Research on the application and training of water combat techniques for security guards

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Abstract: Water security is an important component of security guard work. Compared with other professional skills, research on water security in China has been limited, remaining primarily in the areas of surface swimming protection and first aid, with few studies on water combat techniques. This paper discusses the influencing factors of water combat for security guards, the selection of tactics, techniques, and equipment for water combat, the categories and essentials of water combat, training content for water combat, and training preparation and precautions for water combat.

Keywords: security work, water combat, swimming, diving, training

1. Introduction

With the rapid popularization of scuba diving technology, security departments in various countries are generally concerned that terrorist organizations or individual extremists may easily acquire diving skills and equipment to launch terrorist attacks from underwater. Currently, security departments in the United States, Russia and other countries have trained their own frogman teams and deployed underwater security in actual security operations.

Water combat refers to combat conducted on or below the water surface, with or without weapons. Due to significant differences in weapons and equipment used in water and the operating environment compared with land, water combat differs considerably from land combat. Only by following specific principles and laws of water combat and undergoing long-term training can one gain the initiative in combat, achieve victory in combat, and ensure the safety of the security target.

2. Factors affecting water combat for security guards

2.1. Impact of water environment on water combat

The water environment includes temperature, visibility, water flow, underwater structure, aquatic organisms, and whether the water is fresh or saltwater. These factors affect water combat to varying degrees. Water visibility refers to the maximum horizontal viewing distance in water, which has a significant impact on water combat. Typically, visibility in coastal and inland waters is low, generally within 10 meters, and in some inland seas, rivers, and lakes, visibility is less than 1 meter. Low visibility considerably affects the reaction time for judgment and action for both surface swimming protection personnel and security frogmen. Under conditions of low visibility and complex underwater terrain, without the aid of sonar or other search equipment, our protection personnel and frogmen can hardly detect enemies in time with the naked eye. At this point, the application of underwater combat skills will largely influence the outcome of combat [1]. Additionally, water flow conditions and underwater topography vary across different waters, sometimes providing convenience for enemy frogmen to conceal themselves.

2.2. Impact of lack of fixed support points on combat

In land combat, when the body contacts the ground or other fixed objects, at least one support point can be obtained. Due to the fluidity of water, which flows from high-pressure areas to low-pressure areas

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according to pressure changes, it is impossible to obtain fixed support like on land during water combat. Additionally, when both sides move in water, the body is mostly in a prone position. Surface swimming protection personnel mainly rely on upper and lower limb strokes to gain movement speed, while underwater divers mainly rely on fin kicks to propel forward. Therefore, their displacement and movement speed are much slower than on land. When both sides engage in entangled combat, due to constantly changing body positions, it is difficult to find force application support points like in land combat.

2.3. Impact of water resistance on striking force

Water density is 772 times that of air, and objects moving in water mainly encounter three types of resistance. When an object passes through the water surface or moves at relatively high speed below the surface along the horizontal plane, the resistance generated is called wave resistance. When an object advances on or below the water surface, due to factors such as shape and projected cross-section, pressure difference resistance is created between the water blocked in front and the turbulent wake area behind, known as form resistance. Water has viscosity, and when water flows over an object surface, water molecules and the object surface generate a certain frictional force, known as surface resistance. This means that completing the same movement in water encounters much greater resistance than on land, and movement speed in water is affected by this resistance. Therefore, during water combat, striking, hitting, and kicking movements that rely on speed to win—commonly used in land combat—have their speed and power greatly reduced, with lethality significantly decreased and difficulty in effectiveness. Meanwhile, sweeping, chopping, and cutting movements with larger resistance surfaces are basically useless underwater.

