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INTRODUCTION

Background

Induction treatment with immune checkpoint inhibitors (ICI) improves survival and pathological response in locally advanced and oligometastatic non-small cell lung cancer (NSCLC).

However, neoadjuvant ICI treatment may increase surgical complexity through hilar fibrosis, and higher conversion rates have been reported. Minimally invasive surgery rates after neoadjuvant chemo-immunotherapy are only 30–55%.

Aim

To assess perioperative outcomes of robotic-assisted thoracic surgery (RATS) for anatomical lung resection after neoadjuvant immunotherapy or chemo-immunotherapy.

METHODS

Endpoints: Conversion rate, R0-resection rate and duration of surgery.

Surgical complexity: Operative reports were reviewed using the scoring system proposed by Rusch et al. (JTCVS 2023), capturing adhesions, hilar fibrosis, vascular anatomy and conversion necessity.

Prospectively maintained NSCLC database
June 2019 – January 2026

Histologically confirmed UICC stage II–IV NSCLC
treated with ICI or chemo-ICI
Undergoing anatomical lung resection
n=61
Stage II: n=22
Stage III: n=29
Stage IV: n=10

Excluded:

Patients included in clinical trials (n=9)

Patients with primarily open / VATS approach

**RATS anatomical lung resection:
35 patients analyzed**

RESULTS

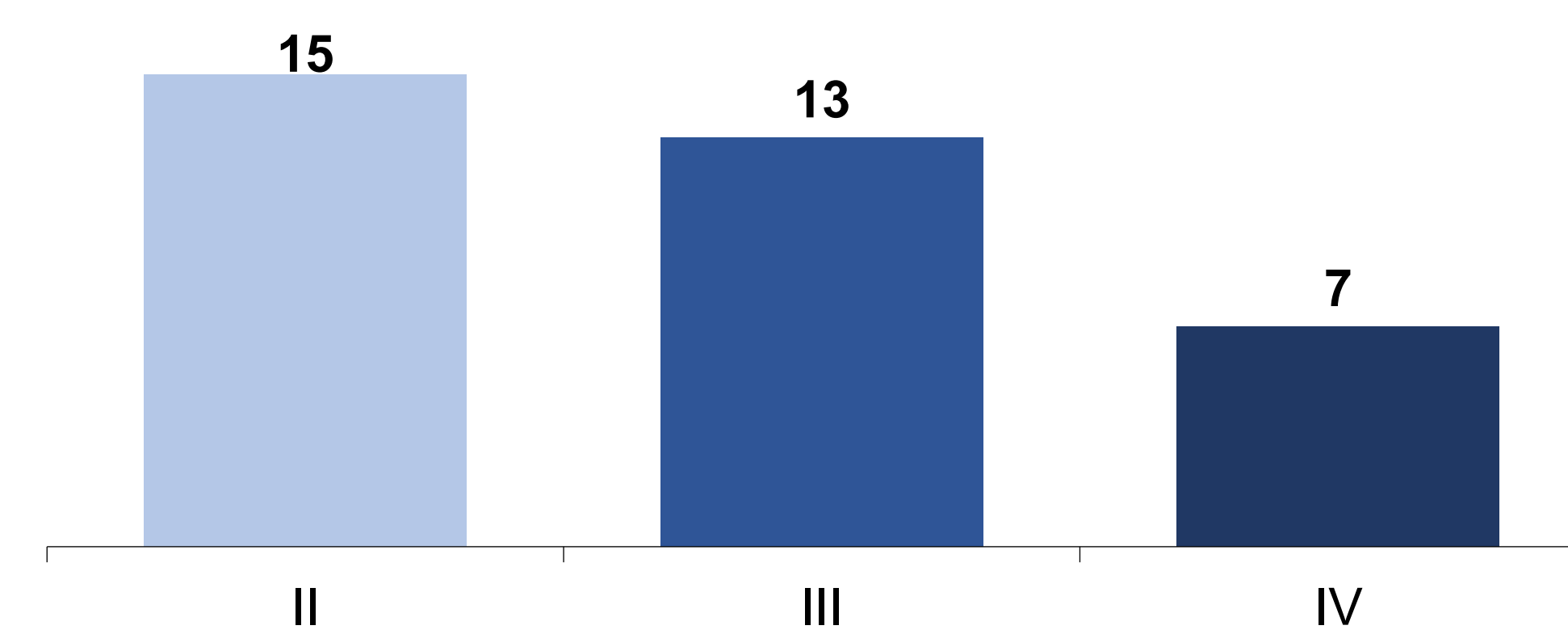
8.6%conversion to thoracotomy (3/35) —
all due to extensive hilar fibrosis**100%**

