

Alcor A-1879

Case Report



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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.

A-1879 was a 68-year-old male with neuro cryopreservation arrangements. The member appeared to have had a hemorrhagic stroke and was transported by medical helicopter to the nearest stroke center. The patient was pronounced legally deceased in Arizona at 19:18 hrs on T-0 days in October of 2017 and was packed in ice for transport to Alcor.

The patient arrived at Alcor at 22:05 hrs. Cryogenic cooldown to liquid nitrogen temperature was initiated that same day at 23:23 hrs and was terminated on T+8 days at 11:54 hrs. The patient was transferred to long term maintenance at liquid nitrogen temperature on T+108 days.

2. Deployment and Patient Assessment

T-0 days

The member's wife notified Alcor at 09:59 hrs that her husband was showing the symptoms of a stroke and was being transported by air to a stroke center for evaluation. Alcor's Chief Medical Advisor (CMA) had been given information about the member's condition and did not feel a standby was yet justified, but standby personnel were put on alert in case the situation were to change. Alcor's Scottsdale funeral home was alerted to the situation as well.

Contact was made with the member's wife at 10:20 hrs; she stated that the member appeared to have the stroke at 08:30 hrs, was unable to speak or to move his right hand and suffered from right-sided facial droop. The patient was being transported to the closest stroke center. Alcor's Medical Response Director (MRD) updated Alcor's Chief Executive Officer (CEO) and Alcor's CMA with an update on the case at 10:30 hrs. It was decided that no standby would be needed until additional information was obtained.

At 10:55 hrs the member's wife informed Alcor that her husband was being transferred to a different stroke center by medical helicopter. One of Alcor's strategic partners for standby, stabilization and transport (SST) was asked to be on call in case he was needed to be deployed.

Alcor's MRD drove to the hospital to which the member had been flown and contacted the attending physician in the emergency department (ED) at 12:25 hrs. The member had suffered a hemorrhagic stroke. A CT scan showed that the brain stem was herniating. No sedation drugs were used while the patient was intubated.

Between 13:00 hrs and 16:24 hrs, the MRD left the hospital to obtain the equipment needed to transport the patient back to Alcor. He picked up a Ziegler case, updated various team members, obtained a vehicle to transport the patient to Alcor, purchased coolers for ice storage, purchased a roll of R-30 insulation for the Ziegler case, and purchased 25 five-pound bags of ice. 21 bags of ice fit into the coolers and 4 bags were placed into the Ziegler case to cool the inside of the sealed case.

At 13:19 hrs the member was removed from life support. Based on the inability to perfuse the brain due to the hemorrhagic stroke, the associated warm ischemia that had already occurred, and the chance that added perfusion pressure would cause more damage inside the patient's brain, the decision was made to not perform any cryoprotective perfusion once the patient was at Alcor but to perform the cryopreservation without cryoprotection (straight freeze) protocol.

At 15:41 hrs the MRD called and spoke with the house supervisor at the hospital and learned that the member had been breathing on his own since he was extubated, his vital signs were down (the notes do not give specifics) and that the MRD would be called when the member was pronounced legally deceased. At 16:24 hrs the MRD arrived back at the hospital from obtaining supplies. The patient's vital signs had changed significantly. At 18:57 hrs as his heart rate had decreased, rhythm changes had occurred, blood pressure had spiked, and oxygen levels had dropped (specific details were not recorded).

3. Transport

The member was pronounced legally deceased at 19:18 hrs (per the death certificate). Ice was placed around the patient's head and neck. The patient was placed into a body bag and more ice was added; the patient was then moved to the rented transport vehicle.

An additional 35 pounds of ice was added around the patient's body to ensure the ice would not melt before the first stop on the route. The MRD and the patient left the hospital at 20:11 hrs to head back to Alcor. A stop was made at 20:36 hrs to check the ice; five pounds of ice were added. Another stop was made at 21:33 hrs and an additional five pounds of ice were added.

At 22:05 hrs the patient arrived at Alcor fully covered with ice. Surgery for the cephalic isolation was estimated to begin at 19:45 hrs (time not recorded) and it was completed at 23:17 hrs.

4. Cooling to Liquid Nitrogen Temperature

At 23:23 hrs the appropriate cooldown program was started which held the temperature at -20°C to completely solidify the tissue and then descended at -1°C/hr to liquid nitrogen (LN_2) temperature. A thermocouple had been placed down the patient's pharynx.

T+1 days

The cooldown system triggered an alarm due to a stuck solenoid valve at 10:48 hrs. Normal function was restored (time of restoration not recorded).

T+3 days

At approximately 15:20 hrs the valve that had stuck earlier showed signs of beginning to leak (see the running temperature plot of the cooldown program), and the valve set was replaced.

T+8 days

At 11:54 hrs the cryogenic cooldown was terminated at liquid nitrogen temperature.