2.4. Impact of breathing methods on water combat

Surface swimming protection personnel use mouth inhalation and combined nose and mouth exhalation in water, which differs considerably from the nasal-dominated breathing pattern on land. Frogmen carry self-contained breathing apparatus that can continuously supply air underwater, breathing through the mouth via a second-stage regulator, which also differs from the breathing method used in swimming. Since surface swimming protection personnel cannot breathe underwater without equipment, underwater combat time is greatly limited. Compared with surface personnel, divers' breathing apparatus can provide longer activity time underwater, but cylinder usage time is also affected by breathing rate, water depth, intensity of combat, and air supply equipment. These characteristics determine that water combat must adopt a strategy of quick victory. For underwater frogmen, air supply is extremely important. Once the air supply system is attacked (such as the air hose being cut or the breathing regulator being removed), it will have fatal consequences for the frogman. It means the frogman loses their inherent advantage, while the heavy equipment becomes a huge burden. Therefore, when frogmen engage in underwater combat, they must prioritize the protection of their breathing apparatus in both offense and defense.

3. Selection of tactics, techniques, and equipment for aquatic combat

3.1. Selection of unarmed water combat techniques

When conducting unarmed underwater combat, due to water resistance and the influence of self-carried equipment, striking, hitting, and kicking movements used in land combat have unsatisfactory attack effects. Therefore, joint-locking and controlling techniques such as grappling and jujitsu are predominantly employed. Meanwhile, the characteristic that humans cannot breathe naturally in water should be exploited, striving to place opponents in a state where they cannot breathe. In situations where there is a significant disparity in strength between the two sides (such as when our surface swimming protection personnel confront enemy frogmen), emphasis should be placed on attacking the enemy's vital parts, such as ripping off the enemy's mask, pulling out the enemy's regulator, closing the enemy's cylinder valve, or blocking the opponent's breathing tube, thereby depriving them of favorable combat opportunities and achieving the purpose of victory.

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3.2. Selection of diving technical equipment

Currently, two problems must be solved when executing security missions in water. First, how to rapidly detect enemy targets. Security targets and protection personnel have obvious surface activities, placing us in a situation where the enemy is concealed and we are exposed. Due to environmental and visual field limitations, it is difficult to detect underwater targets early using visual observation. At present, when developed countries conduct underwater security operations, they not only deploy frogmen for underwater search but also use sensors and sonar equipment for early warning and preparation. Second, how to avoid premature exposure of our frogmen's targets. Currently, self-contained underwater breathing apparatus commonly equipped by military forces worldwide can be divided into three categories according to air supply form. The first category is open-circuit scuba. Its air source is compressed air, which is provided to divers in a pulsating manner from compressed air cylinders through automatic breathing apparatus, and exhaled gas is directly discharged into water. The advantages are simple maintenance, reliable use, and divers only need general training to master the usage method, with low training standards and difficulty, and no risk of oxygen toxicity or carbon dioxide poisoning. The disadvantages are that it can only work within 40 meters depth, with relatively short working time; divers' exhaled gas is directly discharged into water, producing more bubbles and poor concealment. The second category is semi-closed circuit scuba. Its air source can be air and nitrox, with oxygen content exceeding 21% or even reaching 60%. When inhaling, gas from the breathing bag is inhaled, and when exhaling, the exhaled gas circulates in the system, where carbon dioxide is filtered and discharged while oxygen is recovered and reused. The system ensures breathing through slow and stable airflow into the breathing bag. The advantages are small volume, light weight, and longer no-decompression stop time at the same depth compared with using compressed air. Additionally, semi-closed circuit scuba releases fewer bubbles and much less sound compared with open-circuit scuba. The disadvantage is the possibility of oxygen toxicity, requiring more consideration in training and equipment acquisition. The third category is closed-circuit scuba. It generally relies on oxygen-helium or oxygen-nitrogen mixed gas supply. The advantages are that it can provide divers with ultra-long underwater working time, leaves no bubble traces in water, and has good concealment. However, its production is not sufficiently standardized, and control devices of different brands may be set in different positions. This means that switching to a new set of equipment requires receiving training again, which is technically inconvenient to master. Based on previous water security work experience, when security frogmen are on guard, affected by visibility, they cannot be too far from surface security targets, with surface depth generally not exceeding 20 meters, and combat occurring mainly within the 20-meter depth range; meanwhile, concealment must be maintained as much as possible. Therefore, both semi-closed circuit and closed-circuit scuba can meet the above tactical requirements. However, if considering equipment and technical availability, semi-closed circuit scuba is more suitable.