R0 resection achieved

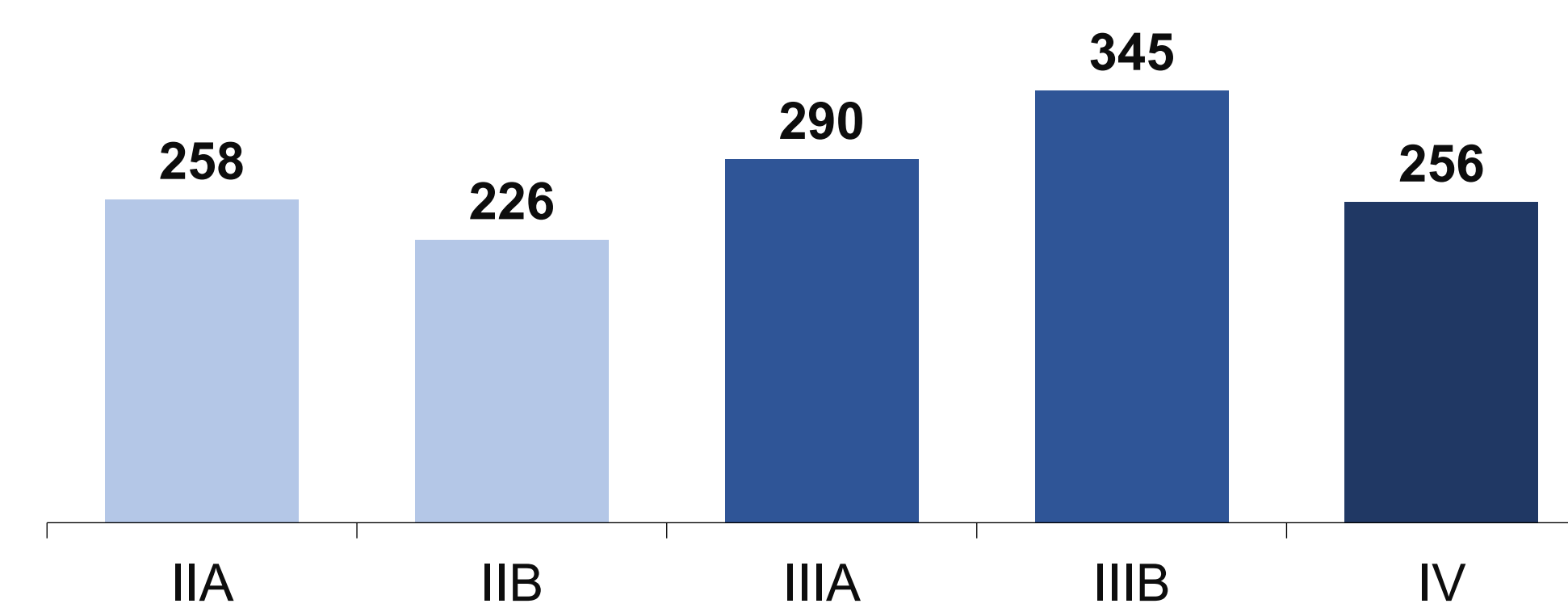
7/35Clavien-Dindo grade 3/4
complications**5 days**

median hospital stay (IQR 4–8)

UICC Stage distribution (n = 35)

