



Robotic surgery improves overall survival for T1 and T2 tumors of the hypopharynx

Andrey Finegersh^{1,2} , Rohith S. Voora¹ , Bharat Panuganti¹ , Farhoud Faraji¹ , F. Christopher Holsinger² , Kevin T. Brumund^{1,3} , Charles Coffey^{1,3} , Joseph Califano¹ , Ryan K. Orosco¹



¹Division of Otolaryngology, Department of Surgery, University of California San Diego, San Diego, California, US, ²Division of Head and Neck Surgery, Department of Otolaryngology, Stanford University, Palo Alto, California, US, ³Division of Otolaryngology, Department of Surgery, VA San Diego Health System, La Jolla, CA, US

Background



Hypopharyngeal cancer is associated with poor survival. Robotic surgery is emerging as a treatment for hypopharyngeal tumors, but no rigorous data are available to assess its effect on survival. We used the national cancer database (NCDB) to evaluate whether robotic surgery improved outcomes for small (T1 and T2) hypopharyngeal tumors.

Methods

The national cancer database (NCDB) was used to identify patients coded as undergoing robotic surgery (TORS), laser surgery (TLM), or no surgical therapy (primary radiation)

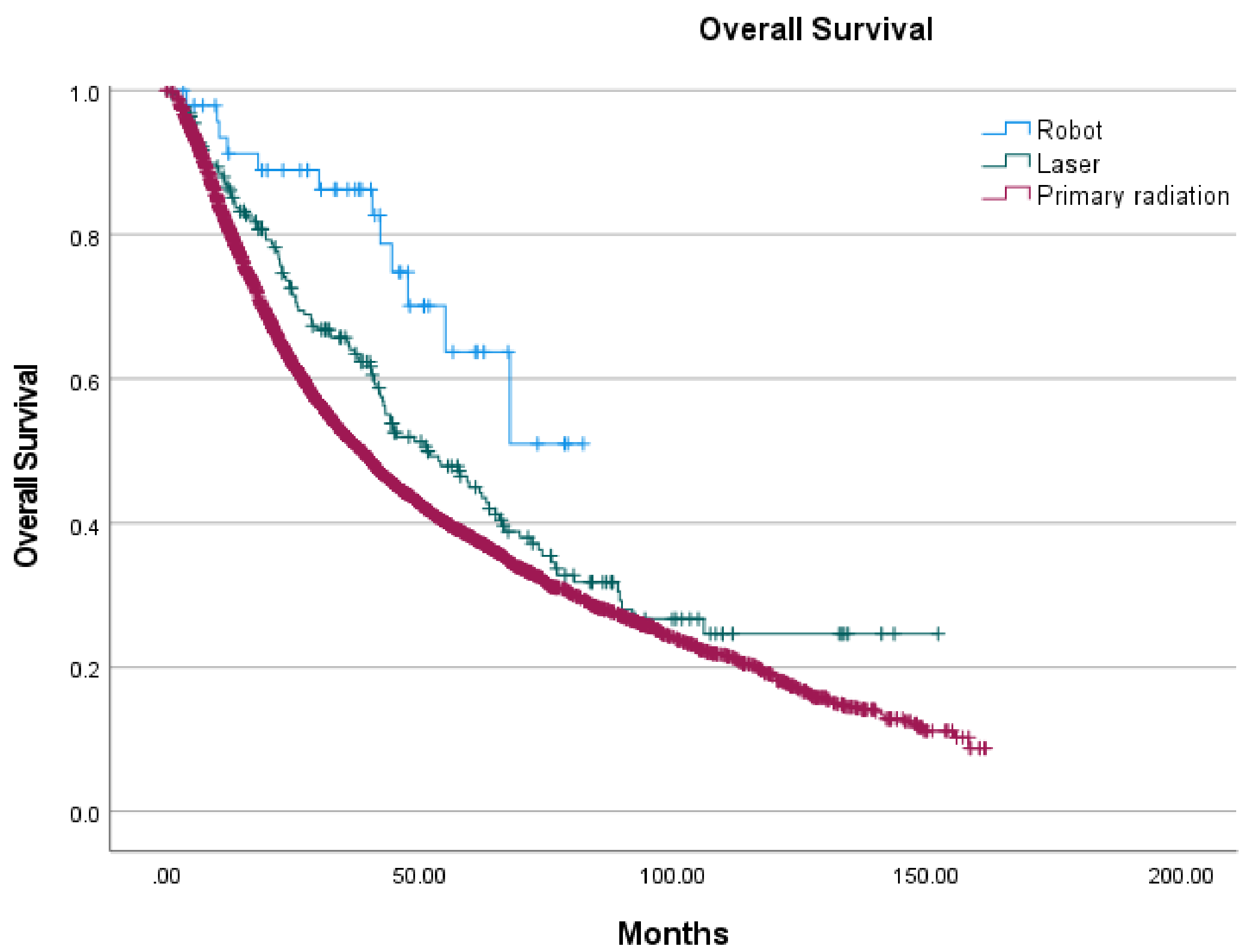
Inclusion:

