Surgery vs. SBRT in Early Lung Cancer — The Two Paths to Cure

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YouTube Series

Non-Disclosure Statement

I have nothing to disclose

Objectives

- Review key surgical and SBRT outcome data (RCTs, cohorts, meta-analyses)
- Define patient and tumor profiles favoring surgery versus SBRT
- Outline a practical shared decision-making framework

The 15-Second Take

- In truly operable, fit patients: lobectomy + nodal staging has the strongest long-term OS signal in large comparative cohorts/meta-analyses.
- SBRT is a curative, non-invasive alternative with excellent local control—best for inoperable/declining surgery.
- Definitive randomized data pending (VALOR).

Key refs: Chang 2015 Lancet Oncol (STARS/ROSEL); VALOR NCT02984761; JAMA Netw Open 2019/2023 cohort signals.

What Are We Really Comparing?

- Surgery (usually lobectomy): removes tumor + samples mediastinal nodes → definitive pathology and staging.
- Occult N1/N2 upstaging in ~15–20% of cT1 cases guides adjuvant therapy.
- SBRT: outpatient, non-invasive, 1–5 fx peripheral; more fractions for central/ultracentral; ~90% local control in peripheral, inoperable cohorts.

Refs: JAMA Netw Open 2019; Ann Thorac Surg 2021; TLCR 2019 review.

Evidence Map (Operable Patients)

- STARS/ROSEL pooled: underpowered but hypothesis-generating (signal favoring SABR not practice-changing).
- Large databases/meta-analyses: OS and CSS generally favor surgery when adequate LN evaluation is done.
- VALOR Phase III (ongoing): anatomic resection vs SBRT; primary endpoint 5-yr OS.

Chang 2015 Lancet Oncol; JAMA Netw Open 2019; VALOR NCT02984761.

Low-Comorbidity Lens: What Happens in the Fittest?

- Short-term (30/90-day) mortality lower with SBRT than surgery—expected due to invasiveness.
- By ~1 year onward, adjusted OS curves favor surgery; 5-yr OS higher after surgery.
- Translation: if you’re truly fit for lobectomy, long-term survival still tends to favor surgery.

Udelsman 2024 JTCVS (low-comorbidity); related VA/NCDB cohorts.

SBRT for Central/Ultracentral Tumors

- NRG/RTOG 0813: 5-fraction dose-escalation defined safe ranges; toxicity risk increases near proximal bronchial tree.
- Ultracentral lesions: higher severe toxicity risk—consider hypofractionation (8–15 fx) with stringent constraints.
- Peripheral lesions: RTOG 0915 (34 Gy ×1 vs 48 Gy ×4) → similar control with different toxicity profiles.

RTOG 0813 (Bezjak 2019, JAMA Oncol/PMC); RTOG 0915 (PubMed).

Why Nodal Staging Matters

- Adequate lymph-node evaluation (LNE) detects occult N1/N2 (~15–20%) and changes management.
- Cohort studies show best OS when surgery includes adequate LNE; understaging can bias comparisons against surgery.

JAMA Netw Open 2019; Ann Thorac Surg 2021 (Razi et al.).

Modern Planning #1 — Sinoatrial Node (SA Node) Sparing

- Higher SAN dose associates with ↑ atrial fibrillation and ↓ survival after thoracic RT.
- Plan tactic: contour RA/SAN region; track SAN Dmax/Dmean; prioritize beam angles to keep SAN dose low.

Kim et al., JAMA Oncol 2022 (+ commentary/validations 2023–2024).

Modern Planning #2 — Immune-Dose Sparing (EDIC/EDRIC)

- Higher EDIC/EDRIC correlates with lymphopenia and worse outcomes across thoracic sites.
- Planning levers: reduce low-dose bath (lung/heart), smaller fields, gating/ITV refinement; consider protons when appropriate.
- Emerging data show proton therapy can lower EDIC vs photons.

