

Implementation of Abdominal Normothermic Regional Perfusion at a Level 1 Trauma Center

Sherri Crumley DNP, RN, CNOR, NE-BC, CSSM & Ashley Roche MSN, RN, CNL, CCRN, NE-BC

Loyola University Medical Center

Introduction

- The continuing shortage of deceased donor organs for transplantation and the limited number of potential donors after brain death have led to a resurgence of interest in donation after circulatory death (DCD). The processes of warm and cold ischemia threaten the viability of DCD organs, but these can be minimized by well-organized DCD pathways and new techniques of in situ organ preservation.
- In order to improve the quality and function of the organs recovered from DCD donors, a technique called Normothermic Regional Perfusion (NRP) has been developed. This technique is initiated after the donor has been declared dead based on the spontaneous cessation of respiration and circulation.
- Two types of NRP exist:
 - (1) thoraco-abdominal (2) abdominal

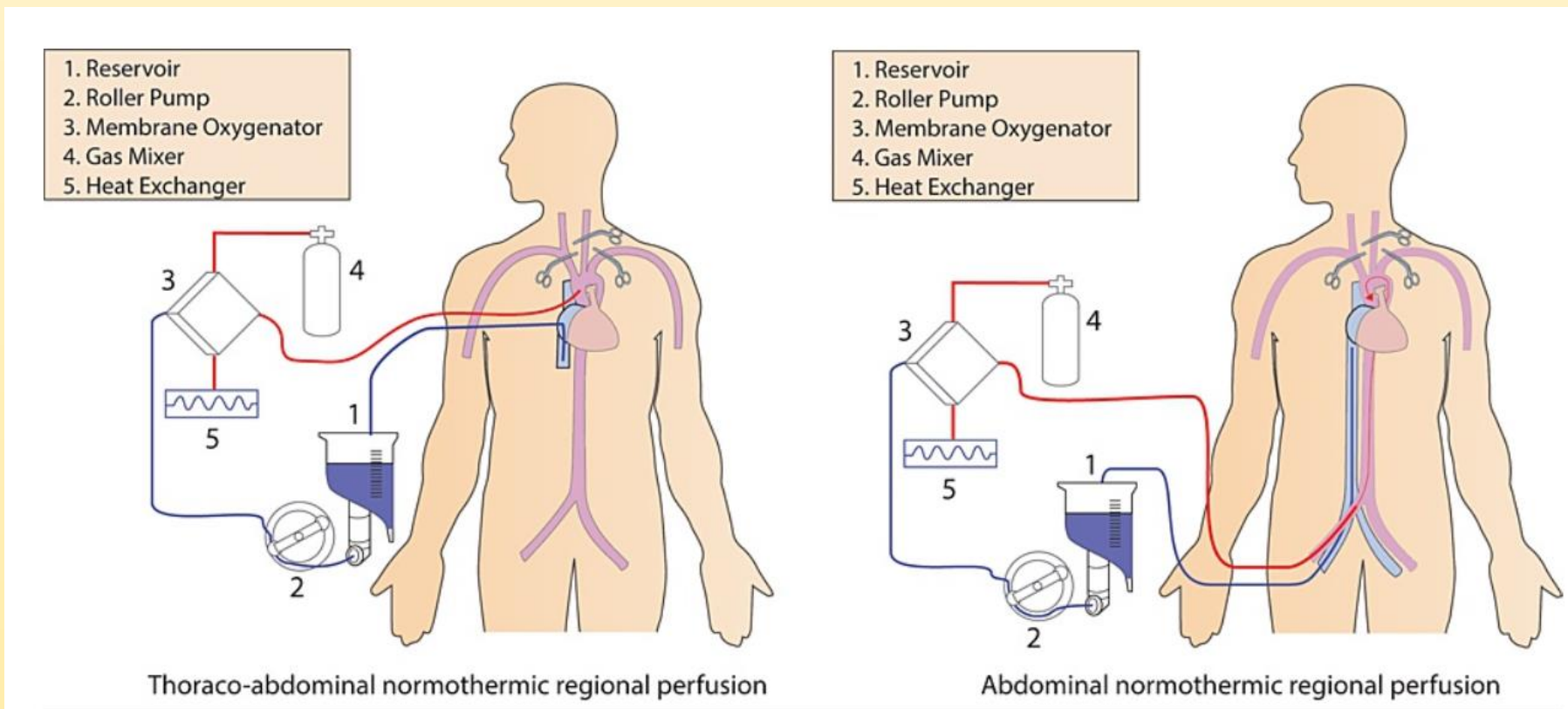


FIGURE 1: Cannulation and circuit for normothermic regional perfusion.

