

Alcor A-1088

Case Report



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1. Overview

Alcor member A-1088, Dennis Ross, was pronounced legally dead on Sunday, October 30, 2011. A neurocryopreservation, Mr. Ross became Alcor's 108th patient.

Alcor received emergency notification that a member in the St. Petersburg, Florida area had been rushed to the hospital on Friday, October 28th and was diagnosed with a massive intracerebral hemorrhagic stroke due to a ruptured brain aneurysm. Suspended Animation (SA) went to the hospital and began to prepare for a probable cryonics case.

Through medical imaging on October 30, physicians determined the individual's brain damage was so extensive they declared him brain-dead. After the family decided to withdraw life support, SA performed field stabilization and attempted washout; however their success was limited due to the compromised blood flow of the brain. SA completed a neuroseparation before shipping the anatomical donation on dry ice to Alcor.

SA reports tremendous cooperation from the medical center that was caring for him. Hospital staff facilitated advanced preparations and they were able to transfer Mr. Ross directly from his hospital bed into the SA mobile operating room vehicle where the thoracic surgeon was waiting. This was the first case of open chest and heart cannulation and perfusion performed in the field and it was completed within about seven minutes of the patient arriving in the SA vehicle.

It is extremely unfortunate that the patient's brain perfusion was so compromised by his stroke. Despite the especially bad situation surrounding the cause of clinical death, manual readings indicate a drop of about 10°C in 30 minutes.

After washout and perfusion, neuroseparation was performed. Under the direction of a consulting cryobiologist, he was cooled slowly to near dry ice temperature using a special protocol and shipped to Alcor. As of Friday November 4, 2011, Mr. Ross was being slowly cooled to liquid nitrogen temperature.

2. Medical Background

The patient was a 69-year old Caucasian male, approximately 6 feet 2 inches, weighing about 190 pounds.

He was physically active and had no health issues prior to collapsing in his home the morning of October 28, 2011. He was conscious but incoherent when brought into the Emergency Room at Bay Front Hospital. His Glasgow Coma Score was 3. Once in the ER, he had a seizure.

At noon he had a CT scan and was diagnosed with a subarachnoid and intracerebral hemorrhage. It was described as an anterior communicating region aneurysm in the right A2 segment. From CT he was sent to interventional radiology where an endovascular coil was placed in the aneurysm to stop the bleeding. He was placed on a ventilator.

Later in the evening, his ICU nurses noted that he was able to respond to family by squeezing their hands with his. He also had a gag reflex and a cough. He remained on a ventilator and was medicated to maintain blood pressure within "normal" range. His official prognosis was "poor."

Alcor was notified of his condition and alerted SA. Alcor's Medical Response Director, Aaron Drake, and SA's Chief Operating Officer, Catherine Baldwin, teleconferenced with the patient's night shift ICU nurse and learned that the patient was still showing some signs of brain activity and was scheduled for a brain scan the following day. Alcor's Deployment Committee agreed that a full SA team should deploy to St. Petersburg as soon as possible.

Severe weather delayed deployment into St. Petersburg that night but the team began traveling at 4am when the weather dissipated. SA deployed a surgeon, a perfusionist, two staff EMTs, and two additional staff along with the Florida-based mobile operating vehicle.

3. Standby

Saturday morning, October 29, Alcor began communicating with Bay Front Hospital administrators over the phone to try to secure their assistance in the event the patient died before SA's team arrived. Unfortunately, the hospital's nursing director and vice-president recommended that the patient be transferred to another facility because they were "unprepared" to deal with a cryopreservation patient. The administrators agreed to postpone any decisions until SA's Team Leader arrived at the hospital to speak to them directly.

SA's Team Leader arrived about an hour and a half later and arranged to meet with the administrators. The administrators explained their protocols for handling pronouncement of brain death and release of a body or organ donor. After explaining the paperwork, protocol and typical sequence of events to transition a cryopreservation patient from ICU care into SA's care, the hospital agreed to do everything possible to support the SA team and the patient's wishes. Arrangements were made to provide the administrators and ICU staff with tours of the SA mobile operating room and introductions to SA's team.