T+108 days

The patient was transferred to long-term maintenance at liquid nitrogen temperature.

5. Timeline and Time Summaries

Timeline

T-0 days

- 19:18 Legal death pronounced
- 20:11 Transport from the hospital to Alcor
- 22:05 Arrival of the patient at Alcor
- 23:17 Cephalic isolation was completed (time when initiated not recorded)
- 23:23 Start of patient cryogenic cooldown

T+1 days

- 10:48 The cooldown system triggered an alarm due to a stuck solenoid valve

T+3 days

- 15:20 (est) Replaced solenoid valve

T+8 days

- 11:54 The cooldown was terminated

T+108 days

The patient was transferred to long-term maintenance at liquid nitrogen temperature.

Time Summaries

hrs: mins

02:47 From pronouncement to patient arrival at Alcor: 19:18 hrs to 22:05 hrs

01:18 From arrival at Alcor to the start of cooldown: 22:05 hrs to 23:23 hrs

04:05 From pronouncement to start of cooldown: 19:18 hrs to 23:23 hrs

6. Discussion

The member suffered a hemorrhagic stroke. A CT scan showed that the brain stem was herniating. No sedation drugs were used while the patient was intubated. The case notes say that the member's physician stated that the member's brain was receiving no significant blood flow and he was "brain dead" with no chance of recovery from the injury. With consent from the member's wife, the member was extubated at 12:50 hrs to allow legal death to occur. It should be noted that if the physician used the term "brain death" in reference to this patient, he/she could not have meant that the patient was formally brain dead but something more like "on an irreversible course toward brain death, in his/her opinion." The physician was presumably saying that further ventilator care was not in the interest of this patient or their family.