VA-ECMO circuit is the same for both TA-NRP and A-NRP. In TA-NRP, the aorta and right atrium are cannulated; in A-NRP, the femoral artery and femoral vein are cannulated. In addition, the circuit is modified to accommodate two suction for blood collection. VA-ECMO: veno-arterial extracorporeal membrane oxygenation, TA-NRP: thoracoabdominal normothermic regional perfusion, A-NRP: abdominal-normothermic regional perfusion.

- Artificial circulation is then initiated through a mechanical circulatory device (ECMO) to perfuse the organs during recovery. This technique, which provides oxygen repletion to organs after a period of prolonged warm ischemia, also allows for the assessment of organ function and viability for subsequent transplantation.
- Despite its advantages, NRP can be logistically challenging and requires considerable coordination between donor hospitals, perioperative staff and ICU staff, procurement teams, perfusionists, as well as the organ procurement organization (OPO). Successful implementation of the protocol requires coordinated efforts by all parties.

Project Plan

Objective:

- This project sought to adopt and implement abdominal normothermic regional perfusion at a Level 1 Trauma Center for patients donating organs after circulatory death.

Description of Team:

- The project was led by the Assistant Manager of the Inpatient Operating Room and Clinical Nurse Leader of the Cardiovascular Intensive Care Unit.
- This project included patients from intensive care units (MICU, SICU, BICU, NICU, AND CVICU) and the operating room

Project Setting:

- Loyola University Medical Center (LUMC) – Maywood, IL
- Quaternary Academic Medical Center with 547 licensed beds, Level 1 Trauma Center, Transplant Center, Burn Center, and Comprehensive Stroke Center
- 27 operating rooms, multi-specialty

Assessment:

- Nationally, a major increase in DCD donors was noted with 7,820 donors, which was a 23.5% increase over 2023.
- As a transplant center, in 2024, our organization referred 335 ventilated patients to our OPO, resulting in 18 donors (6 DCD and 12 DBD) and 42 total organs transplanted (9 organs transplanted from DCD donors and 33 organs transplanted from DBD donors).

Results

- Abdominal NRP went live at the organization on February 10th, 2025.
- Between 2/10/25 – 12/10/25, a total of 317 ventilated patients were referred for organ donation, resulting in:
 - 49 families were approached by our OPO, resulting in 30 authorized organ cases and 48 total organs transplanted.
 - 8 DCD donor cases (YoY growth +33.3%, +2 cases) resulting in 19 organs transplanted (YoY +111.1%, +10 organs)

Year	Ventilated Patient Referrals	Family Approached by OPO	Authorized Organ Cases	Authorized/Not Recovered Organ Cases	DCD Donor Cases	Organs Transplanted/DCD Donor Cases	DBD Donor Cases	Organs Transplanted/DB Donor Cases	TOTAL Donor Cases	TOTAL Organs Transplanted
2021	201	43	24	5	4	5	15	58	19	63
2022	283	44	20	4	7	13	9	25	16	38
2023	243	37	18	3	4	9	11	31	15	40
2024	335	37	23	5	6	9	12	33	18	42
YTD 12/10/25	317	49	30	10	8	19	12	29	20	48

Debrief Outcomes:

- Although NRP added length to the overall case, perioperative staff reported that cases in which abdominal NRP was used were noted to be significantly less rushed in contrast to the historical process before NRP was implemented.
- Workflow Challenges Identified: (1) process for ordering and administering blood in the absence of anesthesia involved in DCD cases, (2) workflow for cross-clamping and cannulation intra-operatively

Key Considerations:

- Our OPO modified the age criteria for DCD donors to 67 years of age, effective 6/16/25. The age was increased again to 70 years effective 11/3/25.
- These changes were introduced methodically over time to ensure the organization had time to support the expected increase in DCD donor cases.

Implementation

- The organization conducted an ethics review of the potential of including NRP as a standard practice for solid organ donation for DCDs.
 - The organization approved the use of NRP for abdominal solid organs exclusively (excluding heart and lungs).
- Subsequently, the organization's DCD policy was reviewed and updated to include abdominal NRP as a standard practice.
- Perioperative nursing staff were introduced to NRP through the use of quarterly education sessions conducted by our OPO liaison.
- After implementation, 30-minute debriefs were scheduled after each case with the clinical teams involved in the case to identify what went well and what could be improved upon for future cases as a means for rapid process improvement between cases.

Practice Implications

- NRP enhances the viability of organs that might otherwise be unsuitable for transplantation due to warm ischemic injury.
- As the pool of potential donors potentially expands, NRP may allow for more individuals to become organ donors and potentially allow for more solid organ donation after circulatory death.
- Perioperative nurses will likely encounter more DCD cases and play a crucial role in facilitating NRP process and preparing organs for transplantation.
- As NRP requires closed collaboration between the perioperative team, OPOs, and transplant centers, perioperative nurses are at the forefront of this advancement.

References/Acknowledgements



Thank you to our OPO for their continued partnership. To donors and their families – thank you for trusting us to care for you.