

Trends and the Utilization of Transoral Robotic Surgery (TORS) with Neck Dissection for the Treatment of Head and Neck Cancer in New York State (2008–2012)



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Abstract

Objective: To identify local practice patterns and access disparities in neck dissection (ND) and transoral robotic surgery (TORS).
Design: Adults undergoing TORS and ND from 2008-2012 (n = 225) were analyzed using the New York Statewide Planning and Research Cooperative System (SPARCS) all-payer administrative database. Head and neck cancer incidence from the Centers for Disease Control was used to control for statewide cancer incidence. Temporal trends were analyzed with Poisson regression models for counts.
Results: Concurrent procedures were most commonly practiced. Staged procedures increased at a greater relative rate than concurrent procedures from 2008 to 2012 (RR = 3.01 vs 1.73, P = 0.23). No patient demographic or insurer was greater represented in concurrent versus staged populations. Caucasians were more likely than Black/Hispanics to undergo TORS (P = 0.03). Staged procedures resulted in higher mean hospital charges (P = 0.02).
Conclusion: Concurrent procedures are most commonly practiced in New York and are more cost-effective. However, the rate of staged procedures is increasing. Access to concurrent versus staged procedures does not depend on patient demographics or insurer status, but racial disparities exist in overall access to TORS.

Introduction

The first Transoral Robotic Surgery (TORS) Program, developed by the University of Pennsylvania in 2004, was introduced as a minimally invasive alternative to open surgical resection of oropharyngeal cancer.¹ A subset of TORS patients requires neck dissection, and the optimal timing of neck dissection is unclear. It is also unknown whether social barriers influence patient access to TORS. In other surgical specialties, access to minimally invasive robotic technology is better for patients of higher socioeconomic status.^{2, 3}

We evaluate statewide utilization of TORS + ND during the critical period of technology adoption, and we identify factors that may be associated with treatment selection.

Methods and Materials

Following Institutional Review Board approval, the initial five-year period of TORS was identified using the SPARCS database. TORS and ND were defined with ICD-9/CPT codes. Patients under 18 years of age, staged procedures with an interval >6 months, or patients with codes for multiple robotic resections or neck dissections in a 6-month interval (n = 2) were excluded. Incidence of oral cavity, pharynx, and larynx cancer was determined using the Centers for Disease Control web-based report on United States Cancer Statistics 1999-2012.⁴

A Chi-square test with exact P-values based on Monte Carlo simulation and Welch's t-test were utilized. Temporal trends were analyzed with Poisson regression models for counts. All analyses were carried out using SAS 9.3 (SAS Institute Inc., Cary, NC), and statistical significance was set at 0.05.