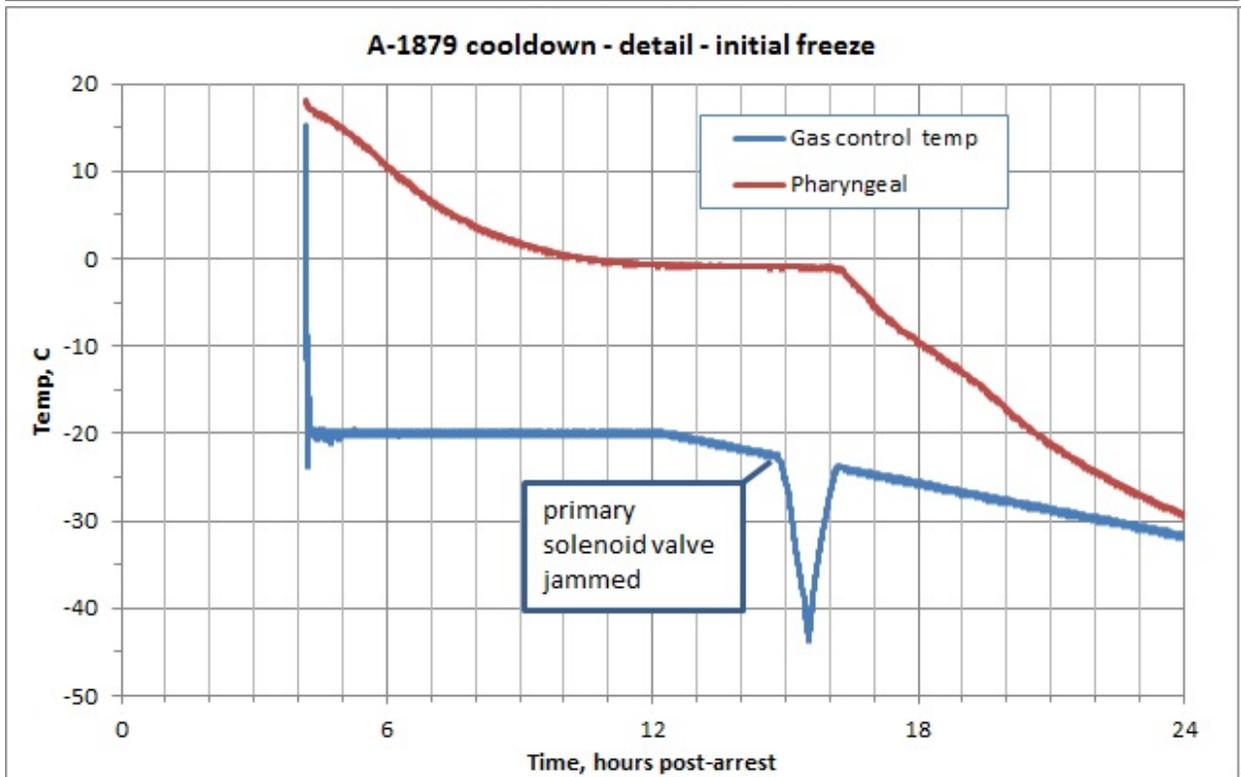
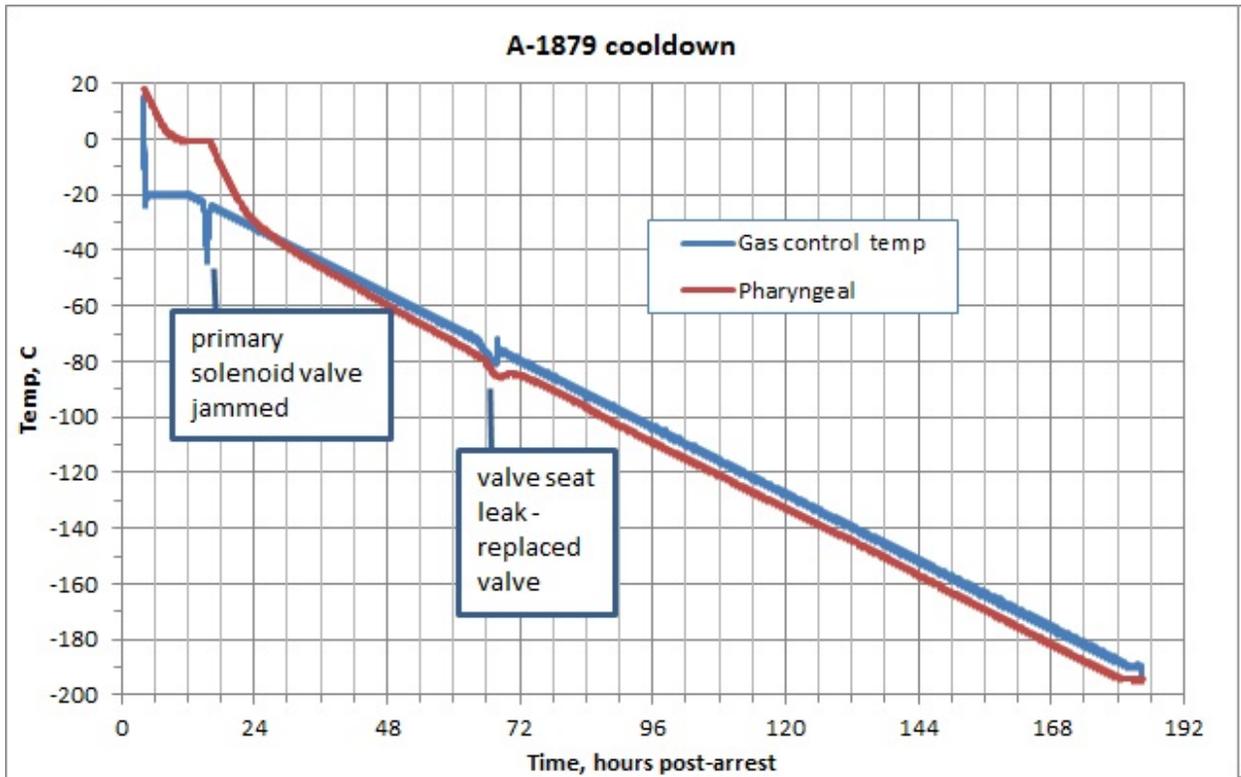
After being updated, Alcor's CMA counseled that no stabilization protocol would be appropriate due to the hemorrhaging and that other stabilization drugs were not needed due to concerns about bleeding. He suggested that the member be extubated to allow for the occurrence of legal death by cardiopulmonary criteria. With consent from the member's wife, the member was extubated at 12:50 hrs to allow legal death to occur.

The MRD, the CMA and Alcor staff discussed the advisability of cryoprotective perfusion due to the hemorrhaging in the brain, as this could cause more damage and could make the outcome worse for the patient. The decision was made to not perform any cryoprotective perfusion once the patient was at Alcor but to perform a straight freeze protocol. This decision was based on the inability to perfuse the brain due to the hemorrhagic stroke, the associated warm ischemia that had already occurred, and the chance that added perfusion pressure would cause more damage inside the patient's brain.

It was decided to transport the patient to Alcor with water ice because there were concerns about the availability of dry ice at that time of the night. It was also decided that the cephalic isolation should wait until the patient arrived at Alcor for training experience for Alcor personnel. The reason for making two stops for ice was the concern about the limited space for ice around the patient's head, which was restricted by the wadded body bag inside the Ziegler case. There was sufficient ice, but the MRD wanted to be sure cooling continued as efficiently as possible during the drive to Alcor.

Alcor patients that present with a hemorrhagic stroke present a different set of challenges than those diagnosed with an ischemic stroke. For future reference, it would be informative for Alcor to have a general framework how to deal with stroke cases with objective criteria for electing to do cryoprotection or not.

7. Graphs



Note: As this was a straight freeze protocol, no CT scans were obtained.