8th WORLD CONGRESS of PEDIATRIC SURGERY
WOFAPS
12-15 November 2025
Titanic Mardan Palace Hotel
ANTALYA, TÜRKİYE

Long-Term Outcomes Following Vascular Cannulation and Reconstruction in Neonates Undergoing Veno-Arterial Extracorporeal Membrane Oxygenation (ECMO)

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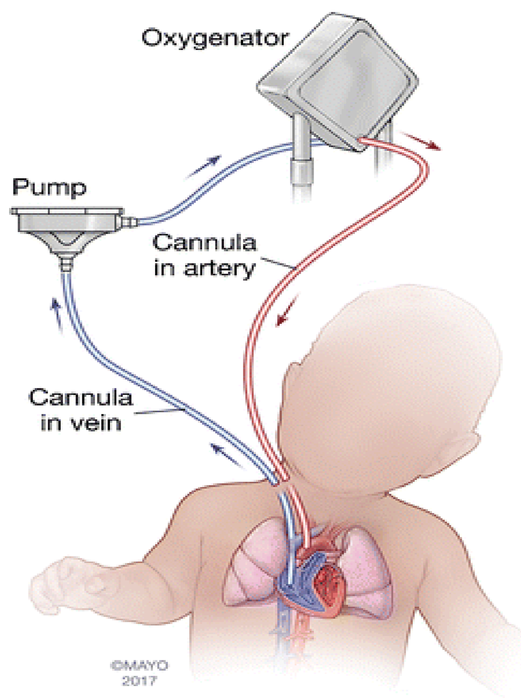
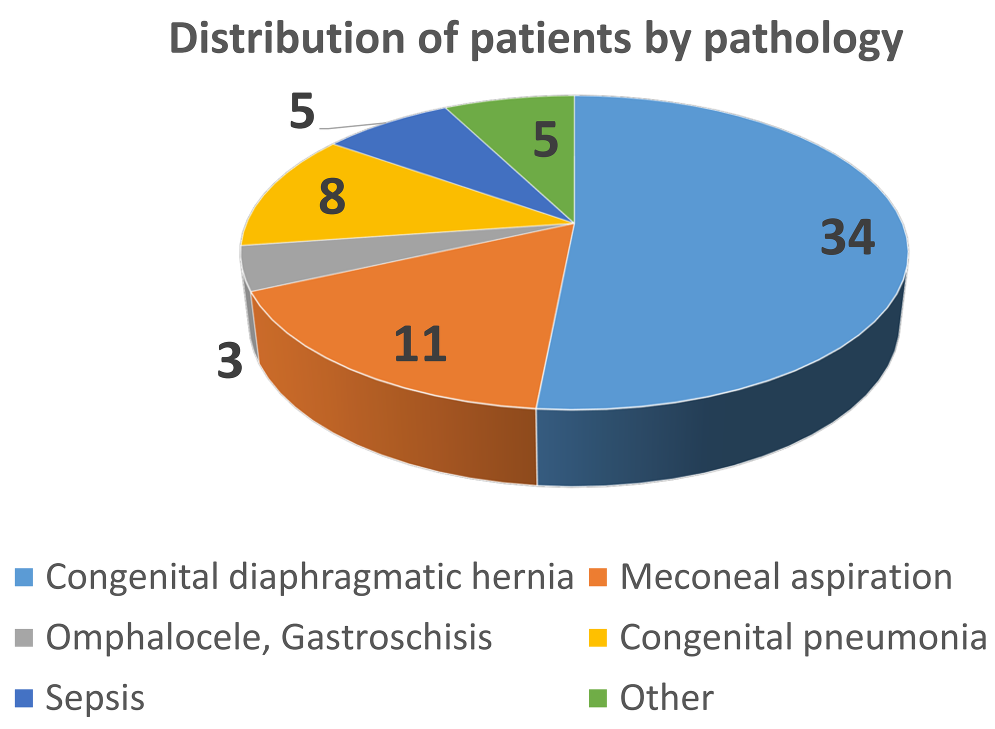


Topicality: Employment of extraocorporeal membrane oxygenation (ECMO) has become increasingly widespread as a bridging therapy for neonates with severe malformations respiratory system, diaphragms or cardiac diseases. Traditional methods of cannulation for ECMO use involvement of the common carotid artery (CCA) and the internal jugular vein (IJV). The main objection to venoarterial ECMO is that it is neurologic risk from injury of the CCA.