Jin et al., Cancers 2021 (RTOG0617 secondary); Front Oncol 2023; IJROBP/Green Journal 2024–2025; PMC 2024 proton data.

Short-Term Risks Patients Feel

- Surgery: pneumonia, AF, prolonged air leak, readmission risk; 90-day mortality ~2–4% across series (center-dependent).
- SBRT: most patients ‘sail through’; watch for pneumonitis, chest wall/rib pain; airway toxicity for central lesions.

JAMA Surg 2023 surgical quality; VA/NCDB cohorts; RTOG 0813 toxicity data.

If You Choose SBRT (Fit but Prefer Non-Surgical)

- Confirm fractionation is appropriate for location (central/ultracentral often 8–15 fx).
- Documented SAN doses and a SAN-sparing strategy.
- Report EDIC/EDRIC and steps taken to keep it low.

RTOG 0813; Kim 2022 JAMA Oncol; Jin 2021 Cancers; proton-EDIC literature.

Patient-Facing Rule of Thumb

- Fit & operable → Surgery (lobectomy + nodal staging) usually gives best long-term odds.
- Not operable or decline surgery → SBRT is a proven curative route; apply cardio-immune sparing principles.

JAMA Netw Open 2019; Chang 2015; VALOR ongoing.

Key Trials & Cohorts (Receipts)

- STARS/ROSEL pooled (operable): underpowered; hypothesis-generating — The Lancet Oncology 2015 (Chang et al.).
- JAMA Netw Open 2019 (NCDB, n>100k): surgery + adequate LNE → best OS vs SBRT.
- JTCVS 2024 low-comorbidity: early safety edge for SBRT; 5-yr OS favors surgery (Udelsman et al.).
- VALOR Phase III (ongoing): anatomic resection vs SBRT; primary 5-yr OS — ClinicalTrials.gov NCT02984761.
- RTOG 0813 (central): set safe 5-fx ranges; highlighted ultracentral risk — PMC/2019.
- RTOG 0915 (peripheral): 34 Gy ×1 vs 48 Gy ×4 — similar control, different toxicity — PubMed.

Lancet Oncol 2015; JAMA Netw Open 2019; JTCVS 2024; NCT02984761; RTOG 0813; RTOG 0915.

Cardio-Immune (Receipts)

- SA node dose ↔ AF & OS after thoracic RT — JAMA Oncology 2022 (+ validations/letters 2023–2024).
- EDIC/EDRIC links to lymphopenia/toxicity & outcomes; proton lowers EDIC — Cancers 2021; Front Oncol 2023; IJROBP/Green J 2024–2025; PMC 2024 proton EDIC.

JAMA Oncol 2022; Jin 2021 Cancers; Front Oncol 2023; IJROBP/Green J 2024–2025; PMC EDIC-proton 2024.

References (Compact)

- Chang JY et al. Lancet Oncol. 2015;16:630–637. (STARS/ROSEL pooled)
- JAMA Netw Open. 2019: Large NCDB comparative analyses (surgery vs SBRT; LNE).
- Udelsman BV et al. J Thorac Cardiovasc Surg. 2024. (Low-comorbidity comparison)
- VALOR Trial – ClinicalTrials.gov NCT02984761; Ritter TA et al. Pract Radiat Oncol 2025 (QA report).
- NRG/RTOG 0813 – JAMA Oncol/PMC 2019. (Central SBRT dose-escalation)
- RTOG 0915 – Peripheral SBRT 34×1 vs 48×4 (PubMed).
- Kim KH et al. JAMA Oncol. 2022;8:1624–1634. (SAN dose ↔ AF & OS)
- Jin J-Y et al. Cancers. 2021;13:6193. (EDIC; RTOG0617 secondary)
- Loap P et al. 2024 (PMC): Protons reduce EDIC; additional Front Oncol 2023; Green J/IJROBP 2024–2025.