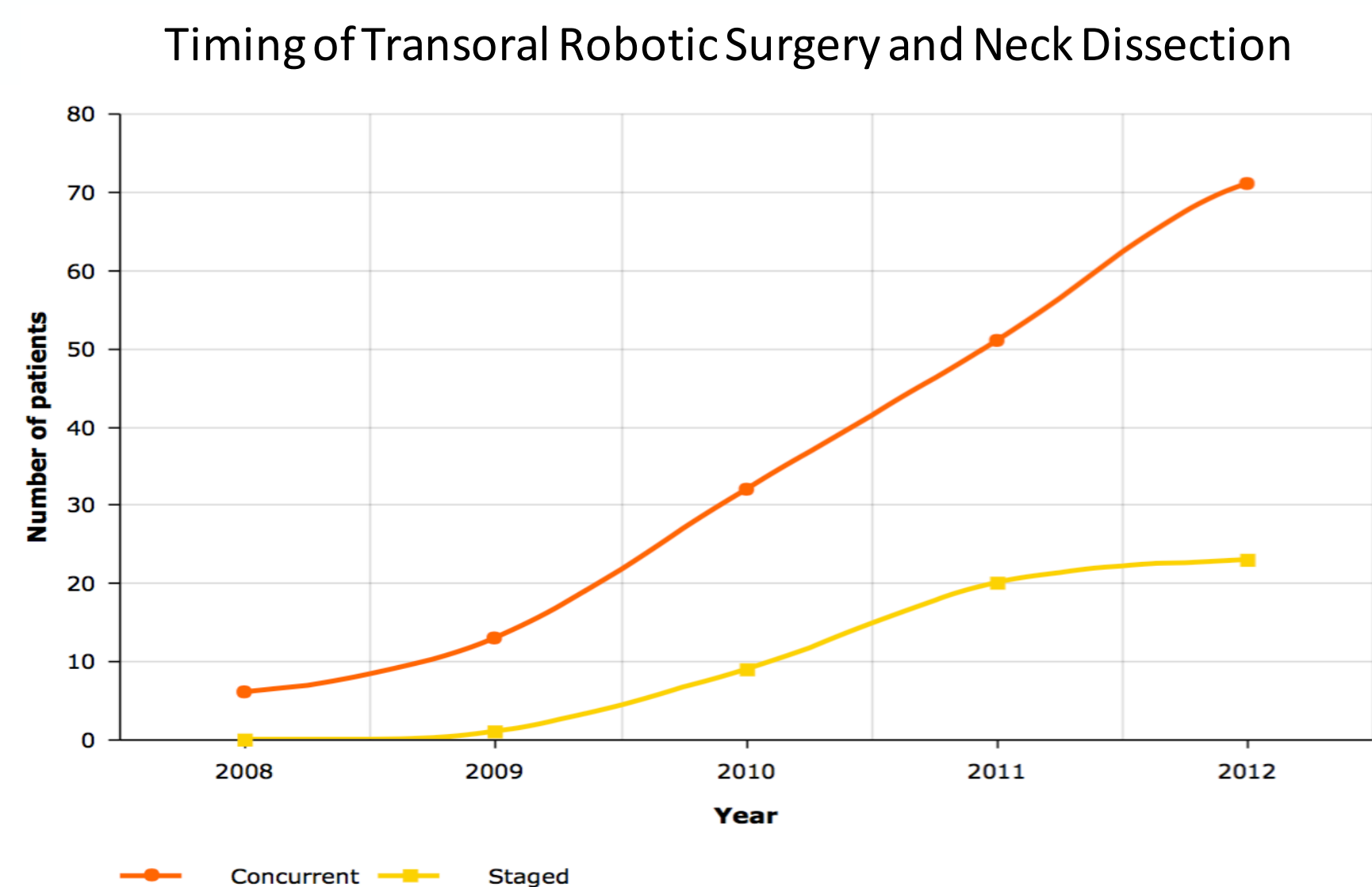
Table 1. Number of Patients in Each Subgroup by Year

	2008	2009	2010	2011	2012	Total
Total TORS	7	27	67	120	165	386*
Concurrent	6	13	32	51	71	173
Staged: TORS then ND	0	0	7	19	18	44
Staged: ND then TORS	0	0	<6	<6	<6	8

Concurrent ND was the most frequently practiced, followed by staged TORS then ND. Staged ND preceding TORS was least frequent. The average time interval between ND and TORS was 39.44 +/- 29.49 days. Numbers <6 suppressed due to cell size reporting restrictions. *Total TORS also includes TORS only (n = 151) and TORS + ND >6 months apart (n = 10). Patients with multiple TORS or ND records within 6 months (n = 2) were included in the total number of TORS but excluded from further analysis. TORS = Transoral Robotic Surgery. ND = Neck dissection.

Results

Staged procedures increased at a greater relative rate than concurrent procedures from 2008 to 2012 (RR = 3.01 vs 1.73, P = 0.23).