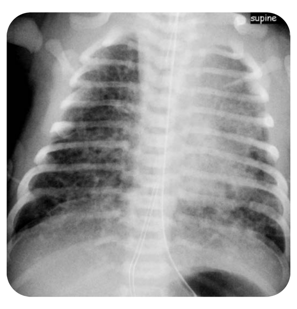
Aim: To assess the long-term outcomes of internal jugular vein and common carotid artery cannulation in neonates treated with veno-arterial ECMO, with a focus on vascular patency, cerebral perfusion, and neurodevelopmental status following surgical reconstruction during decannulation.



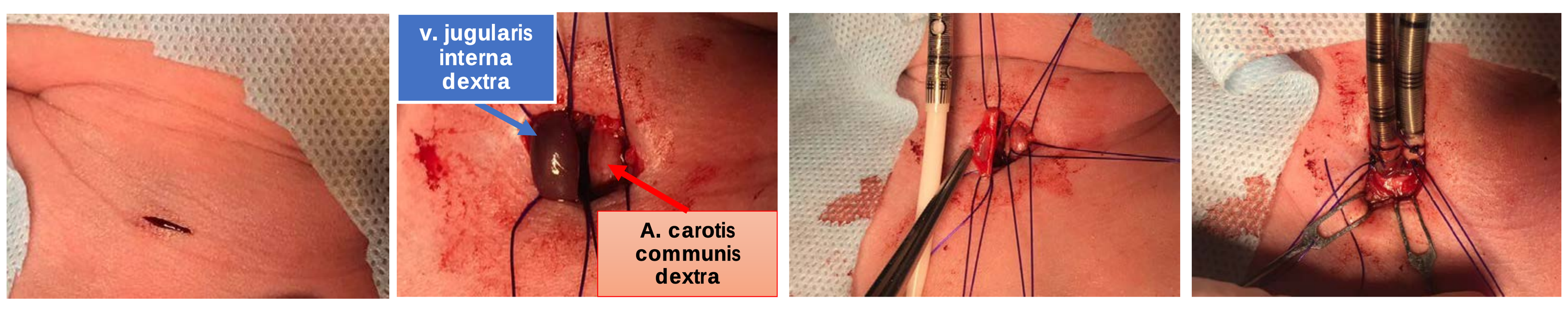
Methods:
Filatov Children's City Clinical Hospital (Moscow)
from 2016 to 2024,
66 neonates who underwent right-sided vascular cannulation for ECMO:
- ✓ Mean gestational age: 39,26 ± 1,5 (33;42)
- ✓ mean age: 4.76 ± 4.83 days (1;21);
- ✓ mean weight: 3490.7 ± 567.36 g (2050;4700)

The mean ECMO duration was 8.95 ± 7.3 days (1;41)
Assessment of long-term results – 20 patients

