The 2021 European Cave Rescue Association Conference

In early November, four NSS cavers traveled to northern Spain to attend the annual European Cave Rescue Association (ECRA) conference. The conference brings together cavers from across Europe and the world to share techniques and prepare for the next large cave rescue. This year's conference focused on insurance issues, such as when cavers support rescues in other countries. It also had sessions on medical issues, turning big rocks into smaller ones, small party assisted rescue, and cave diving.

ECRA was founded several decades ago as Europeans started to push into cave systems reaching one kilometer deep. The founders realized that any major rescue would quickly exhaust the available manpower in any single country, requiring countries to work together. This was made very evident by a rescue in England the week before this year's conference. It required the work of over two hundred people to get one person out of the cave. There are of course the eight hundred that were needed in Germany a few years back, and the reported ten thousand for the 2018 Thailand rescue. This year Russia joined ECRA, bringing the number of participating countries and organizations to over thirty.

This year's two-day conference took place in Ramales de la Victoria, Spain. Ramales is a beautiful town surrounded by mountains and a twenty-minute drive from the coast. Altamira cave, famous for its cave paintings from many thousand years ago, is nearby. The American contingent arrived several days early to get over the jet lag and go on pre-conference caving trips. This included a trip to the vertical Coventosa cave, with over twenty miles of passages and a river leading to a nearby spring. We tried to get in a pre-conference cave dive but the local Spanish organizer was drawn away by family problems.

Diving Commission – The First Day

On the first day of the conference, the diving commission members met to discuss common problems and issues of contention. This included topics such as swimming patients face up vs down, backboards and litters, full face masks (FFMs), issues affecting response speed, search, communications, and relationships with non-caving rescue teams.

The group discussed the likelihood of various types of incidents they would be called upon to respond to. It was agreed that things like searching for a missing diver and doing a body recovery were far more likely than having to do an actual rescue. For rescues, the most likely ones would be for sump divers who ran into trouble in dry passage. Since they had to be experienced divers to get to where they had gotten, the "rescue" would likely involve just repairing some piece of essential kit they could no longer use.

For the problem of search, the Italians have recently developed a system for marking lines in maze caves. The system is based around large white wooden markers that are attached to the line and float above it. When a search team starts a new section of line, they mark it with a triangle. If they leave the cave before completing the line, they mark their progress with a rectangle. Once a line has been completed, any rectangle is removed and the triangle is replaced with a circle.

For the topic of face up vs face down, the consensus seemed to be that face down travel for patients should be the norm. Face up gives better access to the patient, and currently the best photos are face up, but face down is much more comfortable for the patient. That said, for very short sumps, face up travel may make the most sense. This is because the patient will already be face up when traveling through dry cave. It may be faster to just swim with them face up through short sumps than to take the time to flip them over at both the start and end of the sump. For teams that move their patients face up, they make sure to have the patient's head raised for comfort. This may mean traveling feet first down slopes and then rotating the patient to travel head first when traveling up slopes. It was noted that it is easier to dump gas from a patient's drysuit when they are facing up.

On the topic of backboards and litters, the consensus seemed to be that the least equipment possible should be used. Litters complicate movement through small passages as well as getting buoyancy right. Patients with only hurt extremities such as legs and wrists do not need a litter. For patients that do need some form of additional spine support, a KEDD or OSS backboard is preferred. If the patient is being moved through dry cave on a litter, then it may make sense to move them into the water on the litter, take them off it to swim with them, then move them back onto a litter to remove them from the water. If the patient does need to use some form of litter to be moved through the water, only needs back support, and all you have is a full-length litter, then the litter should be cut down to a smaller size.

For long distance underwater travel, international consensus is rapidly converging on using something like an OmniSwivel gas block to manage the multiple stage and decompression swaps. Cylinders are attached with QC6 or QC8 connectors. One cylinder is left attached to the gas block for the entire dive and is used to provide breathing gas while other cylinders are swapped in and out. Frequently there is a method to give gas to the patient if the gas block or FFM fails, but some feel this is adding complication. The Italians are the most organized in this realm, and have standardized gasses and stage tank distances for deep and long rescues.

Consensus about FFMs seems to be that they are unlikely to be needed, but that rescuers should be practiced in their use. FFMs have big differences between versions. Rescuers must have experience using them themselves. They must know how to inspect and repair the FFM before trying to use it with a patient. Kirby Morgan FFMs behave poorly when used face up, and if the mask is underwater but not on someone, then they should be hooked up to a pressurized gas source to prevent water from entering their valves. Consensus is that over-pressure masks should be used to minimize the amount of water that leaks into a FFM while being worn.

FFMs are not the only solution when a person's face is too damaged to use a regulator. A special hose can be inserted into person's nose and run down into their throat or lungs. A breathing gas source can then be attached to this hose. The process of inserting the hose is very unpleasant for the person receiving it, and some believed that they would need to be sedated. Obviously, this is one of many worst-case scenarios and fraught with complications.

A lot of time was spent discussing how to speed up the response time to patients. Getting to the patient requires rescue authorities to ask for and accept the support of divers, time spent getting equipment to the dive site, and time spent swimming to the patient with initial treatment.