The nursing director informed SA's Team Leader that the patient's pupils were fixed at 5mm. He was now unresponsive to stimuli and verbal commands but had some spontaneous movement in his hands and feet. His neurologist's PA took this as a sign of some brain activity and had cancelled the brain scan that had been scheduled for that afternoon.

SA's Team Leader conferred with Alcor's Chief Medical Advisor, Dr. Steve Harris, along with SA's medical advisors who recommended that every attempt be made to get a brain scan to confirm brain blood flow (or its absence) to determine the extent of ischemia and the patient's viability.

The Team Leader met with the family to explain the significance of the brain scan as well as the expected sequence of events should the patient be declared brain dead.

The family requested that the patient's neurologist reschedule brain blood flow scan for Sunday.

After a local funeral director was enlisted to provide filing of the death certificate and an immediate transit permit at whatever hour it was required, the SA team was divided into 12-hour shifts between the hospital and a nearby hotel. The mobile operating vehicle was parked at the hospital's rear dock with the overnight team.

On Sunday, October 30, the patient remained unresponsive with the same spontaneous movement in his hands and feet. At 11am, his doctor removed him from the ventilator to see if he was able to breathe on his own. He did not breathe and was returned to the ventilator. He was then taken for the scheduled brain scan.

Around noon, the nursing director informed SA and the family that the brain scan was negative for blood flow and that the patient would be pronounced brain dead according to the hospital's criteria. They would follow the family's instructions for removing the ventilator and medications. The family requested time to gather members and friends and make their decision on when/if to withdraw support.

About 1pm discussions began among SA's and Alcor's scientific and medical advisors for the best approach to caring for the cryopreservation patient with little or no brain perfusion. Based on the discussions and recommendations, and the staff and equipment on hand, the decision was made to attempt to provide some initial cooling by performing a thoracotomy, cannulating and then perfusing cold organ preservation solution through the aorta and vena cava. A burr hole in the top of the skull would be made to relieve some pressure and allow direct observation of any swelling. Perfusion would be followed by neuroseparation and cooling in an insulated container large enough to provide a dry ice atmosphere. Shipping to Alcor would occur after the patient had stabilized at dry ice temperature. The body would be cremated according to the wishes of the family.

At 5pm, the family was still expecting the arrival of additional friends, the physician had not yet signed the death certificate and there was no dry ice available anywhere in St. Petersburg. An SA team member drove to a dry ice warehouse an hour away in Tampa where an off-duty foreman was persuaded to come in and provide a truckload in coolers.

At 7pm, the physician signed the death certificate and ICU staff began disconnecting monitors and preparing to move the patient downstairs to the SA mobile operating vehicle.

The intravenous infuser and IV remained in place and a respiratory therapist was called to the floor to disconnect the ventilator and provide manual ventilations while the patient was wheeled to the vehicle. SA's surgeon and assistant scrubbed in inside the vehicle and waited with the perfusionist for the rest of the team and the arrival of the patient.

4. Stabilization

At 7:25pm at the entrance to the SA vehicle, the ICU staff and respiratory therapist disconnected the IV infuser and helped to transfer the patient into the waiting ice bath. While wheeling the patient into the vehicle, SA team members pushed and flushed 200mg of propofol, 250,000 units of streptase and 100,000 units of heparin into the existing IV line.

Once inside the vehicle, the surgeon and assistant prepped and draped the patient's chest. An incision was made along the midline before a battery-powered Stryker sternal saw was applied to the sternum.

The nasopharyngeal probe and rectal occluder were inserted. The patient's temperature was 36.5°C. The nasopharyngeal probe stopped reading at some point during the procedure.

At 7:37pm the chest spreader was opened and the surgeon began cannulation of the aorta and vena cava. The patient's heart continued to beat on its own.

At 7:42pm the surgeon connected the patient to the perfusion circuit and washout began. The perfusionist maintained pressures between 300-350mmHg and flow rates around 3.5Lpm.