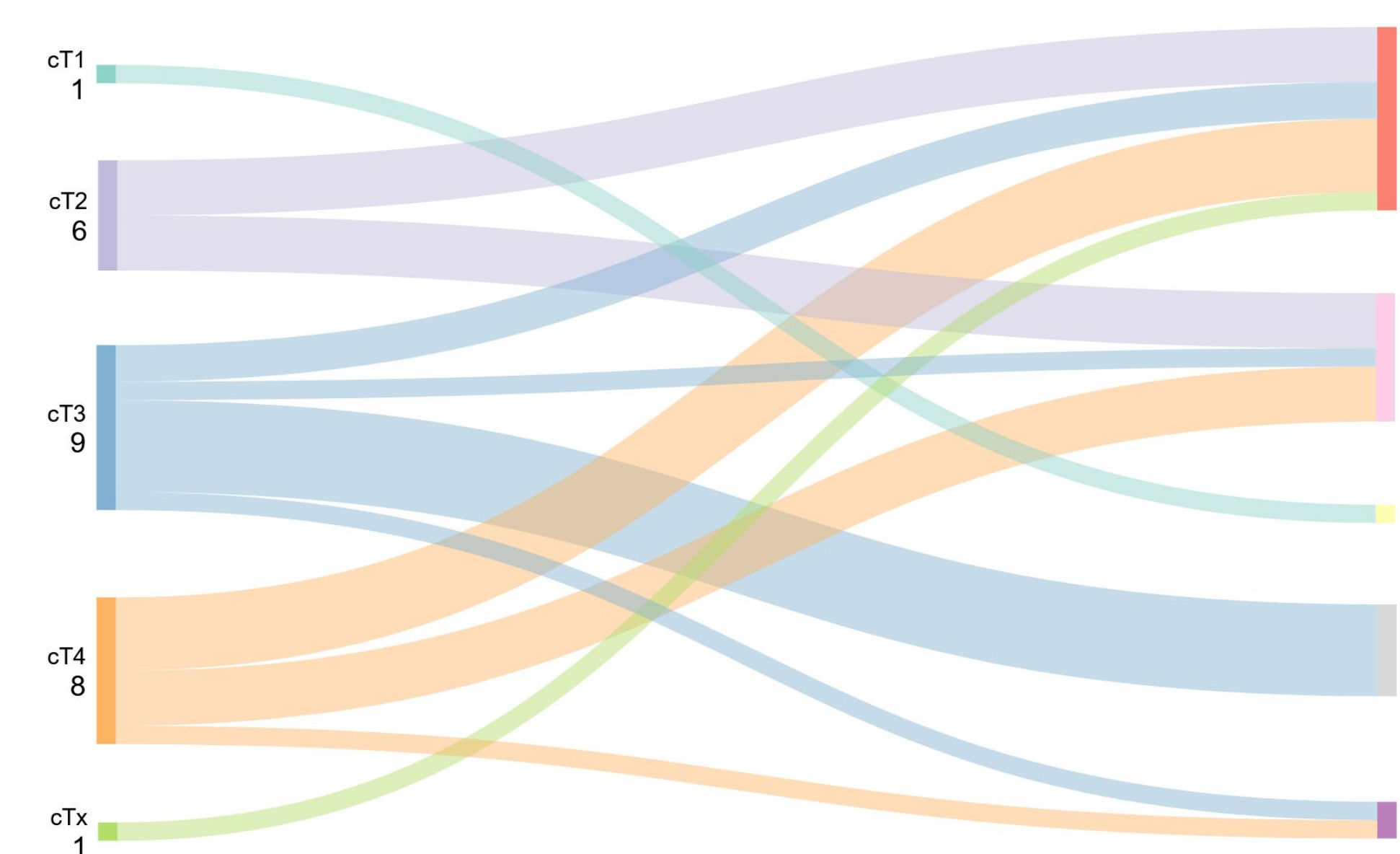


Mean operative time by UICC stage (min)