- > 18 years
- Squamous cell carcinoma histology
- T1 and T2 tumors of the hypopharynx
- No distant metastasis (M0)
- Available surgical treatment information
- Available clinical staging (T, N, and M classification)

Table 1. Baseline characteristics of TLM, TORS, and primary radiation groups

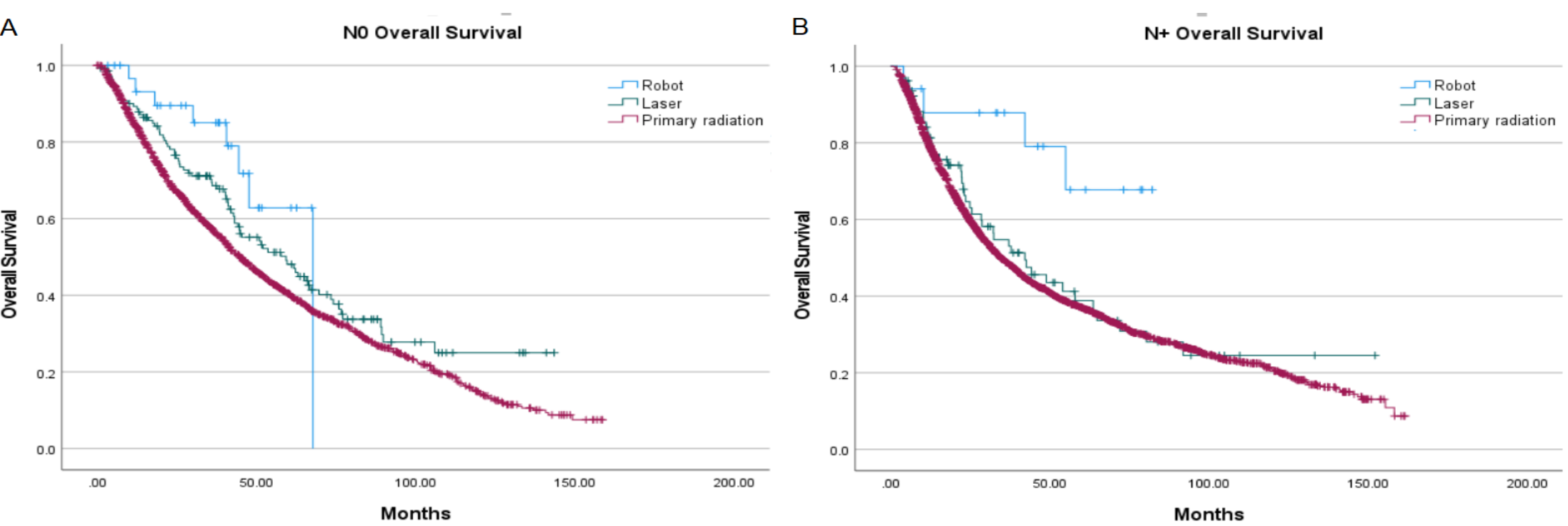
Variable	Robot (n = 57)	Laser (n = 236)	Radiation (n = 5742)	Combined p-value	Laser vs. Robot p- value
Age	62.4 (1.41)	65.9 (0.65)	64.3 (0.14)	0.03	0.02
Female	19 (33.3)	50 (21.2)	1306 (22.7)	0.12	0.05
Race				0.17	0.17
White	46 (80.7)	205 (86.9)	4768 (83.0)		
Black	9 (15.8)	18 (7.6)	750 (13.1)		
Asian/PI	2 (3.5)	7 (3.0)	120 (2.1)		
Other/Unknown	0 (0)	6 (2.5)	104 (1.8)		
Charlson-Deydo				0.32	0.53
CDCC 0-1	53 (92.9)	220 (93.2)	5381 (93.7)		
CDCC 2	3 (5.3)	15 (6.4)	252 (4.4)		
CDCC 3+	1 (1.8)	1 (0.4)	109 (1.9)		
Median Household Income				0.01	0.01
< \$40,227	16 (28.1)	34 (14.4)	1328 (23.1)		
\$40,227-50,353	18 (31.6)	50 (21.2)	1343 (23.4)		
\$50,354-63,332	8 (14.0)	65 (27.5)	1292 (22.5)		
>=\$63,333	15 (26.3)	84 (35.6)	1668 (29.0)		
Missing	0 (0)	3 (1.3)	111 (1.9)		
Facility Type				<0.001	<0.001
Community	6 (10.6)	88 (37.3)	2932 (51.1)		
Academic	45 (78.9)	132 (55.9)	2033 (35.4)		
Integrated	6 (10.5)	16 (6.8)	748 (13.0)		
Missing	0 (0)	0 (0)	29 (0.5)		
Insurance				0.32	0.33
Uninsured	2 (3.5)	4 (1.7)	226 (2.9)		
Private	24 (42.1)	82 (34.7)	1954 (34.0)		
Government	30 (52.6)	149 (63.2)	3469 (60.4)		
Unknown	1 (1.8)	1 (0.4)	93 (1.7)		
T-classification				<0.001	0.58
T1	33 (57.9)	127 (53.8)	1567 (27.3)		
T2	24 (42.1)	109 (46.2)	4175 (72.7)		
N-classification				<0.001	0.84
N0	37 (65.0)	150 (63.6)	1863 (32.5)		
N1	10 (17.5)	36 (15.3)	1134 (19.7)		
N2	10 (17.5)	48 (20.3)	2426 (42.3)		
N3	0 (0)	2 (0.8)	311 (5.5)		
Subsite				<0.001	0.001
Piriform sinus	19 (33.3)	115 (48.7)	3106 (54.1)		
Post-cricoid space	1 (1.8)	5 (2.1)	104 (1.8)		
Hypopharyngeal AE fold	4 (7.8)	45 (19.1)	579 (10.1)		
Posterior wall	10 (17.5)	24 (10.2)	411 (7.2)		
Overlapping	4 (7.1)	4 (1.7)	149 (2.6)		
Not specified	19 (33.3)	43 (18.2)	1393 (24.3)		
HPV+	8 of 28 (28.6)	15 of 58 (25.9)	315 of 1216 (25.9)	0.95	0.79
Chemotherapy	11 (19.3)	64 (27.1)	4277 (74.5)	<0.001	0.14
Radiation	23 (40.4)	115 (48.7)	-	-	0.26
Neck dissection	35 (61.4)	76 (32.2)	-	-	<0.001
>4 lymph nodes examined	31 (54.3)	66 (28.0)	-	-	
Positive margins	7 of 54 (13.0)	58 of 179 (32.4)	-	-	<0.01

