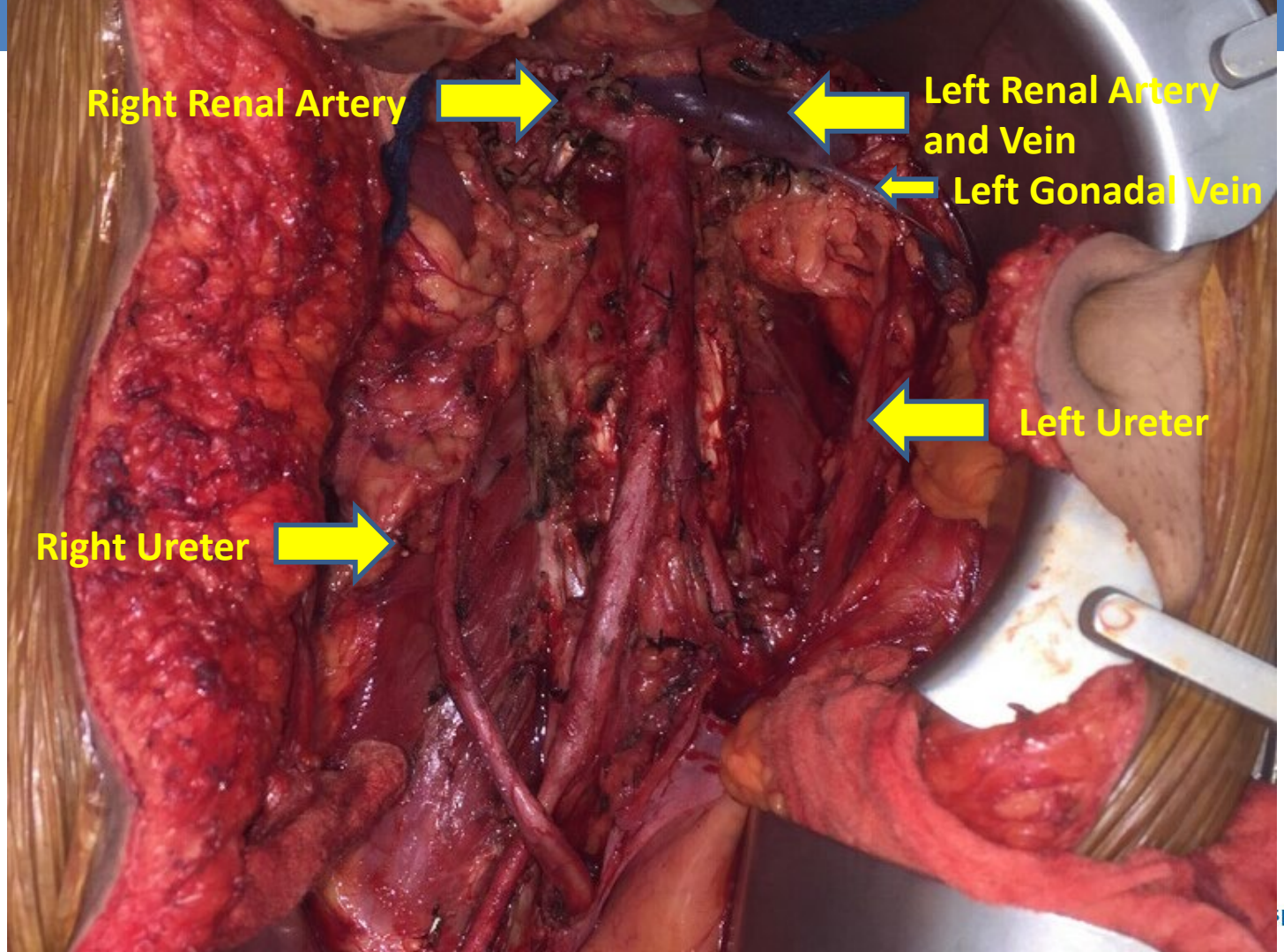
Audience Question #2

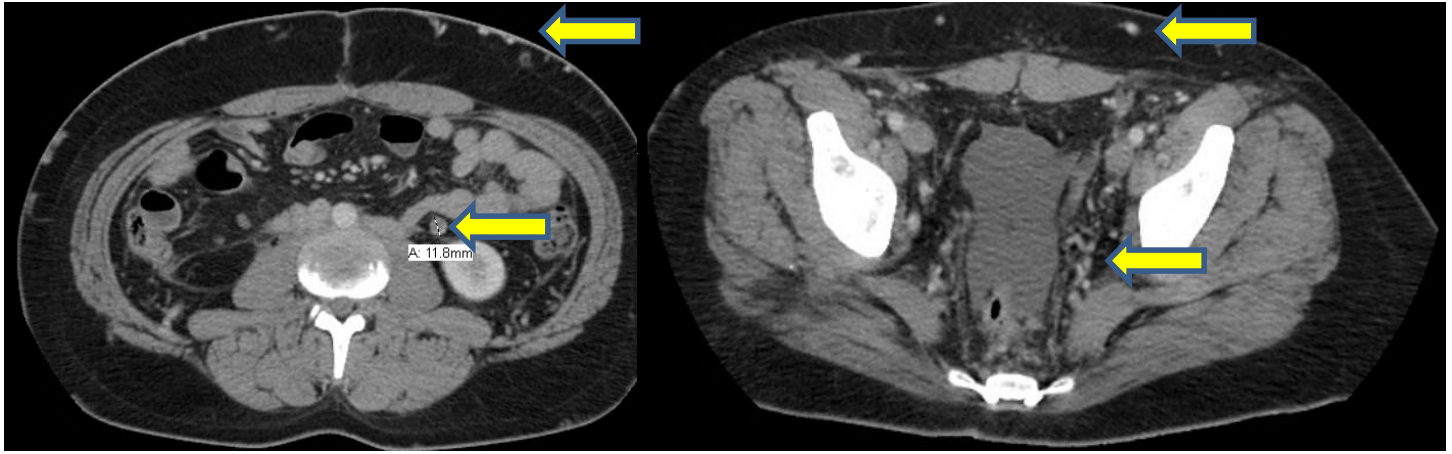
- Tumor thrombus was long-standing and likely unable to perform a thrombectomy.
- Given that the thrombus appeared infra-renal and there were massive collaterals, the plan was to resect the IVC without reconstruction but preserve all collaterals when possible.
- Theoretically will allow most complete oncologic resection.
- Most common tumors giving rise to IVC tumor thrombi?
  - #1 – Renal Tumors
  - #2 – Adrenal Tumors
  - #3 – Gonadal Tumors


Intra-op Frozen Section Demonstrated Tumor Thrombus . . .
Thus, Cava and Proximal Iliacs Resected *en-bloc* with Mass


Right Renal Artery
Left Renal Artery and Vein
Left Gonadal Vein
Left Ureter
Right Ureter

Teaching Point

- Taking care to preserve collaterals
  - Patent lumbars
  - Left gonadal vein



Pathology

- All resected tissue contained:
  - 40% Mature Teratoma including in the IVC Thrombus.
  - Remaining 60% was necrotic tumor without evidence of active Germ Cell elements.

Teaching Points

- Adolescent Germ Cell Tumors are particularly high-risk

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JOURNAL OF CLINICAL ONCOLOGY

ORIGINAL REPORT

Revised Risk Classification for Pediatric Extracranial Germ Cell Tumors Based on 25 Years of Clinical Trial Data From the United Kingdom and United States

