



ACCIDENT MANAGEMENT STRATEGIES

Recovering An Unconscious Diver From Depth

Managing an unconscious diver while under water is a problematic scenario. It is clear that a range of nuances create some doubt about the perfect management. Furthermore, different scenarios likely result in additional complexity; it is impossible to craft a strategy that operates independently of these variables. Yet, it is nearly impossible to revive an unconscious diver while at depth, making it likely that an efficient ascent is the most successful strategy. Very calm and proficient rescuers may be able to manage multiple aspects of a rescue without compromising an efficient ascent. Yet, most rescuers should focus on a few important points, ensuring they do not sacrifice safety or efficiency. We would argue that three areas should be the rescuers primary focus; these include maintaining control, keeping an open airway and ensuring a smooth ascent. Failure to properly manage any of these areas is likely to result in a failed rescue.

Upon reaching an apparently unconscious diver the rescuer should evaluate the environment and the victim; this ensures that the diver is, in fact, unconscious and also provides an opportunity to evaluate any associated risks, including loss of visibility, lost direction, current, depth and equipment. After evaluating the victim and environment the rescuer should prepare the victim for ascent. It is preferred to manage the ascent using only the victim's buoyancy compensator; this reduces the number of variables to be considered. Both dry suit OPV valves should be identified, left open, and oriented to allow venting. The rescuers BC should be empty though in some cases the victim's BC might not contain sufficient lift; in this case some gas is left in the rescuers BC. Ideally the rescuer will "ride" the slightly positive victim slowly to the surface; the negative ballast of the rescuer acts to trap the victim, keeping the victim roughly horizontal. In some environments (i.e. cave or wreck) this horizontal position is very useful to facilitate an exit that is not vertical in nature. Of course, where direct ascents are needed this aspect is less important. Yet, it is usually easier to maneuver with a victim in the recommended horizontal position.

While managing the victim during ascent it is usually easier for the rescuer to use the right hand to keep the airway open. The regulator is left in place (if the regulator was originally found in the mouth then it is kept in this position - otherwise it is left out of the mouth). The right arm is often able to assist in stabilizing the victim; for example, this can be done by trapping the victims right tank valve in the crook of the arm. The rescuers left hand is also used for stability usually by grasping the victim's BC near the OPV; this hand is also used to adjust buoyancy (adding gas or dumping from the OPV/deflator). The particulars of this hand placement should be refined during training and adjusted based upon comfort/capacity. These details are less important than the primary objectives; these include maintaining control, keeping an open airway and ensuring a smooth ascent. Rescuers need to be cognizant of the big picture so they can adjust to small changes in equipment or stature (i.e. diver/rescuer size).



Positioning the diver as indicated allows the rescuer significant latitude in managing various scenarios (overhead, slow diagonal ascent etc). However, the most important factors remain the need to maintain control, keep an open airway and ensure a smooth ascent. If the rescuer is in doubt over a change to procedure the maintenance of these priorities always takes precedence. It is possible to rescue a victim with countless procedures that span the management of dozens of variables. Yet, one must remember that an unconscious diver has precious little time and failing to bring a victim to the surface will result in certain death. Given these options it is incumbent upon the rescuer to be as efficient as possible with the nuances of a rescue but to remain aware of the main priority; this is bringing the victim to the surface during a controlled ascent.

Ventilating An Unconscious Diver At the Surface

The ventilation of an unconscious diver is usually accomplished in the same manner as for most non-breathing victims; the preferred method is mouth-to-mouth breathing. It is possible to ventilate a victim using a Scuba regulator; however, this is not preferred unless the conditions make it difficult to ventilate without getting water in the victim's mouth. Regulator ventilation is not preferred as it creates several problems. These problems include difficulty in creating a proper seal between the regulator and the mouth; the difficulty in preventing gas from venting out the exhaust diaphragm (instead of entering the lungs); the likelihood of sending gas into the stomach (again instead of into the lungs); and finally the potential problem of over inflating the lungs. However, regulator ventilation is a consideration where conditions might make mouth to mouth impractical (such as from heavy surf conditions).

It is also possible to use a regulator for under water ventilation though this is generally not recommended. There are likely few situations in which this might be useful; moreover, few rescuers are likely to be successful in managing the added complexity of under water ventilation. However, rescuers trying to remove a victim where the ascent is likely to be notably delayed (such while removing an unconscious diver from a cave) might consider the use of a regulator for under water ventilation. In this and similar situations the severity of the situation as well as the low probability of victim survival justify consideration of this procedure. Ventilation of the victim is least dangerous while traveling at a relatively constant depth; very experienced divers on a protracted ascent are the only individuals that should consider this technique. Of course the biggest problem with ventilation while underwater is the risk of over inflating the lungs. Embolism of an unconscious diver would negatively impact the likelihood of survival.

Rescuing A Toxing Diver While At Depth

The management of a toxing diver while under water is very similar to the management of an unconscious diver as discussed above. The primary peculiarity relevant for a toxing



diver is the potential increased risk of embolism due to oxygen toxicity seizures (during the toxic phase). In this case, it is recommended that the rescuer allow the seizure to cease prior to surfacing with the victim. It is hoped that this seizure will last approximately one minute though some complications may be present.¹ Should the seizure continue or the conditions degrade the rescuer is obliged to take the risk of a controlled ascent to the surface. The risk of death is certain while under water, prioritizing a controlled ascent followed by surface management of the victim.

¹ Some issue could be made regarding complexities associated with oxygen toxicity. Namely these include the consideration that this reaction can be considered in two parts; these include tonic (rigid phase while glottis is obstructed) and clonic (jerking phase where glottis may or may not open spontaneously). As the seizure continues excess oxygen is metabolized; over time (perhaps 1 - 3 minutes) these seizures will cease. It is conceivable that a victim might still be in the tonic phase; yet, this may be difficult to identify due to stress, dive gear etc. Furthermore, it is conceivable that a victim with significant O₂ and/or CO₂ accumulation might continue to experience ongoing symptoms. This seems unlikely in most diving scenarios and, in any case, is not something with a practical solution while diving. In the end, the rescuer will have to judge a time of least risk, ascending slowly and hoping to do no greater harm. Continued in-water immersion is tantamount to certain death while not breathing while embolism may or may not be present.