MODIFIED BUDDY BREATHING PROCEDURE

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THE PROBLEM

Several years ago during a discussion and analysis of diving accidents as reported by the University of Rhode Island (URI),[1,2,3] we were struck by the following reoccurring problem with buddy breathing, as noted on page 22 of the "United States Underwater Fatality Statistics 1975":2

> "... the accident description leaves little doubt that the usual 'two breaths then pass' requirement for shared breathing was not followed. Typically, the victim finds two breaths entirely insufficient and is reluctant to give up the regulator at all. Alternately, the victim breathes rapidly several times from the shared regulator and then rises as rapidly as possible, embolizing on the way up."

The URI also stated in the same report on page 16, that:

> "... the possession of one's own regulator is decisive in an air-lack emergency. Seldom does the person with his own regulator die."

CONCLUSION

It seemed clear to us upon analysis that the initial two breaths are insufficient for the victim to regain self control. Initiating an immediate ascent prior to the victim's getting his breathing under control only serves to worsen the situation. The victim's buddy, as noted time and again by the URI, was usually able to make it to the surface even if he never recovered his own regulator because he was not "out of control" at the beginning of the problem. Thus a typical buddy breathing failure begins as follows:

> When a victim runs out of air, usually he/she has not paid attention to either pressure gauge or breathing resistance and normally notices the problem only after exhaling a "good breath" and attempting to take in and getting "no air". The victim must then work against anxiety to swim over to his/her buddy (hopefully not far) and give an out of air signal before getting air. At this point it becomes obvious that the victim cannot regain control of his breathing in just two breaths. However, if the victim keeps the regulator for additional breaths, this immediately causes the other buddy great anxiety and the procedure is doomed to failure from that point on.

SOLUTION

The answer then is to:

(1) give the victim a means of regaining self control;

(2) make an established procedure so the victim's buddy is prepared: and

(3) give both victim and buddy a chance to get the procedure under control before surfacing.

All these can be accomplished in a matter of seconds if an established procedure (as follows) is used.

There are mainly two differences between this and the "old" buddy breathing procedure. First, when a diver runs out of air and signals such to his buddy, the buddy passes the regulator and allows the out-of-air diver to take four quick breaths. This procedure was also suggested by Donovan S Conley and Peter J Carrol in 1978.[4] This has several advantages. The out-of-air diver gets the necessary additional air to regain self control. The buddy is expecting the out-of-air diver to take several breaths and, not being anxious, is easily able to wait for the air. Secondly, the buddy pair then start the two-breaths-then-pass cycle and at least two passes are made prior to the start of the ascent. This ensures that both divers have regained the self control, within a matter of a few seconds, which is essential for the success of the procedure, and both divers are in correct position and able to execute a calm ascending manoeuvre.

TRAINING PROCEDURE

Obviously training is based with the emphasis on proper monitoring of air pressure so that an out-of-air situation does not occur. Octopus breathing should be presented as the first option. However, buddy breathing should be taught as a procedure which can work, provided that:

(1) it is learnt correctly, and

(2) it is taught as a skill that must be practiced from time to time in order to maintain proficiency, and

(3) it should be part of the pre-dive buddy check that every time both partners are not using an octopus, the buddies should go through the correct hand position of being donor and recipient prior to the final okay to start the dive.

The procedure and positioning should first be tried on land, then in the shallow end, then in the deep end, etc. The important steps in training are as follows:

(1) Give the correct signals ("out-of-air" followed by "share air").

(2) The donor immediately passes the regulator with the right hand, holding the regulator in such a way (depending on the make) as to allow the recipient clear access to the purge. The donor always holds the regulator with the right hand and passes it as if it was a regulator with an exhaust valve below the mouthpiece regardless of whether it is one with a side exhaust. Trainees must become conditioned to do this in order to avoid inadvertently giving an out-of-air victim a regulator upside down, causing the victim to be unable to purge the water from the second stage.

(3) Both donor and recipient maintain a hold on the second stage at all times while sharing air, and exhale a continuous stream of bubbles anytime the regulator is out of the mouth.

(4) The recipient begins by taking four quick breaths. This is easy for all to remember as it is the same life-saving procedure as used at the start of giving mouth-to-mouth resuscitation (in the USJ). The normal two-breaths-then-pass sequence is then started.