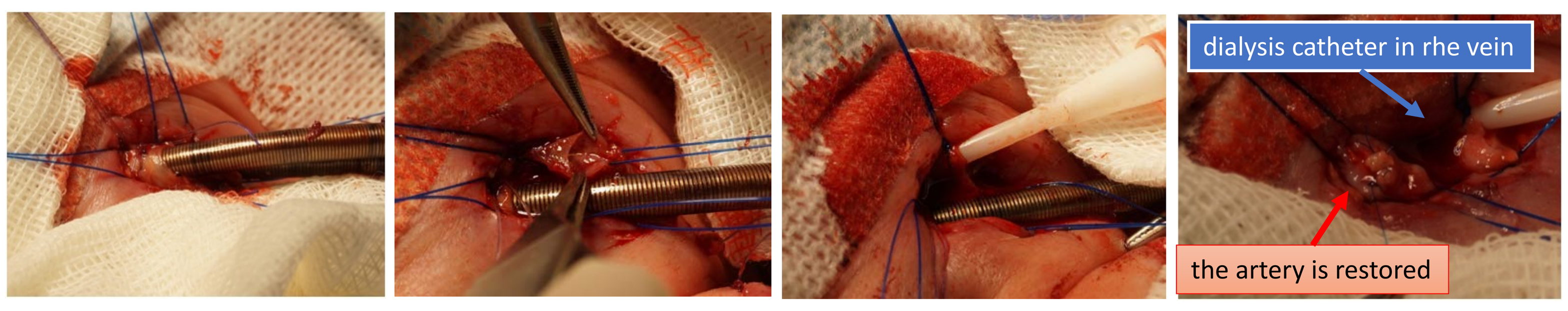

Congenital diaphragmatic hernia


Meconeal aspiration

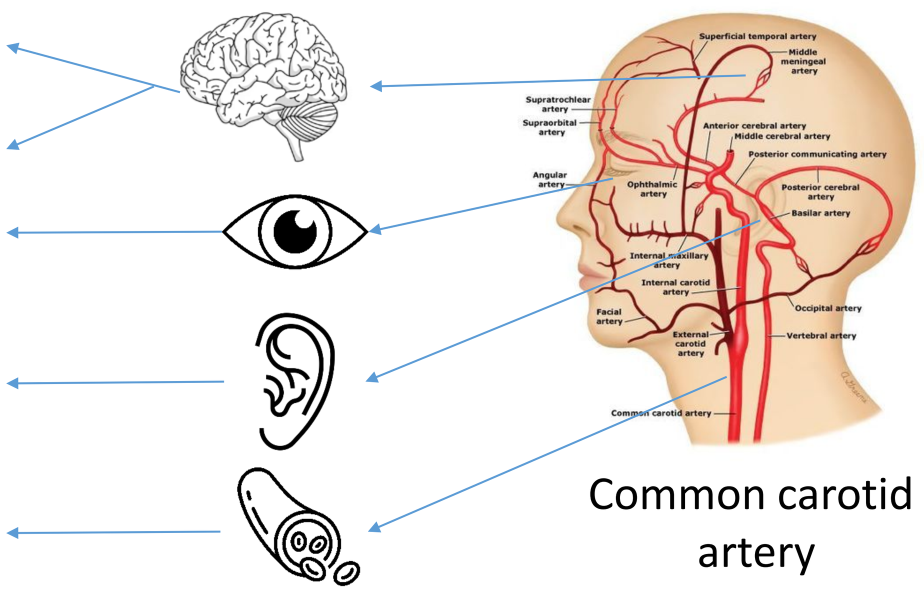
Cannulation



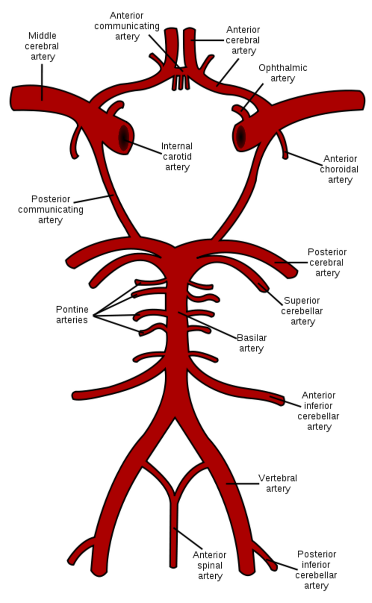