The patient's head was shaved and prepped and a burr hole approximately 8mm in diameter was placed near the top of the patient's head. A small temperature probe was positioned inside the burr hole to just touch the brain surface. The initial reading was 37.5°C.

After about 10 minutes the circuit was closed for recirculation for another 35 minutes.

At 8:24pm some brain extrusion through the dura could be seen through the burr hole and perfusion was stopped. Arterial temperature was 4.0°C. Venous temperature was 11.0°C. Brain surface temperature read 27.8°C.

For dry ice atmosphere cooling, a 71L insulated cooler was lined and filled with dry ice blocks. In the center of the cooler, a five-sided (open-topped) box was created using 10" squares of half inch insulated foam board (polyisocyanurate).

The surgeon extubated the patient and cleaned the neck. Neuroseparation was performed using rough dissection followed by a bone saw, and an osteotome and mallet between c5 and c6. The patient was quickly inverted and double bagged. Remaining inverted, the patient was placed inside the walls of the foam board box within the dry ice cooler, with only the top of the head actually touching the foam board on the bottom. About two inches of space remained around the head on four sides and four inches of space remained between the patient and the cooler top.

Nasopharyngeal temperature and brain surface temperatures remained within a degree or two of each other. Once the DuaLogR memory filled, readings were taken manually. After reaching 0°C, nasopharyngeal temperature dropped about 3°C per hour before slowing to 1-2°C per hour from -55°C down to -75°C over the next 48 hours. Dry ice was replenished periodically.

5. Transport

About 9pm, the patient's body was transported to the funeral home. The dry ice cooler with the patient was transferred to the hotel to the Team Leader's room.

The family asked that the SA Team Leader witness the cremation of the patient's body. Florida law requires a 48-hour waiting period between pronouncement and cremation.

On Monday morning, October 31, the SA team departed and the Team Leader remained with the patient in St. Petersburg.

On Tuesday, November 1, the SA Team Leader witnessed the cremation of the patient's body, retrieved the cremains and the death certificates several hours later and delivered them to the patient's family.

On Wednesday, November 3, the patient was transported to the Miami International Airport and shipped on dry ice on a direct flight from Miami to Phoenix.

6. Procedure Timeline (all times are approximate Eastern Daylight)

Sunday, October 30th, 2011:

12:00 Patient declared brain dead
 19:00 Family ready, team ready, physician signs death certificate
 19:25 ICU staff withdraw ventilations and medications
 19:25 Patient into SA vehicle
 19:25 200mg propofol in IV
 19:26 250,000 units streptase in IV
 19:26 100,000 units heparin in IV
 19:28 Prep and drape chest
 19:30 Initial chest incision
 19:32 Nasopharyngeal probe in, rectal occluder in
 19:37 Begin cannulation
 19:40 Heart stops
 19:42 On bypass for washout
 19:45 Nasopharyngeal 36.5°C, rectal 37.5°C
 19:56 Recirculation
 20:02 Burr hole, brain surface probe 37.5°C

20:24 Brain extrusion, perfusion stopped
20:24 Brain surface temperature 27.8°C
20:44 Neuroseparation
20:45 Patient in dry ice cooler

Wednesday, November 3rd, 2011:

Patient transported from Miami International Airport to Phoenix Sky Harbor Airport
Begin cool down to LN2 temperature

November 9th, 2011:

End cool down

December 1st, 2011:

CT scan performed of A-1088 cephalon

December 7th, 2011:

Transfer A-1088 to neurocan for long term storage

7. Issues and Actions

Issue: Multiple temperature probes failed, including backups.

Action: Investigate ruggedized probes; carry multiple backups (multiple probes added to kits November 2011).

