Alcor Case 074

Case Report

Prepared by:

Linda Chamberlain, Co-Founder and
Director of Special Projects,
Alcor Life Extension Foundation

Table of Contents

1. Summary

Information was derived from multiple sources and was all converted to Mountain Standard Time (MST). For de-identification, dates are not shown. T-0 represents the date of pronouncement of legal death, T-X represents occurrences before T-0, and T+X represents occurrences following T-0.

Alcor Patient 074 was a member with whole-body cryopreservation arrangements. The member was pronounced legally deceased at 05:42 hrs on T-0 days in 2005.

The patient was transported by air ambulance to Alcor for cryoprotectant perfusion. Cryogenic cooldown was initiated at 06:26 hrs on T+1 days and terminated on T+13 days at 14:21 hrs. The patient was transferred to long-term maintenance on T+21 days at 13:40 hrs.

2. Patient Assessment and Deployment

This report was drafted in 2020, but the case took place in 2005; some details are no longer available.

T-0 days

Alcor received notification that the member had had a stroke-like incident and had been taken to a hospital. Alcor's Transport Coordinator (TC) and several standby, stabilization, and transport (SST) team members were on another case. Alcor patient 075 was pronounced legally deceased at 05:42 hrs. Alcor faxed the Emergency Instructions to the hospital. The hospital initially agreed to follow those instructions for medications and cooling but then reversed their decision to cooperate.

3. Transport

Attempts were made to find a private jet for patient transport, but it was found that they would not transport human remains. Alcor staff finally located an air ambulance that would transport the patient. The funeral director near the patient and the Arizona funeral director were placed in contact with each other to coordinate patient transport.

Alcor's Arizona funeral director was working on getting the death certificate filled out and signed. He advised Alcor that he could not locate a Ziegler case in that area to be used for shipping the patient and obtaining ice and flight arrangements were also problematic. Alcor suggested a casket be used. The patient was placed in a cooler (temperature not recorded) overnight to be shipped to Alcor the following day.

4. Cryoprotectant Perfusion Surgery

T-0 days

The patient arrived at Alcor at 22:26 hrs. The operating room (OR) and perfusion circuit had been set up in advance and were ready to receive the patient. When the Ziegler case was opened, it was found that the hospital had placed ice around the patient's neck and axillary areas. It was noted that the patient was very thin. The patient was moved to the whole-body enclosure. More ice was placed around the patient's neck. Rigor was noted along with blood on the back side of the patient.

The patient's neck was prepped for surgery with Betadine, and a temperature thermocouple was placed in his nare at 22:41 hrs. The first incision was made on the left side of the patient's neck at 22:42 hrs. The temperature thermocouple was connected to the data acquisition system. The initial nasopharyngeal temperature (NPT) was 8.6°C. The left jugular vein was isolated and identified at 22:54 hrs; it was very small.

At 23:09 hrs 250,000 IU of streptokinase and 5 mL of sodium chloride were added to the washout perfusate. The left jugular vein was cannulated with an 18 French (Fr) cannula at 23:10 hrs. A red Robinson cannula was prepared for cannulating the carotid artery. The jugular vein was incised, and the cannula was placed in the carotid artery at 23:20 hrs. A leak was apparent, and the arterial pressure was turned down at 23:30 hrs to identify and correct the leak. The leak was in the carotid cannula. There was no effluent flow from the left jugular vein.

An incision was made on the right of the neck to locate the right jugular vein. The NPT was 9.7°C. Initially, the effluent flow had very little blood, mostly just perfusate but at 23:41 hrs blood began to become apparent. Perhaps a blood clot had obscured the flow of blood but had been cleared. There had been a considerable volume of B1 perfusate lost. As a result, the cryoprotectant ramp was initiated temporarily to compensate for the loss. The ramp was stopped and a second bladder of B1 perfusate was added to the circuit. The right carotid artery was cannulated at 23:50 hrs with a 20 Fr cannula. The cannula was too small and was replaced with a 24 Fr cannula and ligated.

5. Cryoprotectant Perfusion

T+1 days

An arterial sample was pulled from the left carotid cannula at 00:02 hrs. The NPT was 9.8°C. At 00:14 hrs the cryoprotectant ramp was slowly initiated. The volume of the venous effluent flow was low, and there were many blood clots, both small and large. The concentration of the M22 perfusate was 15%. The arterial refractive index (RI) was 22.0 Brix and the venous RI was 10.2 Brix. Many blood clots were being seen in the effluent. The arterial pressure was 85 mmHg.

The patient's head was shaved at 00:25 hrs in preparation for the burr holes, and the scalp was cleaned with Betadine. Incisions were made in the scalp for burr holes at 00:29 hrs. The right burr hole was drilled at 00:34 hrs and the left burr hole was drilled at 00:42 hrs. The procedure was finished, and the burr holes were being cleaned at 00:44 hrs. RI samples were taken at 00:46 hrs; the arterial RI was 11 Brix and the venous was 12.2 Brix.