Figure 1. Robotic surgery improves overall survival of T1/T2 tumors



In patients with T1 and T2 hypopharynx tumors, TORS (n = 57) improved overall survival relative to TLM (n = 236) and primary radiation (n = 5742) (5 year OS 64%, 45%, 38%, respectively) (p < 0.001).

Figure 2. Robotic surgery improves overall survival in N0 and N+ patients



Patients were stratified by clinical neck metastasis at time of staging. Both (A) N0 and (B) N+ classification patients had improved overall survival with TORS (p < 0.05 and p < 0.01, respectively)

Table 2. Multivariate Statistics

Covariate	HR	p-value
Age	1.03 (1.02-1.03)	<0.001
Sex	0.90 (0.90 - 1.07)	0.65
Treatment		
Robotic surgery	reference	
Laser surgery	1.99 (1.10 - 3.61)	0.02
Primary radiation	2.38 (1.33 - 4.27)	0.004
Facility type		
Community	reference	
Academic	0.89 (0.82 - 0.96)	0.002
Integrated	0.96 (0.86 - 1.07)	0.46
Median income		
< \$40,227	reference	
\$40,227-50,353	0.89 (0.81 - 0.98)	0.02
\$50,354-63,332	0.74 (0.74 - 0.90)	<0.001
>=\$63,333	0.63 (0.63 - 0.77)	<0.001
Primary payor		
Private	reference	
Government	1.36 (1.24 - 1.48)	<0.001
Not insured	1.36 (1.12 - 1.64)	<0.001
Unknown	1.26 (0.94 - 1.68)	0.12
Primary site		
Not specified	reference	
Piriform sinus	1.01 (0.93 - 1.10)	0.82
Hypopharyngeal AE fold	1.42 (1.11 - 1.82)	0.005
Post-cricoid	0.97 (0.85 - 1.11)	0.66
Posterior wall	1.12 (0.97 - 1.28)	0.12
Overlapping	1.10 (0.88 - 1.37)	0.37
Radiation therapy	0.90 (0.74 - 1.09)	0.28
Chemotherapy	1.00 (1.00 - 1.00)	0.001
AJCC Stage		
Stage I	reference	
Stage II	1.08 (0.95 - 1.2)	0.41
Stage III	1.15 (1.01 - 1.31)	0.04
Stage IVA	1.33 (1.17 - 1.50)	<0.001
Stage IVB	2.12 (1.77 - 2.53)	<0.001

Conclusions

- TORS may increase overall survival of T1 and T2 hypopharyngeal tumors but its use is still uncommon in the NCDB cohort
- Prospective studies are needed to assess benefit in a standardized cohort