

Outcome Of Extracorporeal Membrane Oxygenation Support During Surgery For The Trachea And Upper Airway Obstruction

Sanjay Kumar, MCh,FRCS¹, Vladamir Shumaster, MD².

¹Institute of Medical Sciences, Banaras Hindu University, Varanasi, India,

²Division of Cardiac Surgery, Yale School of Medicine, New Haven, CT, USA.



BACKGROUND:

Anesthetic management of airways during operation of critical airway stenosis is often very challenging. Extracorporeal membrane oxygenation (ECMO) may provide adequate respiratory support when conventional approaches for airway management fail or not feasible while operating on critical airway stenosis.

METHODS:

in this retrospective study from our database we report our experience of ECMO support for critical airway surgery. Twelve patients underwent ECMO-supported airway operation between January 2014 and December 2021. 9 patients who had complete data were analyzed.

Case No.	Sex/Age	Diagnosis	Mechanism of Stenosis	Surgical Lesion	Size of Airway	Cotton-Myer
1	F/47	Fall down, c-spine fracture	PI	TS, Cervical	5.9mm	Gr III
2	M/23	HMVA	PI	TS, Cervical	7mm	Gr III
3	M/50	Glufosinate intoxication	PI	TS, Cervical	4.8mm	Gr III
4	M/58	ICH	PT	TS, Cervical	6mm	Gr III
5	M/25	HMVA	PT	TS, Mediastinal	5mm	Gr III
6	F/16	HMVA, ICH	PT	TS, Cervical	5 mm	Gr III
7	M/14	Tracheobronchomalacia	Malacia	Carina & both main bronchus	Trachea: 7 mm; RMB: 3.7 mm; LMB: 1.7 mm	
8	M/41	Adenoid cystic carcinoma	Primary tracheal tumor	TS, Mediastinal	6.5 mm	
9	M/20	SVC syndrome	Extrinsic compression	TS, Mediastinal	5 mm	

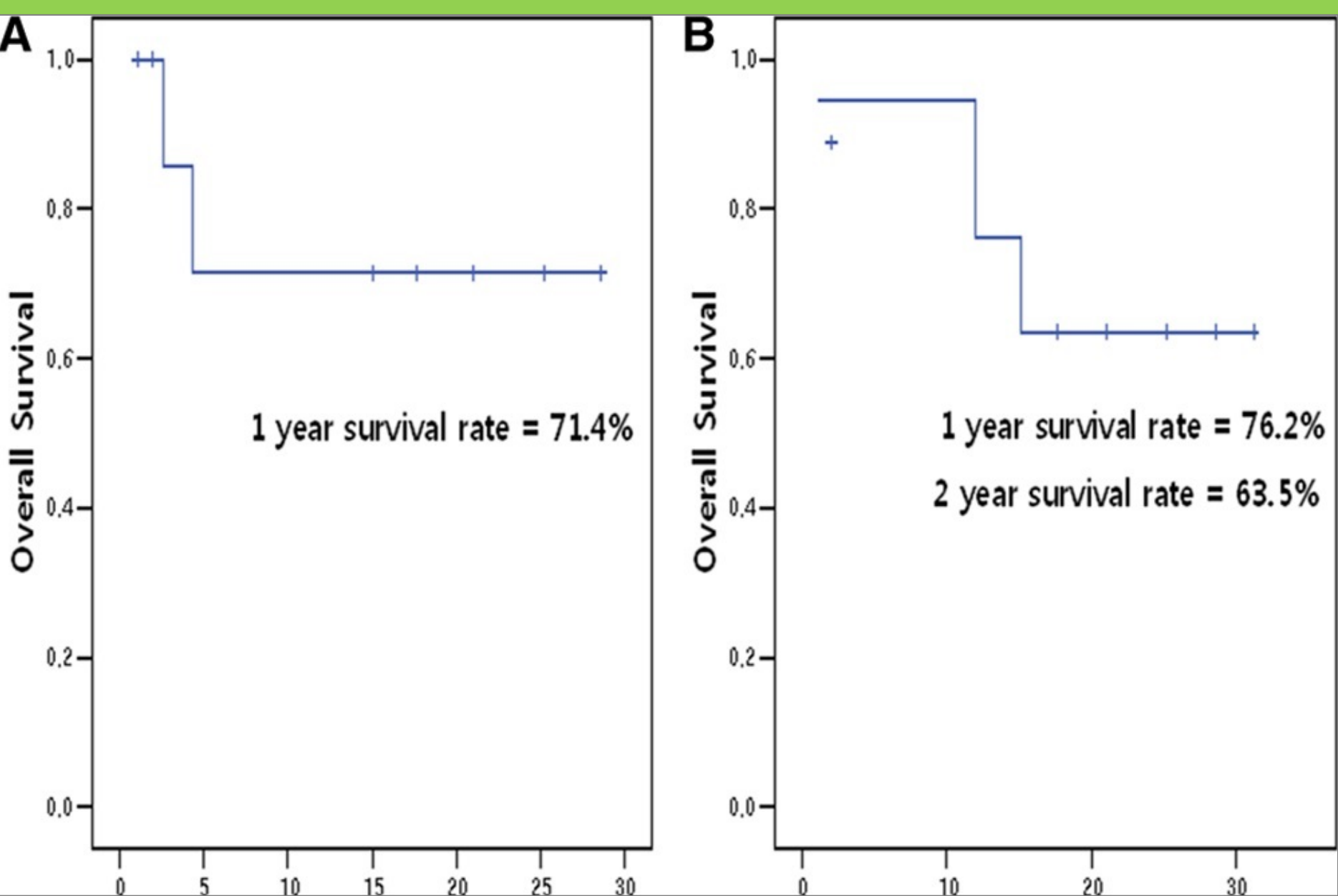
*Mean standard deviation:
DLBCL, diffuse large B cell lymphoma; HMVA, high-speed motor vehicle accident; ICH, Intracranial hemorrhage; LMB, left main bronchus; PI, postintubational; PT, post-tracheostomy; RMB, right main bronchus; SDH, subdural hemorrhage; SVC, super vena cava; TS, tracheal stenosis.

