National Evaluation of Geographic Disparities in Access and Outcomes for Minimally Invasive Surgery for Lung Cancer

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Background/Research Objectives

Minimally invasive surgery (MIS), including robotic-assisted (RATS) and video-assisted thoracoscopic surgery (VATS), has become increasingly common for treatment of non-small-cell lung cancer (NSCLC). However, it is unknown how geographic disparities impact outcomes. The objective of this study is to evaluate how trends in geographic disparities influence access and perioperative outcomes for patients undergoing MIS for NSCLC.

Methods

Patients diagnosed between 2010-2018 with stage 0-IIIA (N0-N1) resected NSCLC were identified using the National Cancer Database (NCDB). Patients were included if they had a single malignancy, intact geographic data, and underwent surgery at the reporting facility. Rural-urban trends in use of MIS and differences in perioperative outcomes were evaluated. Odds of surgical approach were determined while adjusting for patient, clinical, hospital, and geographic characteristics.

Results

Overall, 127,865 patients met inclusion criteria with 11.9% classified as rural (n=15,214). Patients were categorized into those who underwent RATS (n=16,790, 8.5% rural), VATS (n=42,645, 10.3% rural), and thoracotomy (OT) (n=68,428, 13.8% rural).

For rural residents, the median travel distance to treatment with MIS was 50.2 (IQR 31.6-77.2) miles while nonrural residents traveled a median of 10.4 (IQR 4.9-21.7) miles (p<0.001). Use of MIS increased from 19.3% (2010) to 58.0% (2018) for rural residents and 26.5% (2010) to 66.7% (2018) for nonrural residents (**Figure 1**; all P<0.001). OT remains a more common operative approach for rural residents (42.0%; 2018) compared with nonrural residents (33.3%; 2018) as a proportion of all surgical approaches (**Figure 2**; all P<0.001). Rural residents had decreased odds of receiving RATS (aOR 0.66, 95% CI 0.54-0.82). Overall, MIS had decreased 30-day (1.2% RATS vs 1.5% VATS vs 2.4% OT) and 90-day mortality (2.1% RATS vs 2.6% VATS vs 4.3% OT) (**Table 1**; all P<0.001). The number of hospitals providing MIS to rural lung cancer populations increased from 256 (2010) to 370 (2018; **Figure 3;** p<0.01). The number of hospitals providing MIS to nonrural populations increased from 735 (2010) to 828 (2018; **Figure 3;** p<0.01).

Figure 1: Trends in Percent of Patients Receiving MIS for NSCLC

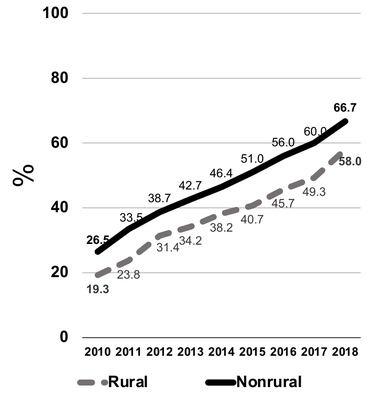


Table 1: Perioperative Outcomes

NCDB[α] 2010-2018	RATS[β]	VATS[γ]	Thoracotomy	Total
Overall, n	16,790	42,645	68,428	127,865
Rural, n	1,421	4,379	9,414	15,214
Nonrural, n	15,369	38,266	59,014	112,651
Parameter	**%**	**%**	**%**	P value
30-Day Mortality				
Overall	1.2	1.5	2.4	<0.001
Rural	1.3	1.8	2.8	<0.001
Nonrural	1.2	1.5	2.3	<0.001
90-Day Mortality				
Overall	2.1	2.6	4.3	<0.001
Rural	2.2	3.2	5.1	<0.001
Nonrural	2.1	2.6	4.2	<0.001
30-Day Unplanned Readmission				
Overall	3.9	3.9	4.1	<0.001
Rural	3.7	4.3	4.2	0.55
Nonrural	4.0	3.9	4.1	0.3
R0 Resection				
Overall	96.1	95.0	94.0	0.32
Rural	95.6	94.4	93.5	<0.01
Nonrural	96.2	95.1	94.0	<0.001
≥10 Lymph Nodes Sampled				
Overall	51.1	41.4	41.4	<0.001
Rural	49.7	40.5	41.8	<0.001
Nonrural	51.2	41.5	41.3	<0.001

[α]NCDB = National Cancer Database
[β]RATS = Robotic-assisted thoracoscopic resection
[γ]VATS = Video-assisted thoracoscopic resection

Figure 2: Trends in Operative Approach for NSCLC

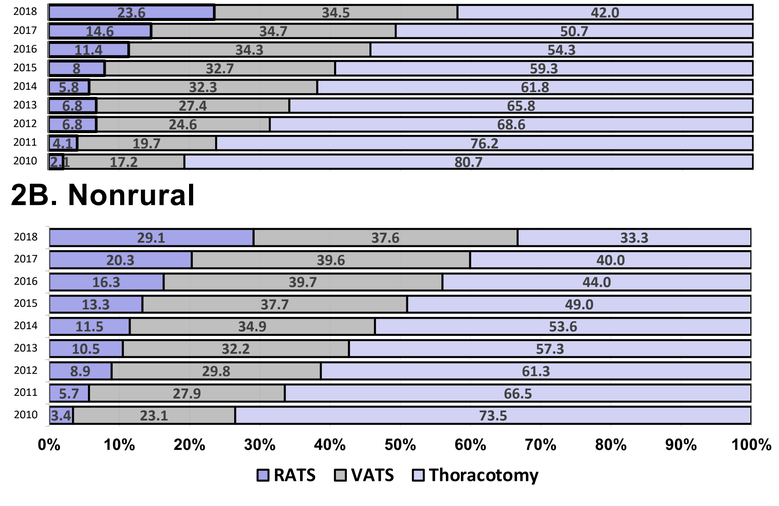
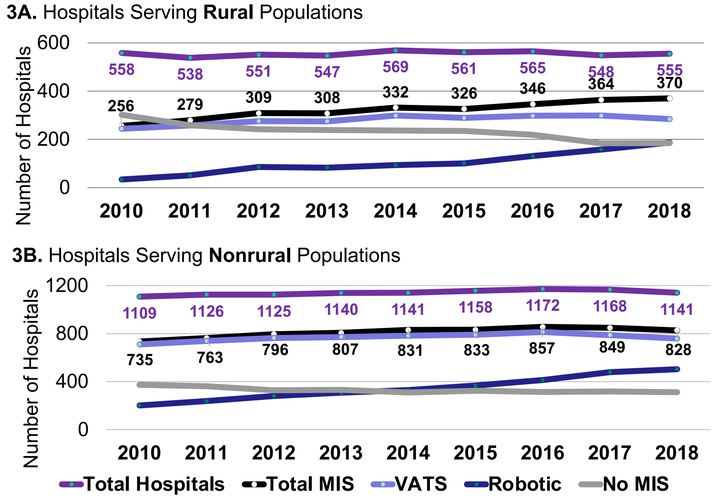


Figure 3: Trends in Hospital MIS Capabilities



Conclusions

There are persistent geographic disparities in access to MIS for treatment of NSCLC. Rural residence is associated with decreased odds of MIS, and MIS is associated with improved perioperative outcomes.

References

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