Survival Outcomes, Practice Patterns and Risks Associated with Partial Orchiectomy versus Radical Orchiectomy: An Analysis of the National Cancer Database (18-5091)

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INTRODUCTION

Background

- Testicular cancer is the most commonly diagnosed malignancy in males 18-35 years of age
- Up to 31% of palpable testicular masses and over 50% of those diagnosed on ultrasound alone may be benign at final pathology
- Partial orchiectomy (PO) is an attractive alternative to radical orchiectomy (RO) in patients with bilateral masses or a solitary testicle, but outcomes are poorly defined and trends in the performance of PO are unreported
- To date, studies examining PO are small, retrospective and frequently focus on non-germ cell histologies

Objectives

- The primary objectives were to evaluate risk of positive margins and overall survival (OS) for PO versus RO
- Secondary objectives included evaluating the effect of positive margin status on survival and whether PO resulted in increased use of adjuvant therapies compared to RO
- Temporal trends, facility and patient-specific factors were also examined

METHODS

Patient Selection

- The National Cancer Database (NCDB) was queried for all patients ages 18-80 diagnosed with testicular tumors between 2004-2015
  - Inclusion Criteria
    - Receipt of either PO or RO
    - Metastasis-free
    - Post-orchiectomy tumor markers negative
  - Exclusion
    - Non-specific surgical codes that did not represent either of these modalities
    - M0 status unable to be determined
    - Post-orchiectomy tumor markers unknown

Variables Examined

- Small Tumor size (STS): <30mm
- Margin status
- Receipt of adjuvant therapy
- Age
- Payer status
- Charlson/Deyo score
- Facility designation
- Histological patterns

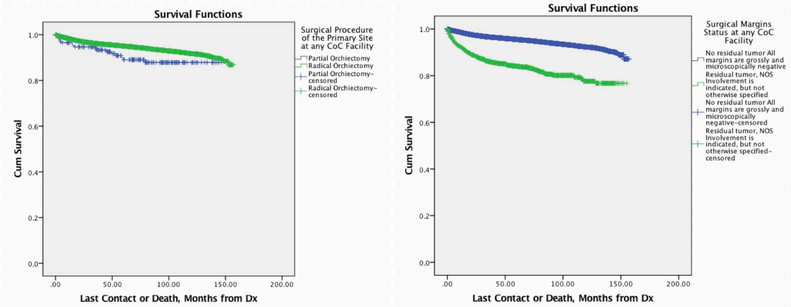
Statistical Analysis

- Pearson's Chi-Square to evaluate relationships between PO and RO and positive margin status or receipt of adjuvant therapy
- Multivariable logistic regression to evaluate effect of patient and facility-specific factors on likelihood of PO receipt
- Kaplan-Meier curves to estimate the primary outcome, OS
- Cox Proportional Hazards Regression to compare survival outcomes
- Linea-by-linear analysis to evaluate trends across time

Overall Survival

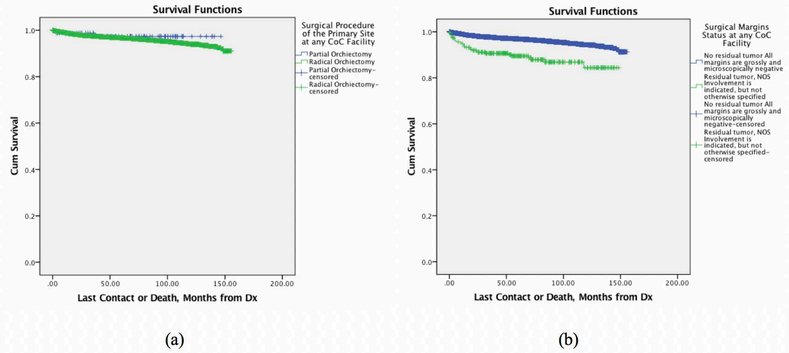
All Tumors

Figure 1. Survival curves for all tumors based on surgical approach (a) or margin status (b).



Tumors <30mm

Figure 2. Survival curves for small (<30mm) testicular tumors based on surgical approach (a) or margin status (b)



Interpretation

All Tumors Curves

- Early separation of the K-M curve for OS suggests survival benefit for RO
- Decreased survival was seen for patients with positive margins

Tumors <30mm Curves

- No difference in OS between PO and RO for small tumors
- However, patients with positive margins still seen to have decreased survival

Discussion

Discussion

- PO demonstrated equivalent OS to RO when stratified by tumor size <30mm
- Positive margin status demonstrated decreased OS regardless of tumor size
- PO was not associated with the use of adjuvant therapy, regardless of histology
- PO was not more likely to be performed at an academic cancer institution and performance of PO has not increased with time

Limitations

- Though this represents the largest cohort in current literature of patients undergoing PO, overall sample size is small and unequally distributed between PO and RO
- There are inherent limitations of retrospective analyses, especially those of administrative databases
- It is ultimately unclear why patients may have been selected to receive PO and selection biases are likely present
- Cancer-specific survival is not inferable based on available datapoints

Results

Primary Outcome

Table 1. Operative, Demographic and Survival Data for Partial and Radical Orchiectomy