(5) The donor must have a firm hold of the recipient's tank strap or buoyancy compensator with the left hand. The recipient must have hold of the donor's tank strap or buoyancy compensator with the right hand. This ensures that they are in correct position and using the correct hands to pass the regulator.

(6) The buddies pass the regulator between them twice before commencing their ascent in order to establish both self control and control of the procedure.

(7) The pair swim up at a normal rate of ascent with both buddies kicking slowly and continuously (do not stop kicking while inhaling!) for the surface.

Two other points should be made to the instructor regarding the teaching of buddy breathing. Dr Glen Egstrom stated in his "UCLA-Diving Safety Research Program"[5] that:

> "... error free behaviour and continued progress throughout the sequence (of buddy breathing) were not seen until the eighth or ninth trial period."

This means that a few practices in the pool and once in the ocean are entirely insufficient! Buddy breathing practice should be initiated in the early pool session (second session) and practiced several times in every session thereafter. It should also be performed at least four times in the open water (allowing for the adjustment necessary due to the change in the environment), on at least two separate dives. This should ensure that each buddy is comfortable both as donor and recipient and should give a total of 12-16 separate buddy breathing practices to get the trainees beyond the limit described by Dr Egstrom.

The effect of slowed reaction times due to depth, cold, anxiety, etc., should also be emphasized.[6,7] This can be pointed out during the classroom lecture on the effects of nitrogen narcosis and can effectively demonstrate both the danger of narcosis and the need for conditioning buddy breathing reactions, by the following role playing:

> Act out that as an out-of-air victim at 100 feet, it takes you "about" 10 seconds to realize that you have run out of air (I've run out of air ... I've run out ... of air? out of air? I'VE RUN OUT OF AIR!!!! etc., taking 10 seconds). Then "swim" over to one of the students who will take 10 seconds to understand that you have run out of air. ("Hand across the throat ... means ... run out of air. You've run out of air? ... You've run out of air?! YOU'VE RUN OUT OF AIR !!!! etc). This amusing demonstration reinforces the need to be completely familiar with Buddy Breathing. It is also very successful in demonstrating the need for an octopus regulator.

PRACTICAL TESTING

We have done extensive testing of this procedure over the past four and a half years and have found it extraordinarily successful. It cannot be emphasized strongly enough how important both the victim's first four quick breaths, and the following exchange of the regulator twice first before initiating their ascent, are towards the successful use of buddy breathing. This method has proven successful not only in tests, but also in a number of actual buddy breathing situations.

We would urge the diving community to try this procedure to realize the potential for improving the success rate of buddy breathing. Until octopus regulators becomes standard equipment adoption of this method could lower the number of cases of buddy breathing failures reported so tragically often in the URI reports of diving fatalities.

One simple initial test which instructors can try for themselves. Have one person sit at one end of a pool (back turned) at least 30 yards away from the "victim". The person playing the victim removes his regulator and swims towards his "buddy", exhaling continuously (to simulate an out-of-air victim without full lung volume). Upon reaching the buddy, get his attention, give the correct signals, and then begin buddy breathing. The difference between the old "two-breaths-then-pass-and-start-up-right-away" and the "four-quick-breaths-and-pass-twice-before-starting-up" method will immediately be clear. In fact, it will be found by most people that two breaths to start with are "not enough" ... something that many out-of-air victims discovered for real.

REFERENCES

1. Description of 24 Buddy Breathing Failures 1946-1970. Di*ving Accident Survey 1946-1970. U*RI Report No. 5, 1972: 22-26.

2. *Underwater Fatality Statistics 1975.* Report No. URI-SSR-77-11.

3. *US Underwater Diving Fatality Statistics 1970-1978. Re*port No. URI-SSR-80-13.

4. Conley, Donovan S and Carrol, Peter J. The effects of Mental-Physical and Physical Practice of Buddy Breathing. *Proceedings of the Tenth International Conference on Underwater Education, Addendum. 19*76: 8-12.

5. Egstrom GH. UCLA-Diving Safety Research Program. *Proceedings of the Tenth International Conference on Underwater Education, Addendum. 19*76: 8-12.

6. McAniff, John J. National Accident Data Analysis, *Proceedings of the Tenth International Conference on Underwater Education, Addendum. 19*76: 39-59.

7. Human Performance and Scuba Diving, Proceed*ings of the Symposium on Underwater Physiology*. 1970.