3.3. Weapon selection

Due to water resistance, the power and speed of unarmed movements in water combat are significantly reduced compared with land, greatly decreasing striking efficiency. Additionally, due to high pressure in seawater, even small wounds can cause massive rapid bleeding, resulting in fatal injuries [2]. Therefore, weapon selection must be emphasized in water combat to fully utilize the advantages of weapons.

Since water density is much greater than air, bullets rapidly lose energy after being fired underwater due to water resistance. Thus, water resistance must be considered when designing underwater firearms. Currently, the most famous underwater assault rifle worldwide is the APS underwater assault special rifle developed by the former Soviet Union in the 1970s and its derivative products. Its excellent waterproof performance and slender bullet head solve the problems of underwater firing and strong underwater resistance, and it has been issued as the dedicated weapon for Russian frogmen. Due to its outstanding performance characteristics of high speed and strong lethality, the underwater special rifle maintains a high success rate within 10 meters and can fire continuously, capable of dealing with multiple enemies simultaneously. At close range, once targeted by an underwater special rifle, it is difficult for the enemy to effectively evade. Coupled with the scarcity of objects that can serve as cover underwater, the performance of underwater weapons can be brought into full play [3].

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The underwater dagger is also one of the weapons and equipment for underwater combat. Generally, the blade length reaches 12-18 centimeters, usually made of high-strength titanium alloy, which can effectively resist seawater corrosion, and the blade can withstand high intensity, with a lightweight shape like a short sword. Typically, the scabbard has two straps that can secure the dagger to the forearm, outer calf, or shoulder strap of the diving vest. In addition to use in combat, the underwater dagger can also be used for prying objects, measuring distance, and cutting ropes.

3.4. Tactical coordination selection

When executing water security missions, swimming protection personnel and frogmen usually operate in small team formations. Once underwater attackers are detected, underwater frogmen must cooperate tacitly with surface swimming protection personnel. Generally, surface swimming protection personnel are responsible for rapidly evacuating the security target from the danger zone, while underwater frogmen are responsible for intercepting and subduing the enemy. When the enemy is weak and we are strong, efforts should be made to create a situation of numerical superiority, using encirclement, blocking, and interception methods to quickly form a containment posture and prevent the opponent from escaping. When the enemy is strong and we are weak or when forces are evenly matched, the visual limitations of diving masks should be exploited to approach the enemy covertly from the side or rear, underwater weapons should be used as much as possible, the right timing should be selected, and sudden attacks should be launched to achieve the effect of killing with one blow.

4. Categories and essentials of water combat for security guards

According to water security deployment, water combat can be divided into four types: surface swimming protection personnel versus surface enemy, protection personnel versus enemy frogmen, security frogmen versus surface enemy, and security frogmen versus enemy frogmen.

4.1. Surface-to-surface combat

The characteristic of this type of combat is that both sides are in a state of evenly matched strength without the support of breathing equipment. Tactically, our side must both cover the rapid evacuation of the security target and prevent the enemy from approaching the security target. In combat, first identify the enemy's weapon, approach from the side or rear as much as possible, control the enemy's weapon-bearing arm, deliver fatal blows to the enemy, and strive for quick victory [4]. The specific striking essentials for unarmed water combat between both sides are: after approaching the enemy, the body slightly leaps out of the water surface, simultaneously exerting force, and without water resistance, use the upper limbs to violently strike the enemy's exposed head and other vital parts. In close entangled combat, make every effort to seize the advantageous position from the side and rear, use neck clamping and throat locking movements to control the opponent, or control the opponent's head below the water surface, placing them in a drowning state where they cannot breathe.