Downstaging after induction ICI

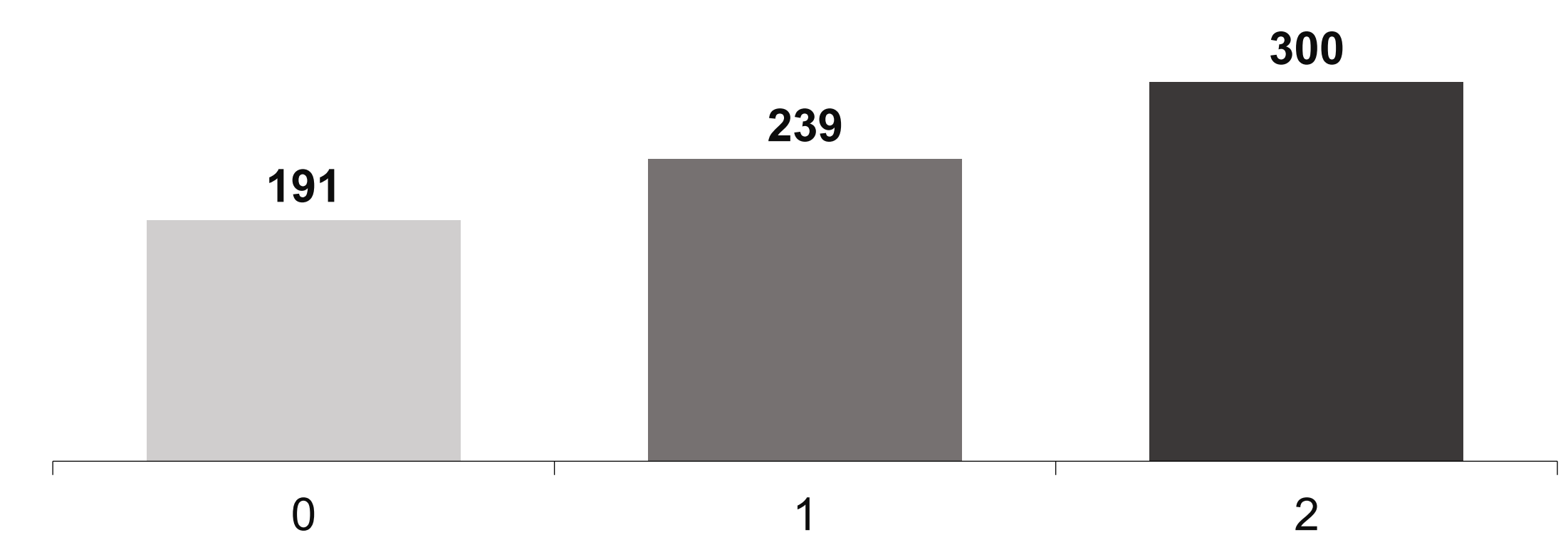
A Primary tumor downstaging



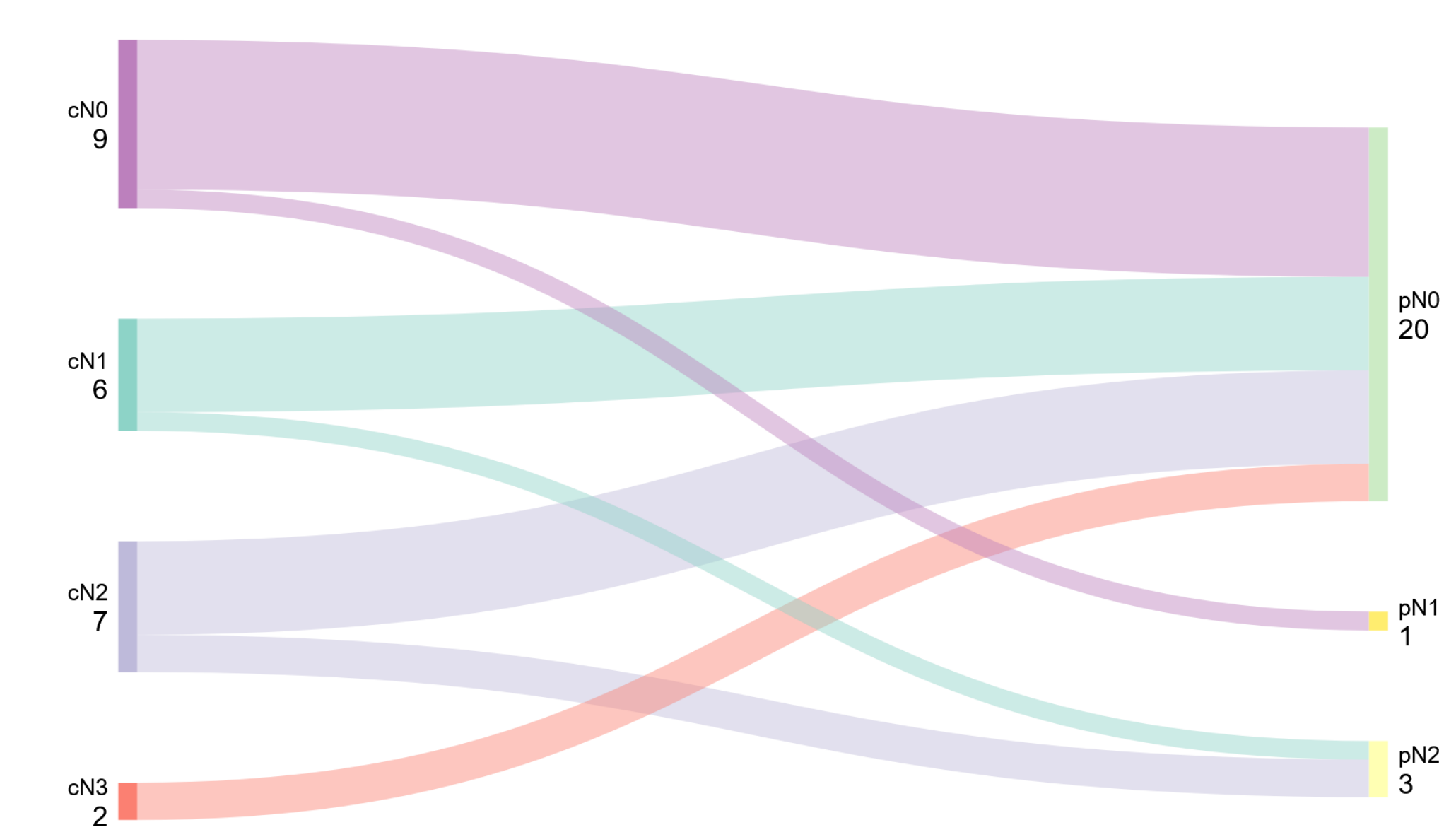
Baseline characteristics

Age at surgery, median (range)	68.0 (44.8–81.0)
Adenocarcinoma	23 (66%)
Squamous-cell carcinoma	10 (29%)
Adenosquamous / other	2 (6%)
KRAS mutation	14 (40%)
TP53 mutation	9 (26%)
PD-L1 TPS ≥50%	13 (37%)
PD-L1 TPS ≤1%	13 (37%)
Pembrolizumab	24 (69%)
Nivolumab / durvalumab / cemiplimab	11 (31%)

Mean operative time by complexity score (min)



