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Rebreather divers' responses to hyperalkaline hydroxide ingestion and aspiration ('caustic cocktail') events

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Introduction/Background

Rebreathers recycle exhaled air using soda-lime scrubber material to remove carbon dioxide and injecting oxygen into the normally closed breathing loop. When water enters the system it generates a hyperalkaline hydroxide solution, commonly known as a "caustic cocktail." Unexpectedly ingesting or aspirating this solution can potentially result in serious harm. The gold standard first-aid treatment for hyperalkaline ingestion/aspiration is to flush the mouth with water. This study surveyed caustic cocktail experiences of rebreather divers.

Materials and Methods

Rebreather divers were recruited through DAN's social media, website or by research team members attending dive-related events. Participants were directed to an online survey that collected information on the participants' training, equipment, diving history, caustic cocktail incidents, and consequential actions.

Results

Of 413 respondents, 394 (95%) identified as male. Mean age was 46 years (SD 10) and median length of CCR certification six years (IQR 3-12). Reported rebreather diving experience ranged from 20 years (median = six years, IQR 3-12). Median self-reported dives experience was 200 (IQR 100-500) and median reported hours of rebreather diving was 300 (IQR 120-750). Forty-four participants (11%) reported 50 hours' experience or less. The three most common sources of information for treating caustic cocktail ingestion came from rebreather instructors (322), manufacturers (117), and other divers (112). Of the 249 first-aid treatments applied, 191 involved flushing with salt/fresh water. Other treatments include flushing with mildly acidic solutions such as soda (24), juice (7), or other mild acids (5). Pain scores of divers who sought medical attention (n=34, mean=4.9, SD=2.6,) was almost twice that of divers who did not (n=203, mean=2.6, SD=2.3).

Summary/Conclusions

Although most divers treated caustic cocktail ingestion/aspiration by flushing with water, many did not. Additionally, very few divers reported seeking professional medical advice, although those experiencing greater pain were more likely to seek medical assistance.