Decannulation

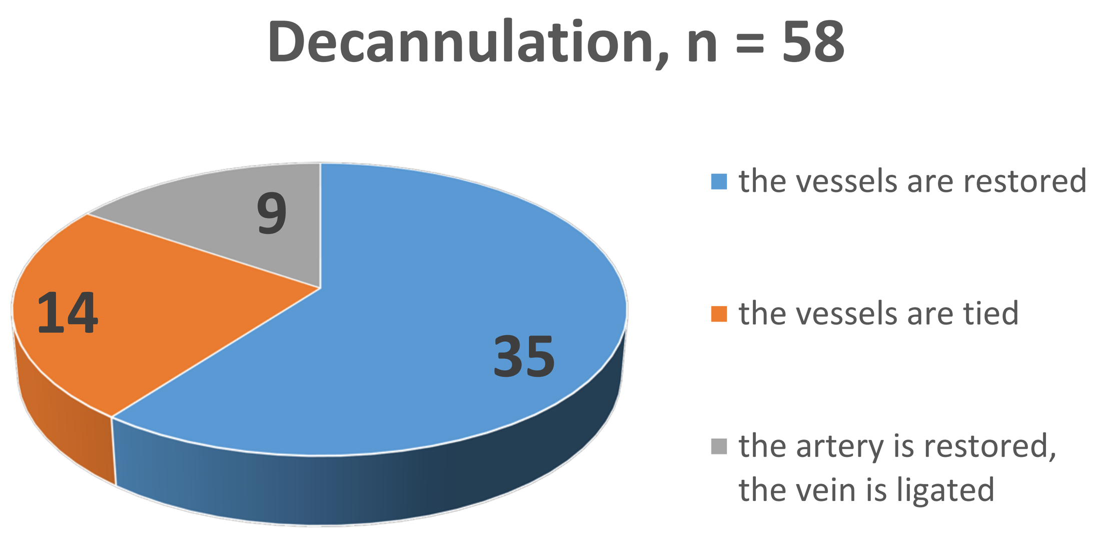


MRI (18)
Neurologist (10)
Fundus of the eye (14)
~~Short-latency auditory evoked potentials~~
Doppler ultrasonography (18)