RESULTS:

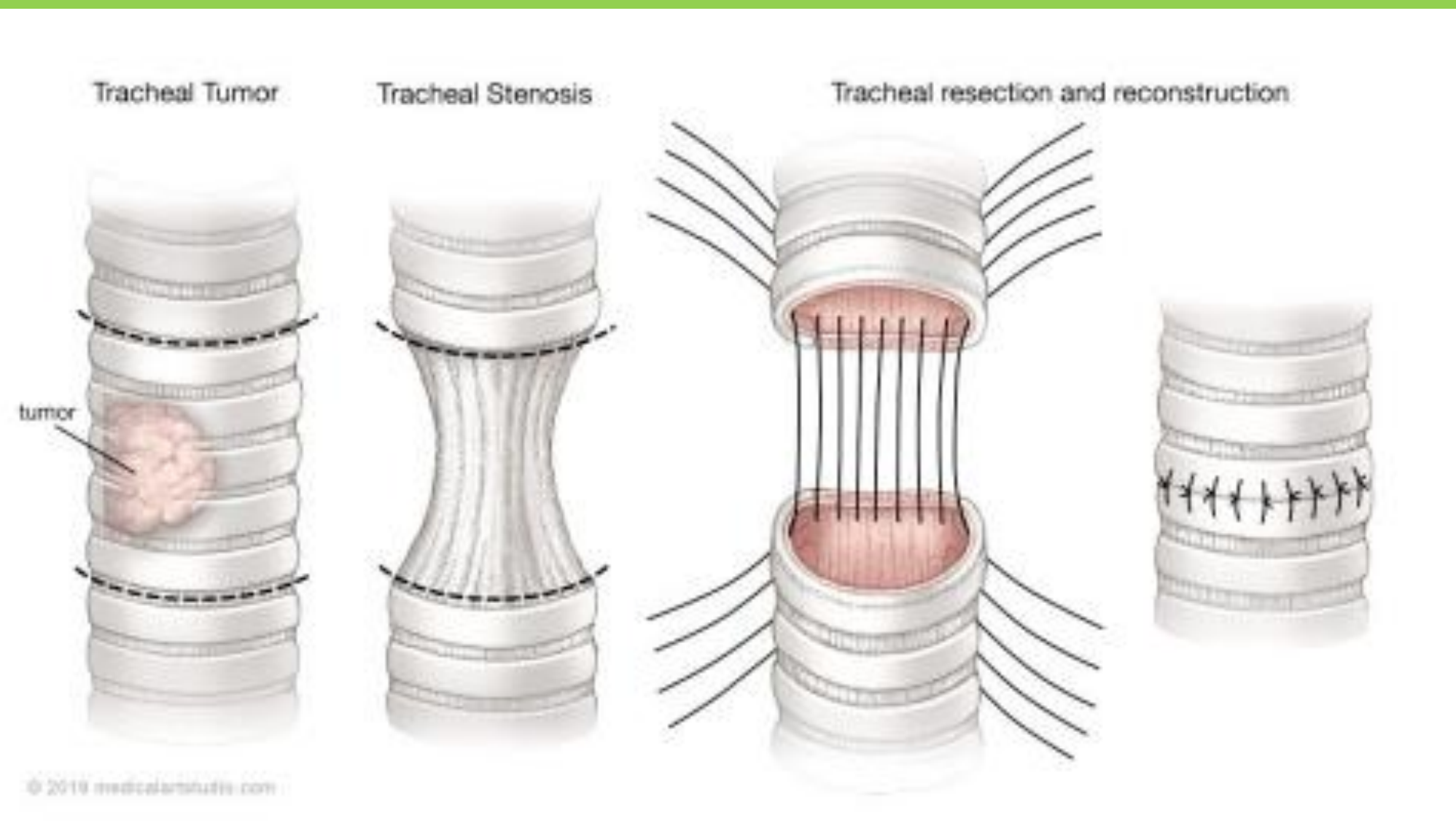
The indications for surgery was tracheal stenosis in 9 patients, and tracheomalacia tracheal tumor, and external tracheal compression by mediastinal mass in one patient each. Resection and end-to-end anastomosis was performed in seven patients; the remainder underwent diverse procedures, including tracheoplasty, tracheal ballooning, tracheostomy, and debulking of mediastinal mass. Extracorporeal membrane oxygenation support was sufficient for gas exchange during surgery and 9 patients were successfully weaned off intraoperatively. The median time on ECMO was 2.54 hours (range: 1.2-208 hours). There was no ECMO-related complication recorded. The median intensive care unit stay, median hospital stay, and mean follow-up period were 2 days (range: 1-46 days), 37 days (range: 7-292 days), and 17.1 ± 10.8 months, respectively. The rate of freedom from reintervention was 75.2%; the mean survival rates over 1 and 2 years were 76% and 64%, respectively. ,

Case	Surgery	Mode of Surgery	Situation of ECMO	Mode	Perfusion Cannula	Drain Cannula	Flow (L/M)	Sat.(%)
1	TRE	Elective	Planned	W	18, RFV	20, LFV	1.5	90-100