A. Lindsay Frazier, Juliet P. Hale, Carlos Rodriguez-Galindo, Ha Dang, Thomas Olson, Matthew J. Murray, James F. Amatruda, Claire Thornton, G. Suren Arul, Deborah Billmire, Furqan Shaikh, Farzana Pashankar, Sara Stoneham, Mark Krailo, and James C. Nicholson

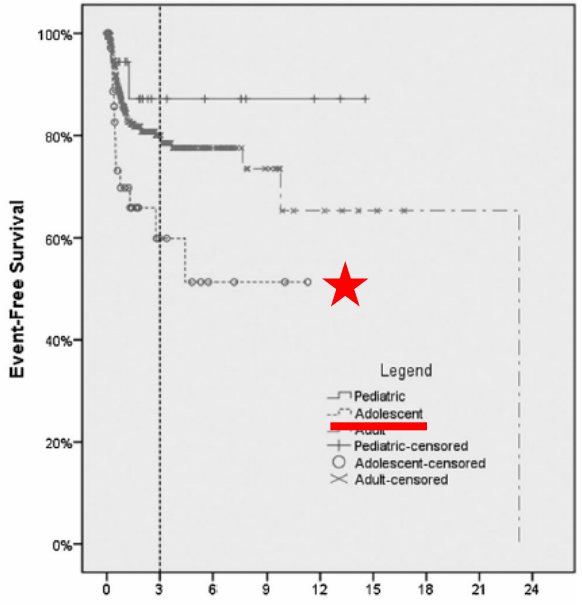
	IGCCC		
Poor-Risk Group	No. of Patients	4-Year Kaplan-Meier EFS (%)	95% CI (%)
Both sexes age > 11 years (all sites)	65	74	61 to 83
Boys age > 11 years (all sites)	27	57	36 to 74
Boys age > 11 years (testicular site)	15	80	50 to 93
Boys age > 11 years (extragonadal site)	12	50*	21 to 74

Teaching Points

Pediatr Blood Cancer 2014;61:446–451

A Comparison of Pediatric, Adolescent, and Adult Testicular Germ Cell Malignancy

Nicholas G. Cost, MD,[1,2]* Jessica D. Lubahn, MD,[1] Mehrad Adibi, MD,[1] Adam Romman, BS,[1] Jonathan E. Wickiser, MD,[3] Ganesh V. Raj, MD, PhD,[1] Arthur I. Sagalowsky, MD,[1] and Vitaly Margulis, MD[1]



University of Colorado Cancer Center

Children's Hospital Colorado

Teaching Points

- In NS-GCT, after chemotherapy if markers have normalized and there is residual disease on imaging, resection is indicated
  - Timely surgery can prevent relapse and the need for more extensive surgery
- PET cannot distinguish Necrosis/Fibrosis from Teratoma
  - Additionally, not all Germ Cell Elements are PET-avid
  - Thus, no role for PET in evaluating post-chemotherapy NS-GCT residuals
- With long-standing IVC occlusion and development of collaterals, no need for grafting of collaterals can be preserved.