The cryoprotectant ramp was initiated at 00:47 hrs with 1.9 L in the mixing reservoir. Arterial pressure was 90 mmHg. An orange crackphone probe was placed in the left burr hole at 00:51 hrs. Both sides of the brain were edematous at the burr holes. A blue crackphone probe was placed in the right burr hole and a temperature probe was attached to it. At some point after that, the brain began retracting.

The flow of venous effluent was very slow. The brain retraction was estimated to be 0.5 cm at 01:08 hrs. The arterial RI was 32 Brix at 01:14 hrs and the venous RI was 26 Brix. At 01:20 hrs the brain edema was notably reduced, and the left iris was cloudy. At 01:25 hrs the whole-body enclosure was closed, and external cooling with gaseous nitrogen was initiated. At 01:35 hrs the cryoprotectant ramp was paused at 50% concentration necessary for vitrification (CNV). The enclosure temperature was reduced to -3°C. The arterial RI was 38 Brix and the venous RI was 29 Brix.

The ramp was started at high speed at 01:49 hrs. There was splashing in the mixing reservoir from the stir bar. The arterial RI was 42 Brix and the venous RI was 30 Brix at 02:00 hrs. At 03:33 hrs the arterial RI was 52.8 Brix and the venous RI was 42.8 Brix. The arterial pressure was 102 mmHg.

The cryoprotectant ramp was terminated at 05:55 hrs with arterial RI at 57.55 Brix and venous RI at 50.4 Brix. The whole-body enclosure was opened, and all equipment and instruments were removed from the patient in preparation for moving into the patient care bay for cryogenic cooldown. The patient's corneas were concave as a result of the dehydration from the cryoprotectant.

6. Cooling to Liquid Nitrogen Temperature

This case took place before the computerized cooldown system was implemented. This was the vapor cooling protocol that replaced the use of a silicone oil bath. Cryogenic cooldown was initiated at 06:26 hrs on T+1 days. An uneventful cooldown terminated on T+13 days at 14:21 hrs. The patient was transferred to long-term maintenance on T+21 days at 13:40 hrs.

The cooldown was paused at -110°C so that a neuro cryopreservation case that had just then started could be dealt with using the same personnel. There are no further details about the cooldown.

7. Timeline and Time Summaries

Timeline

T-0 days

05:42 Pronouncement of legal death

T+1 days

22:26 Arrival of patient at Alcor
22:42 Start of surgery (cannulation)
22:45 NPT probes attached to data acquisition system (initial NPT = 8.6°C)

T+2 days

00:34 Start of burr hole surgery
00:44 Completion of burr hole surgery
00:47 Start of cryoprotection
01:35 Pause at 50% of concentration necessary for vitrification (CNV) achieved
01:49 Start of sub-zero terminal concentration ramp (off pause)
05:55 Termination of cryoprotection (final BRIX readings: arterial = 57.55, venous = 50.4)
06:26 Start of cryogenic cooldown

T+13 days

14:21 Completion of cryogenic cooldown at LN_2 temperature

T+21 days

13:40 Transfer of patient to long-term maintenance at LN_2 temperature

Time Summaries

Stabilization

hrs: mins

40:44 From pronouncement of legal death to patient arrival at Alcor: 05:42 hrs on T-0 days to 22:26 hrs on T+1 days

Cryoprotectant Surgery

hrs: mins

00:16 From arrival at Alcor to the start of surgery: 22:26 hrs to 22:42 hrs
02:05 From the start of surgery to the start of the cryoprotection: 22:42 hrs on T+1 days to 00:47 hrs on T+2 days
07:13 From the start of surgery to the end of the cryoprotection: 22:42 hrs on T+1 days to 05:55 hrs on T+2 days

Cryoprotectant Perfusion

hrs: mins

43:05 From pronouncement of legal death to start of cryoprotection: 05:42 hrs on T-0 days to 00:47 hrs on T+2 days
02:21 From arrival at Alcor to the start of cryoprotection: 22:26 hrs on T+1 days to 00:47 hrs on T+2 days
05:08 From start to the end of cryoprotection: 00:47 hrs to 05:55 hrs
00:31 From the end of cryoprotection to the start of cooldown: 05:55 hrs to 06:26 hrs
48:44 From pronouncement of legal death to start of cooldown: 05:42 hrs on T-0 days to 06:26 hrs on T+2 days
08:00 From arrival at Alcor to the start of cooldown: 22:26 hrs on T+1 days to 06:26 hrs on T+2 days

8. Graphs

No graphs were prepared for this case.