4.2. Combat between our protection personnel and enemy frogmen

Protection personnel generally wear only simple swimming equipment, while enemy frogmen are relatively concealed underwater with continuous breathing equipment support, placing our protection personnel at a distinct disadvantage during underwater combat. Therefore, combat methods should leverage the characteristics of being unencumbered by heavy equipment and relatively agile to seek opportunities for rapid subduing of opponents. In entangled combat, opportunities should be sought to destroy the opponent's diving breathing equipment, depriving the enemy of underwater advantages; simultaneously, care must be taken to avoid being controlled by enemy frogmen and prevent being dragged underwater.

4.3. Combat between frogmen and surface attackers

During protection operations, upon discovering surface attacking enemies, surface swimming protection personnel should rapidly evacuate the security target from the scene and utilize the advantages of security frogmen to subdue the attackers. Security frogmen should exploit their relatively concealed characteristics to occupy favorable directions and positions for surprise attacks on surface attacking personnel. In unarmed

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combat, their own advantages should be brought into play, attempting to entangle and hold the opponent's upper limbs to prevent the opponent from destroying their own diving equipment, dragging them below the water surface to subdue them.

4.4. Combat between frogmen and frogmen

When security frogmen confront enemy frogmen, the following points should be noted: first, fully exploit the characteristic of poor underwater visibility to approach covertly and initiate surprise attacks first, achieving unexpected and fatal effects with one move; second, fully consider the characteristic of high underwater resistance and prioritize weapon use; third, in close entangled combat, pay attention to protecting one's own diving equipment while attempting to destroy the opponent's diving equipment.

5. Training content for water combat

Mastery of water combat techniques must be based on good water adaptability and land combat capabilities, combined with training on individual characteristics and weapons and equipment elements. The training can be divided into the following stages: first, swimming technique training; second, land combat training; third, diving technique training; fourth, unarmed water combat training; fifth, water weapon offense and defense training; sixth, comprehensive simulated confrontation training for water security.

5.1. Swimming technique training

Solid swimming foundation and good swimming technique are the basis for mastering other water combat techniques, enabling security personnel to rapidly move and occupy favorable positions upon detecting enemies, and maintain longer water residence time during combat. In the first stage, basic swimming strokes should be started with, requiring mastery of basic breaststroke and freestyle techniques, and practical swimming training including inverted breaststroke, side stroke, treading water, and weight-bearing swimming should be conducted. On the basis of mastering technical essentials, training to increase swimming speed and distance should be carried out. In the second stage, training for underwater swimming at certain depths and distances without diving equipment should be conducted. In the third stage, combined with possible drowning and oxygen supply shortage situations that may occur in water combat, training should be intensified on the basis of the first two stages, increasing lung capacity and extending underwater breath-holding time.

5.2. Land combat training

Solid land combat technique is the basic foundation for water combat technique. Grappling, breaking, knife seizure, and gun seizure training in land combat can be widely applied to water combat, but attention should be paid to excluding movements with longer attack routes and larger resistance surfaces. Land training should be combined with the characteristics of water combat, arranging relevant water combat techniques for simulation on land and repeated training.

5.3. Diving technique training

Diving technique training mainly focuses on scuba operation and application, including basic diving technique training and semi-closed and closed-circuit rebreather usage techniques. Among them, basic diving theoretical knowledge training includes diving physics, diving physiology, diving equipment science, and diving medicine [5]. Semi-closed circuit rebreather training includes nitrox diving training and special decompression procedure training.

5.4. Unarmed water combat training

Unarmed water combat training should be combined with swimming technique and land combat training. First, security personnel conduct water combat training against multiple enemies or single enemy without using diving equipment, enabling trainees to master water grappling, locking, dragging, and striking technical movements. Second, security personnel conduct underwater combat training against multiple enemies or single enemy using diving equipment, enabling trainees to master underwater grappling, locking, dragging, and striking technical movements.

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5.5. Water weapon offense and defense training

Water weapon offense and defense training can be divided into cold weapons (such as daggers, harpoons, etc.) and underwater firearms training.