	Partial Orchiectomy	Radical Orchiectomy	RR	HR	95%CI	p
Total Patients(n)	220	60313	-	-	-	-
STS	114	22237	-	-	-	-
Age in years (IQR)	33(27-43)	34(27-42)	-	-	-	-
Follow-up(mos)	64.1(39.0-96.1)	68.6(36.9-98.6)	-	-	-	-
(+)Margin(%)	28(12.7)	1616(2.7)	5.10	-	3.61-7.21	**<0.001**
STS(%)	15(13.2)	284(1.3)	11.21	-	6.93-18.15	**<0.001**
Deaths	21(9.5)	2898(4.8)	-	-	-	-
STS(%)	5(4.4)	735(3.3)	-	-	-	-
Overall Survival (mos)	132.9	147.6	-	0.57	0.35-0.92	**0.021**
STS(mos)	143.2	149.2	-	0.98	0.91-1.04	0.504

abbreviations: a. STS: small tumor size, <30mm b. IQR: interquartile range c. mos: months

OS by Margin Status

Table 2. Overall survival (OS) data stratified by surgical margin status

	Margin(+)	Margin(-)	HR	95%CI	p
Overall Survival(mos) all tumors	128.7	148.3	0.28	0.24-0.32	**<0.001**
STS(mos)	131.7	149.5	0.31	0.21-0.45	**<0.001**

abbreviations: a. STS: small tumor size, <30mm b. mos: months

Risk of Adjuvant Tx Overall

Table 3. Adjuvant therapy data, no histological specification

	Partial Orchiectomy	Radical Orchiectomy	RR	HR	95%CI	p
Chemotherapy(%)	75(34.1)	25653(42.5)	0.83	-	0.69-0.99	**0.032**
STS(%)	39(34.2)	9345(42.0)	0.81		0.63-1.05	0.092
Radiotherapy (%)	56(25.5)	12559(20.8)	0.79	-	0.59-1.55	0.074
STS(%)	23(20.2)	4126(18.6)	1.09	-	0.76-1.58	0.635
RPLND(%)	17(7.7)	6946(11.5)	0.67	-	0.43-1.06	0.079
STS(%)	4(3.5)	2779(12.5)	0.28	-	0.11-0.74	**0.004**

abbreviations: a. STS: small tumor size, <30mm b. RPLND: retroperitoneal lymph-node dissection

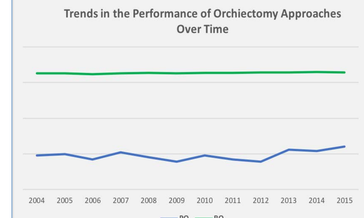
Risk of Adjuvant Tx by Histology

Table 4. Adjuvant therapy, stratified by appropriate histology

	Partial Orchiectomy	Radical Orchiectomy	RR	HR	95%CI	p
Chemotherapy Seminoma (%)	19(24.1)	3484(28.7)	0.84	-	0.57-1.24	0.361
Radiotherapy Seminoma(%)	22(27.8)	4008(33.0)	0.85	-	0.59-1.21	0.340
Chemotherapy NSGCT(%)	15(65.2)	3945(60.0)	1.28	-	0.95-1.73	0.172
RPLND NSGCT(%)	1(4.3)	1730(22.3)	0.81	-	0.74-0.88	**0.038**

abbreviations:a. . NSGCT: nonseminomatous germ cell tumor

Trends: PO vs RO



Overall Survival by Tumor Size

- RO demonstrated improved OS compared to PO among all tumors
- When tumors were stratified by size <30mm, no difference in OS was noted between RO and PO

Positive Margin Status

- Regardless of tumor size, patients undergoing PO had an increased risk of positive surgical margins compared to those undergoing RO

Overall Survival by Margin Status

- Patients with positive surgical margins had decreased overall survival
- This result was seen regardless of tumor size

Risk of Adjuvant Tx (Overall)

- Patients undergoing PO did not have an increased likelihood to undergo adjuvant therapy regardless of tumor size
- Patients undergoing PO were less likely to receive adjuvant chemotherapy
- Patients with tumors <30mm undergoing PO were less likely to receive RPLND

Risk of Adjuvant Tx (by Histology)

- Patients undergoing PO for tumors <30mm were not more likely to undergo adjuvant therapy
- Patients undergoing PO for tumors <30mm with NSGCT were less likely to receive RPLND than patients undergoing RO

CONCLUSIONS

- Partial orchiectomy appears to be oncologically equivalent in an appropriately selected patient population
- Positive margins should result in completion radical orchiectomy due to worse outcomes in these patients
- Partial orchiectomy does not appear to result in increased utilization of adjuvant therapy
- Prospective studies are ideal, but unlikely

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Research Methods

- A research proposal was submitted to the National Cancer Database (NCDB) detailing research questions and methodologies and accepted after being approved by the Commission on Cancer (CoC) chair at our tertiary care institution

- The database was queried for all testicular tumors in males aged 18-80 between 2004-2015 undergoing either partial orchiectomy (PO) or radical orchiectomy (RO)

- Patients were selected if data was available regarding M0 status, tumor size and negative post-orchiectomy tumor markers

- Patients excluded if necessary data was unavailable or nonspecific

- Factors investigated included tumor size, margin status, adjuvant therapy, age, Charlson/Deyo score, facility designation and histological patterns