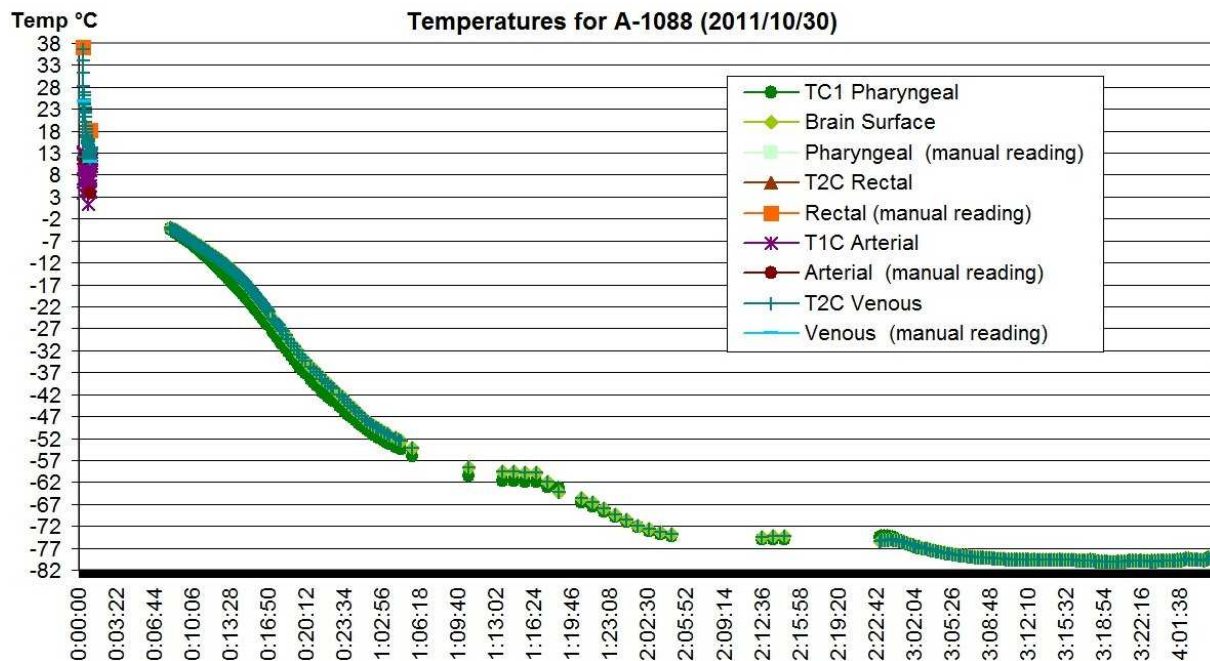
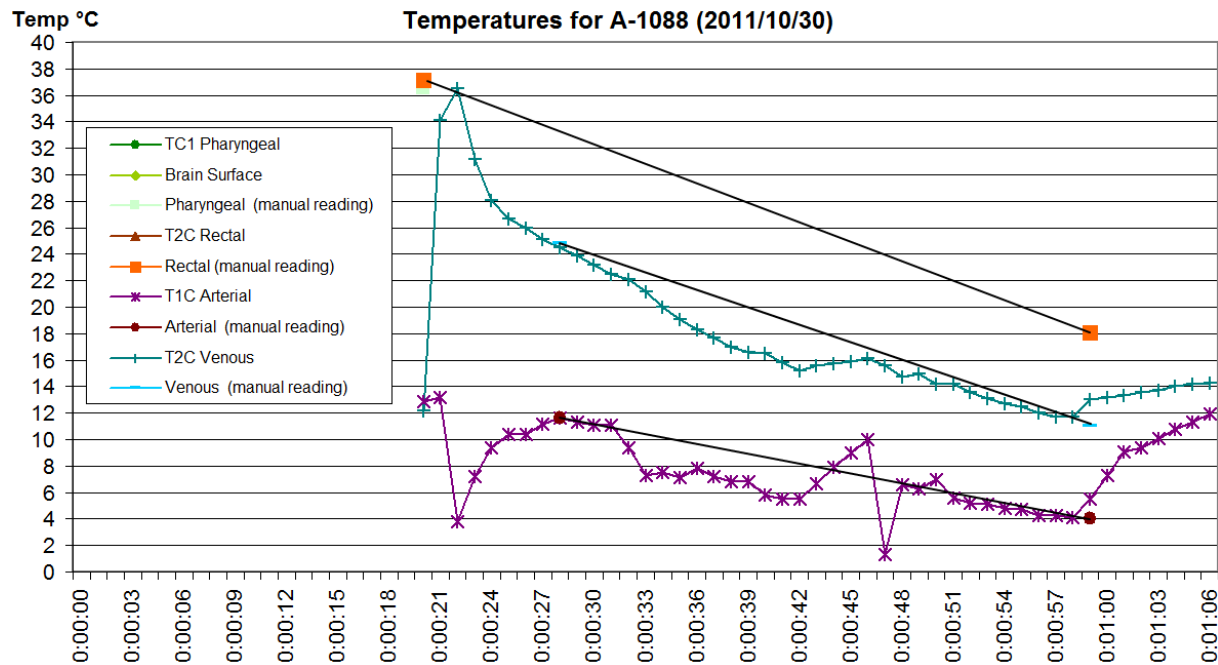
Issue: No Vital-Oxy or other meds added to circuit during recirculation.