The main points of cold weapon offense and defense training in water are as follows: first, understanding the differences between using cold weapons in water and on land for offense and defense. Second, training methods to overcome and reduce resistance, such as how to exert force above the water surface and how to use stabbing and cutting movements with less resistance below the water surface. Third, training on selection of cold weapons in water. When selecting cold weapons for water use, full consideration should be given to underwater resistance issues, preferably choosing sharp weapons with less resistance; meanwhile, complex underwater environments should be considered for ease of carrying and use. Fourth, training on how to subdue enemies using cold weapons in water unarmed.

The main points of underwater firearms training are as follows: first, based on the refraction principle of light in water, theoretically mastering refraction conditions at different water depths and generally grasping the essentials of underwater shooting and aiming. Second, due to the influence of tides and surges, maintaining stability in water is extremely difficult, shooting time cannot be too long, and the probability aiming method is mainly adopted for underwater aiming. Third, due to underwater visibility and visual limitations caused by masks, binocular aiming is often used in underwater shooting training, with one eye observing the target situation and the other eye responsible for forming the sight line. Fourth, affected by water resistance, the effective underwater shooting distance of firearms is relatively short, so close-range shooting training is mainly conducted. Fifth, given the lack of relatively fixed support points in water and the fact that shooters are mostly floating in water, underwater shooting postures should not be limited to prone, kneeling, and standing positions only; comprehensive practice should be conducted to enable aiming and firing from any position.

5.6. Comprehensive simulated confrontation training for water security

Simulate different numbers of security protection personnel, various formation methods, and different equipment configurations, where the security target encounters attacks under different circumstances, and train security personnel on how to resist, subdue, and eliminate enemies to protect the security target's safety. During comprehensive training, observers should use underwater propulsion vehicles for tracking and guidance. When conditions permit, the entire training process can be recorded for replay and summary after returning to shore.

6. Training preparation and precautions for water combat

6.1. Training preparation

First, necessary coaching personnel. Prepare sufficient coaches and assistants, carefully inspect equipment and its usage, and conduct demonstration training by assistants when necessary. Second, necessary observation and first-aid personnel. Prepare necessary shore observation and first-aid personnel according to regulations, closely monitor training conditions in water, and immediately rescue upon discovering danger. Third, necessary first-aid equipment, such as life rings, ropes, first-aid kits, etc. Fourth, formulate necessary first-aid plans, fully anticipate various possible accidents and first-aid procedures after accidents occur to ensure training safety.

6.2. Precautions

First, strict supervision to prevent safety accidents. Unlike land combat training, water combat training is more prone to errors; coaches must strictly supervise the training process and correct mistakes promptly. Generally, coaching personnel should not train too many students simultaneously. Second, prevent drowning to ensure training safety. For beginners in water combat training, drowning prevention is the first priority, with corresponding first-aid preparation in place. Third, prevent diving accidents. Diving methods and depths must follow scientific training requirements, equipment must be used according to regulations, and necessary decompression procedures must be completed after exceeding specific depths to avoid diving accidents and decompression sickness. Fourth, avoid accidental injury. Due to considerable differences

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from weapon use on land, weapon use in water combat training is more prone to accidental injury. During cold weapon training, rubber simulation weapons should be used first to focus on understanding the different characteristics of weapon use in water compared with land; only after proficient mastery can live training be conducted. Underwater shooting training should be conducted in appropriate and safe environments, first experiencing underwater weapon carrying, aiming and firing methods in various postures at different distances and water conditions, before proceeding to live ammunition training.

7. Conclusion

The application and training of water combat techniques is a completely new topic for security forces in China. Since the founding of the People's Republic of China, water security training for security forces has remained at the elementary stage of surface swimming protection, mainly training on how to prevent security targets from drowning and how to rescue them after drowning. With the rapid popularization of diving technology and equipment, the danger of terrorist attacks on security targets from underwater by hostile personnel is increasing. This requires security departments to continuously explore underwater security prevention, underwater defense, and combat techniques, increase relevant training for security personnel, and continuously improve their water combat tactical and technical levels to ensure the safety of security targets.

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