2	TRE	Elective	Planned	W	18, RFV	22, LFV	2.0	98-100
3	TRE	Elective	Planned	W	17, RFV	21, RFV	3.0	97-100
4	Tracheostomy	Emergency	Planned	W	17, RFV	25, LFV	4.0	100
5	Tracheal ballooning	Emergency	Unplanned	W	17, RFV	19, LFV	2.0	100
6	TRE	Elective	Planned	W	17, RFV	21, LFV	3.0	100
7	Carinal resections and reconstruction	Elective	Planned	W	17, RUV	21, RFV	2.8	100
8	Patch repair of Posterior membr	Elective	Planned	W	20, RUV	24, RFV	4.1	100
9	Mediastinal mass	Emergency	Unplanned , CPR	VA	18, RFA	22, LFV	4.5	100

CPR , Cardiopulmonary resuscitation; ECMO, extracorporeal membrane oxygenation; LFA, left femoral artery; LFV, left femors vein; RFA, right femoral artery; RFV, right femoral vein; RUV, right internal jugular vein; TRE, tracheal resection and end-to-end anastomosis; VA, Veno- arterial; VV, venovenous.



Classification	From	To	Endoscopic appearance
Grade I	No Obstruction	50% Obstruction	
Grade II	51%	70%	
Grade III	71%	99%	
Grade IV	No detectable lumen		



CONCLUSIONS: This retrospective study indicates that ECMO is a feasible and safe method for oxygenation as an alternative to airway management during critical airway surgery.