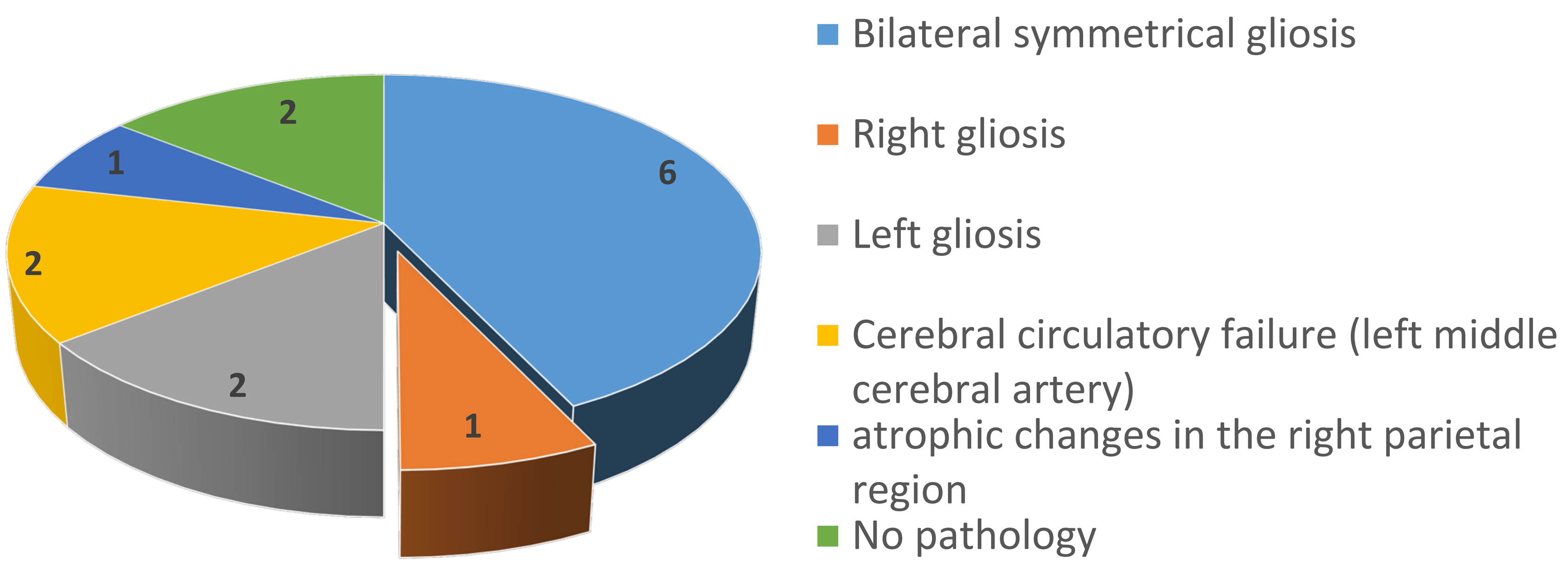
Common carotid artery

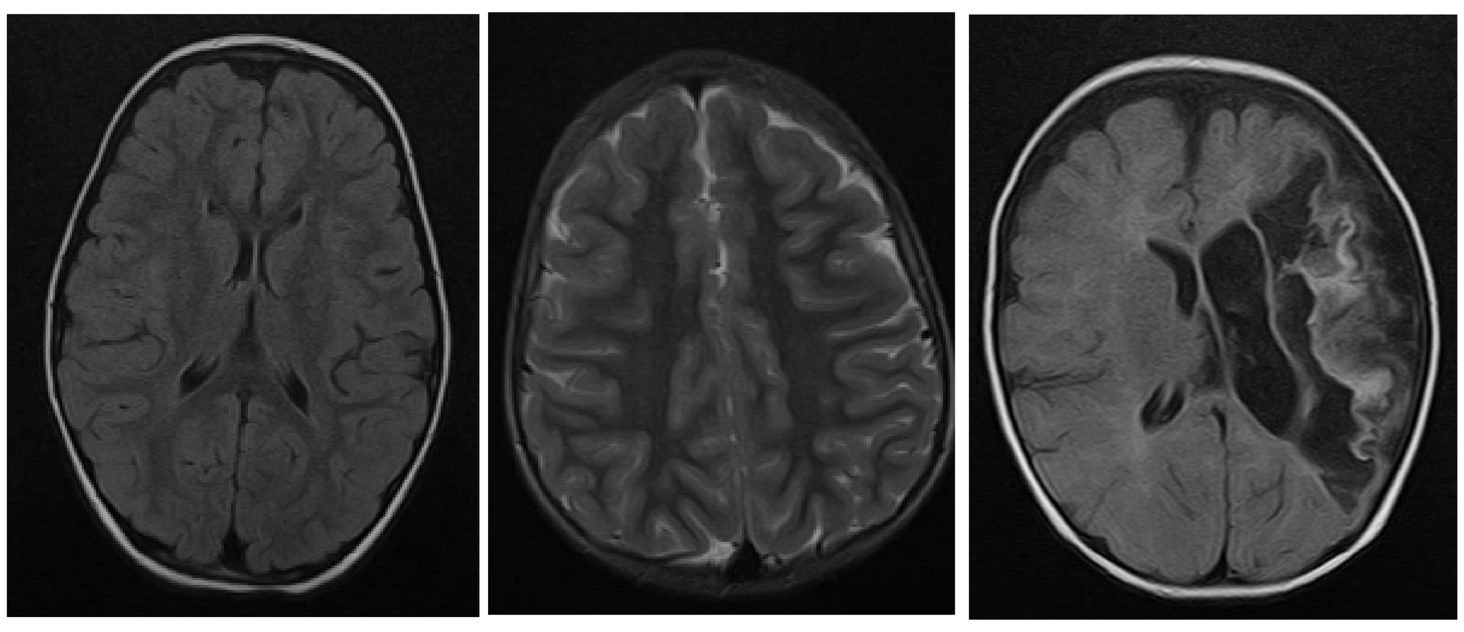




death during ECMO - 8

Magnetic Resonance Imaging (n = 18)