One of attendees was Chris Jewell, who was involved in the 2018 Thailand rescue. Chris was asked if they had to do it again, what would they do differently. Most interestingly, he said that

they wouldn't have the divers arrive at the site wearing t-shirts and shorts. This made it very difficult for the government officials to accept their advice. He said the U.S. military presence at the rescue served as a critical go-between for the groups, lending legitimacy to the divers. Whenever there is a cave accident, rescue leadership will first use the personnel and resources they are familiar with. Unless we have pre-established relationships, it will take them a long time to ask for support from trained but volunteer cave rescuers. There are some ways that this process can be assisted. Presenting a professional appearance is very important. Wearing official-looking clothing, presenting identification, and using paperwork with professional-looking logos helps rescue leaders to believe that it is OK to use your help. If they believe that they are turning things over to a professional agency or organization, then they will be less concerned about getting in trouble later if something goes wrong.

Getting equipment to the dive site involves getting equipment to the cave, and then it into the cave. It is important to the have the Material Data Sheet (MDS) paperwork for all the chemicals (e.g. sofnolime, trimix) and breathing gasses to be used. This shows the people moving the equipment if items are toxic and/or need special handling. For air movement it is especially important to have documents showing the weight of each item. Gathering these forms and calculating these weights ahead of time will save significant time.

The group discussed whether to use rebreathers or open circuit in responses. For dives that do not require rebreathers, they still may be faster due to not needing to transport as many cylinders through the cave. It is believed that if heavy work is to be done, such as moving a patient or doing underwater digging, then open circuit should be used. This will reduce CO_2 problems. For major incidents, porters will become available to move cylinders.

The group discussed what equipment should be brought by the first divers. The patient(s) will almost certainly be suffering from some amount of hypothermia. Divers must bring food, heat sources, and space blankets. Other first aid equipment does not need to come on the first trip. If the patient were suffering from any other life-threatening condition, then they would already be dead. Divers should also bring equipment to help the patient solve simple problems like a broken guideline, stuck zipper, dead light, cut bungee, etc. Having a dry tube to put this rescue equipment into will help a lot. For follow-on dives, divers must have their harness and BCD configured so that they can move heavy equipment like lead weights or large cylinders for the patients.

Another interesting aspect of swimming patients discussed was the number of swimmers to use. There are well known photos of practice rescue sessions with three or more swimmers for the patient while in big cave. The group agreed that two swimmers per patient was more realistic. Those who had practiced with patients on litters while in low visibility said that some form of communication between the divers can be managed by sharp pushes or tugs on the litter. It was also agreed that some form of leash should connect the patient to one of the swimmers.

Some time was also spent discussing communication through sumps. There are a limited number of doctors who can competently travel to the bottom of a kilometer-deep cave, then dive through several sumps, and then start medical care on patients. In Europe they have several pieces of technology for remote medical contact. This includes ground-penetrating radios for low-bandwidth text communication. They also have high quality cables that can be

strung to enable video conferencing between the doctors on the surface and patients and rescuers.

The Second Day

We had meant to do an exercise at a local cave but wound up spending all day at a swimming pool instead. This was almost certainly a good thing for several reasons. Two of us had arrived expecting to receive sidemount tanks fully rigged. There were tanks, but no hose clamps or clips. Chris Jewell had success rigging his tanks by tying scooby loops together and adding a pair of carabiners, while my attempt with zip ties went rather poorly. The closest local dive site, Cubera (not Krubera) sump, lacked parking, and getting to the water was hazardous. Lastly, given the challenges we ran into just moving someone across a swimming pool, doing our first operation together in a cave would have been dangerous.

We began the day at the pool with a presentation by local Spanish cave divers. They had a full-length litter. They had developed additional hardware for it so they could attach cylinders with cam bands. They also had a Kirby Morgan FFM and a gas block through which to route the breathing gas. The Polish representative to the session, Jarek Kur, works as a deep-sea diver and had a lot of experience with the Kirby Morgan. He discussed the many tradeoffs between the Kirby Morgan and the Interspiro Aga mask. Everyone then got a chance to try the Kirby Morgan out.

After lunch we returned to the pool for an in-water exercise. On this weekend Ramales was also hosting a major rally race. The route went right beside the outdoor pool. The pool had gone into winter mode, and was very green with less than one meter of visibility. These distractions added nicely to the challenge.

Our objective was to get our mock patient to the far side of the pool. The team strapped the patient into the litter and slid him into the water. We then put on the Kirby Morgan FFM and strapped one of the tanks to the litter. We flipped the litter over and strapped on the other tank. He remained very buoyant and so a lot of weights were haphazardly attached to the litter. One person regularly checked on the patient to make sure that he was breathing OK. With much effort our group of four divers then swam him across the pool, took the tanks off the litter, and got the patient out of the pool.

This exercise illustrated how difficult even a short and very simple patient swim can be. Fiddling with the cylinders kept our patient in the water for a long time with no forward progress. With the green water and large litter, most of the swimmers had no idea where the line was. It could have been worse. In the shallow pool we never had to deal with patient buoyancy or trim. Before something like this would be done for real, the swimmers would need to do a lot of rehearsing.

The Future

Next year's conference is expected to take place at the end of September in the Czech Republic. Because the ECRA members hadn't seen each other in two years, this past conference was about getting re-acquainted. The hope is that starting next year, the different commissions will begin to tackle issues of common interest. For example, the medical commission wants to understand more about treating decompression illness on the far side of a sump. The diving

commission is interested in classifying which injuries would require a FFM. By continuing to get a lot of smart people together, we can improve our chances to get our patients home.