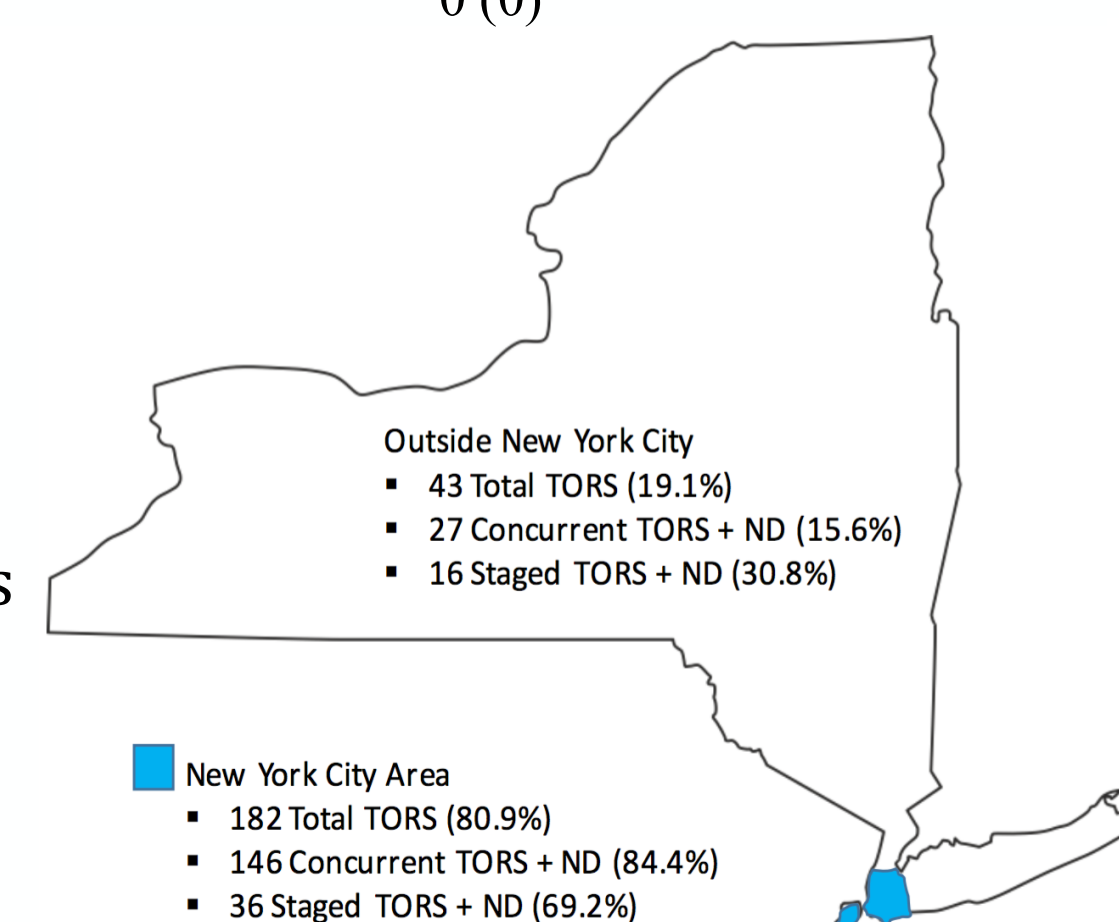
Results (Continued)

No patient demographic or insurer was greater represented in concurrent versus staged populations. Generally, patients undergoing TORS + ND were Caucasian males between the ages of 45-74 with commercial insurance. Caucasians were more likely to undergo robotic resection than Blacks/Hispanics (OR 1.54, 95% CI 1.03 to 2.28, P = 0.03).

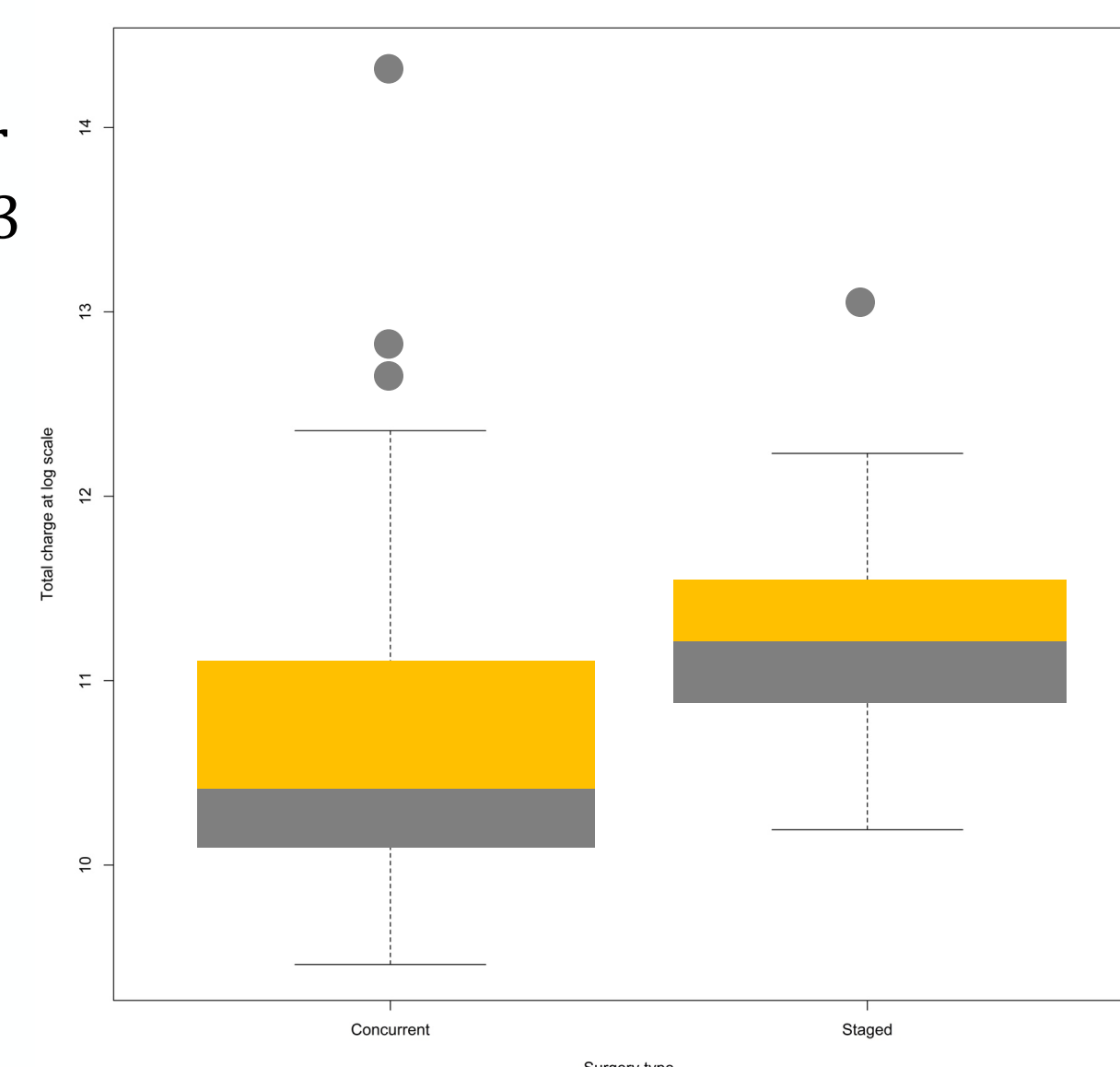
Table 2. Demographic Characteristics for Transoral Robotic Surgery and Neck Dissection Based on Timing of Procedure