B Nodal downstaging



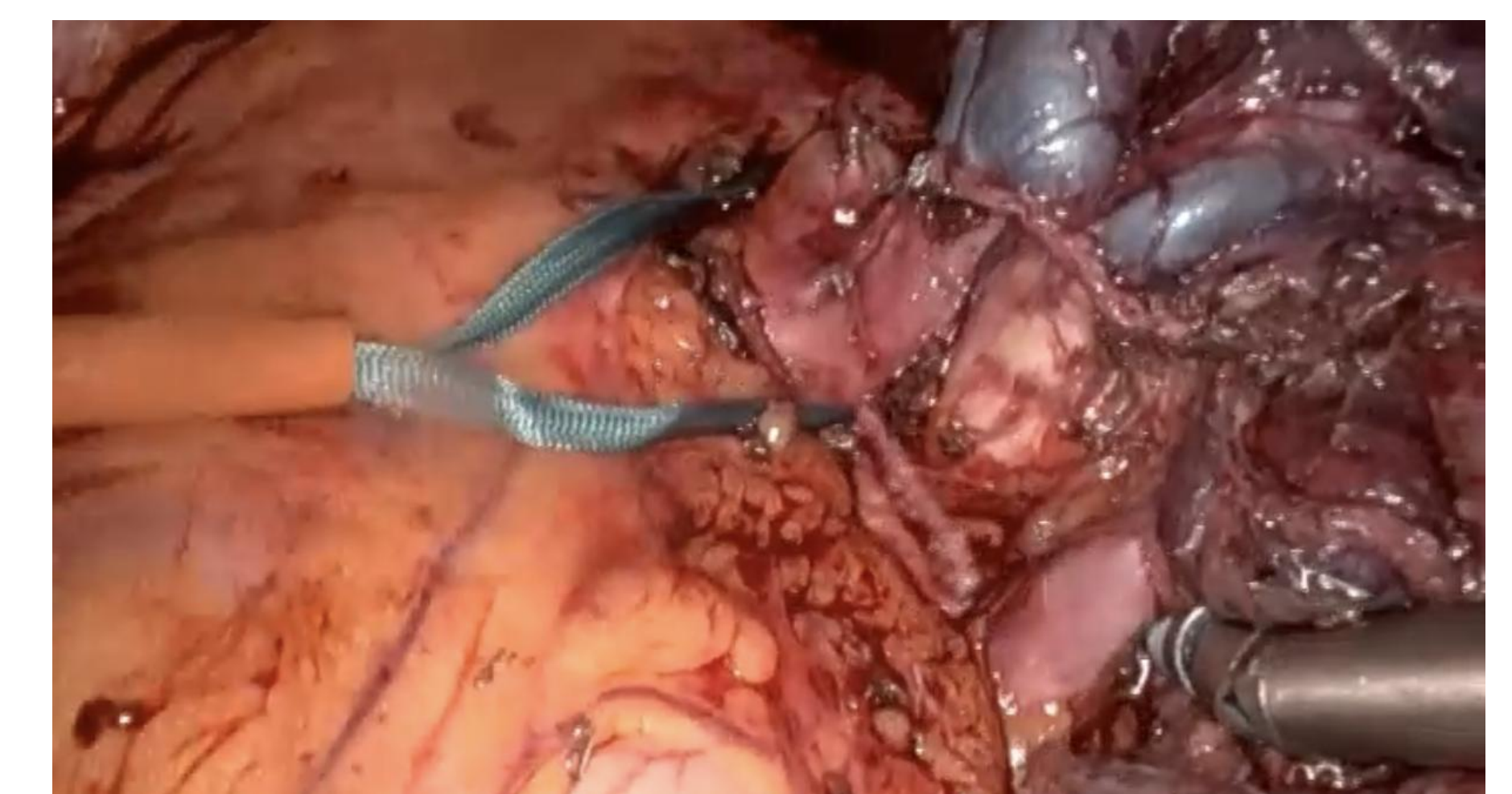
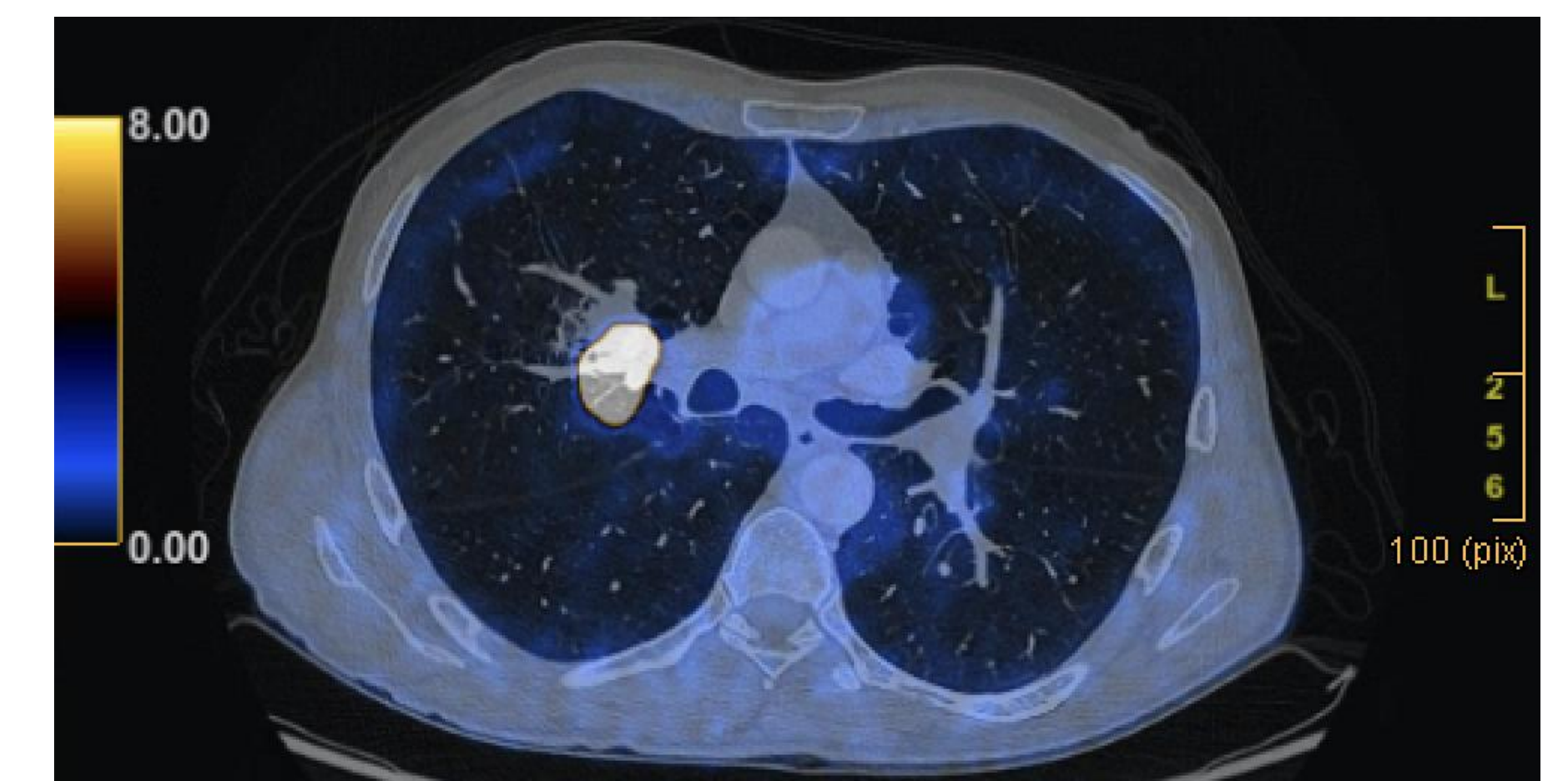
Extended resections in 11 patients

Extrapleural dissection (n=4), bronchial sleeve resection (n=3), central PA control (n=2), arterial sleeve resection (n=1), dissection of brachial plexus and subclavian vessels for Pancoast tumor (n=1), robotic-assisted chest wall resection (n=1), preoperative tEVAR (n=1).

DISCUSSION AND CONCLUSION

Key Message

In this single-center cohort, the RATS approach enabled safe anatomical resection of locally advanced and oligometastatic non-small cell lung cancer after immune checkpoint inhibitor treatment, with low conversion rates despite high surgical complexity. Among the 35 patients treated in this cohort, 11 patients required extended resections or required **central vascular control**:



R0 resection was achieved in 100% of patients, confirming that neoadjuvant chemo-immunotherapy does not compromise resectability by RATS.

Postoperative complications were mostly low-grade and well manageable, with a median hospital stay of 5 days.

Future Directions

Operative time increased with surgical complexity, and future studies are required to help anticipate operative demand and select patients for a robotic approach.