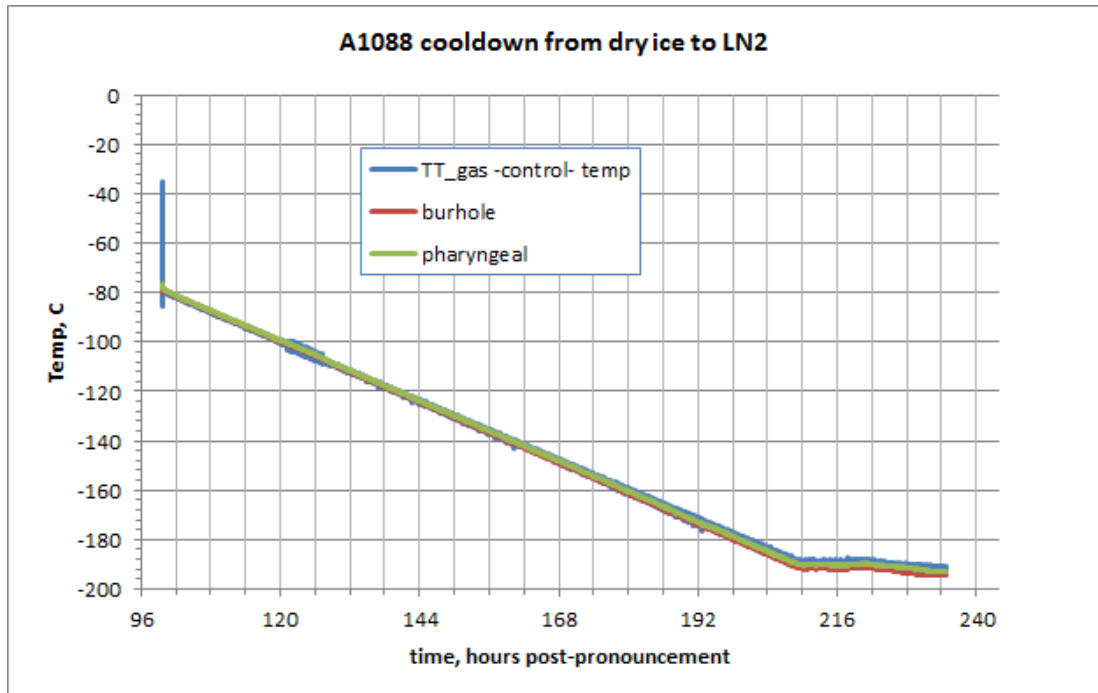
Action: Consider new medications protocol during recirculation perfusion for cases where immediate thoracotomy is an option.

Issue: DuaLogR memory full overnight, data lost and manual readings required.

Action: Investigate new logging device options (new loggers and backups added to kits January 2012).

8. Graphs





9. Post Cryopreservation CT Scan

CT SCAN of A-1088

Color Lookup Table (CLUT) created by scanning various chemicals used in M22x1.25 cryopreservative.

Note: This patient was not perfused with cryoprotectants.

Dec 02, 2011

-End of report-