	Concurrent, n (%)	Staged, n (%)	P-Value
Gender			
Female	41 (23.7)	8 (15.4)	0.24
Male	132 (76.3)	44 (84.6)	
Race			
White	129 (74.6)	42 (80.8)	0.16
Black/African American	11 (6.4)	<6	
Spanish/Hispanic	15 (8.7)	0 (0)	
Other	18 (10.4)	7 (13.5)	
Payment			
Medicaid	<6	<6	0.91
Medicare	45 (26.0)	14 (26.9)	
Commercial	122 (70.5)	36 (69.2)	
Other	<6	0 (0)	

Eighty percent of procedures were performed in New York City (n = 182). Patients who had surgery in New York City were more likely to have a concurrent procedure than patients whose surgery was performed in other regions of New York State (P = 0.02). See New York map with operations based on location (right).⁵



Mean total hospital charges were higher for staged procedures (staged, \$94,118.3 ± \$68,470.9, range \$12,846.1 to \$1,697,368.4) versus concurrent, \$61,858.0 ± \$133,660.5, range \$26,687.0 to \$475,106.6) (P = 0.02). See boxplot of total hospital charges for TORS + ND by procedure type based on a logarithmic scale (right). Total hospital charges are valued in 10⁵ dollars. Outlying data points are plotted as dots.



Discussion

We report a 23.1% rate of staged procedures in New York State.

- De Almeida et al. published that 30% of TORS + ND were performed in a staged fashion amongst 323 patients at 11 U.S and International institutions.⁶
- Survey-based report of 52 TORS surgeons estimates that 42.2% of TORS surgeons perform staged procedures.⁷

The first study to document concurrent neck dissection results in better resource utilization.

- Potentially by maximizing usage of expensive surgical equipment or by a shorter hospitalization.⁸⁻¹⁰
- An average TORS procedure including hospitalization at a single New York State institution has been sited to cost approximately \$8,000, but up to \$16,000 if a free flap is required.²⁵ Our data is based on charges and may be significantly higher than actual reimbursement.

Little is published regarding patient access to TORS. Socioeconomic status and race impact management of head and neck cancer.¹¹⁻¹³

Limitations: Administrative database (inability to access clinically rich data, coding error), outcomes and long-term survival of TORS + ND are not addressed.

Conclusion

Concurrent TORS + ND is the most common and cost-effective practice in New York State for eligible patients. Racial disparities exist in overall access to TORS. Race and insurance status do not appear to play a role in determining ND timing. Geographic region, specifically close proximity to New York City, is the main factor predicting staged versus concurrent TORS + ND.

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