Neurologist (n = 10)

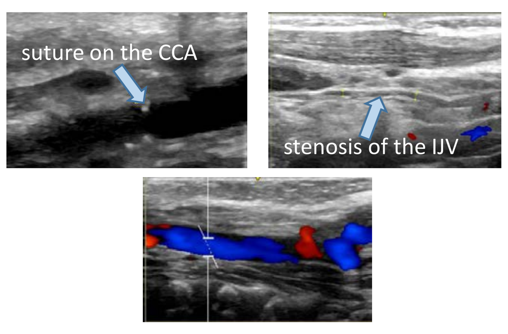
Normal Psychomotor Development	5
Developmental Delay	2
Cerebral Asthenia Syndrome	2
Hemiparesis after extensive hemorrhage	1

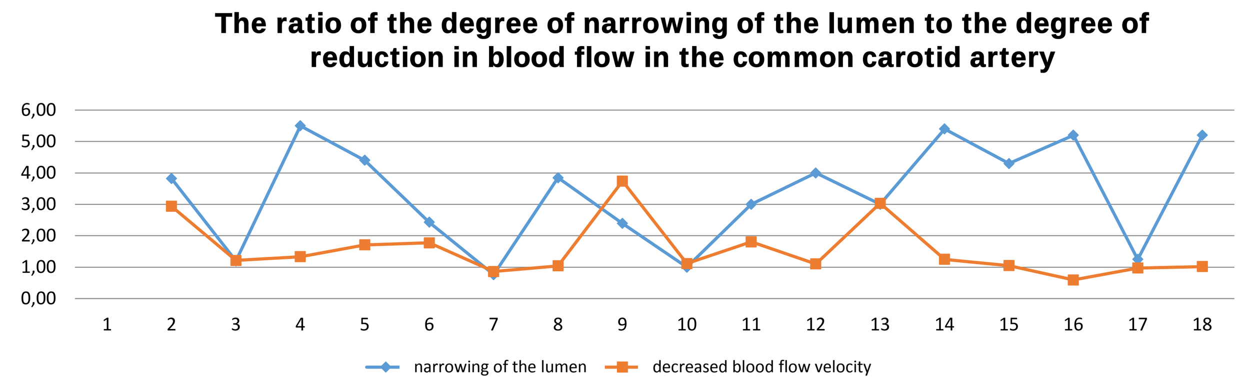
Fundus of the eye (n = 14)

Without pathology 6 (0.4)
Retinal angiopathy: 8 (0.6)
- congestion of veins and arteries 1
- Symmetrical plethora of veins 2
- Asymmetrical plethora of veins:
  - OD>OS 1
  - OS>OD 4!

Doppler ultrasonography (n = 18)

	diameter on the left, mm	diameter on the right, mm	Blood flow velocity on the left, mm/s	Blood flow velocity on the right, mm/s
Common carotid artery	4,6 ±0,9	1,9 ± 1,1	61,9 ± 20	47,1± 19,9
Internal jugular artery	3,6 ±0,5	1,7±0,7	65,0 ±24,5	44,3±27,9
Vertebral artery	3,4 ± 0,5	3,4±0,7	42,6 ± 23,7	58,3 ± 19,2
Internal jugular vein	7,7 ± 1,5	3,7 ±2,3	42,4 ± 28,9	24,9 ± 15,4





Conclusion:
Surgical cannulation and subsequent reconstruction of the internal jugular vein and common carotid artery in neonates undergoing ECMO is not associated with focal cerebral perfusion deficits, ophthalmic abnormalities, or long-term focal neurological impairments. Observed neurological and imaging abnormalities were primarily attributed to underlying disease and hypoxic injury rather than vascular access. The consequences that arise from forced ligation of the main vessels require further research.

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