

THE TACTICAL EDGE

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Aeromedical Evacuation in The Tactical Environment

by Lawrence E. Heiskell, M.D.

Introduction

Trauma is a time-limited disease, and rotor-wing aircraft have added a new dimension to trauma care. More than ever, law enforcement agencies are concerned about coming to the aid of injured or “downed” officers and their expeditious transport to a trauma center. Over 25 years ago, S.H. Neel, M.D., reflecting on the experiences of the U.S. Army Medical Corps in Vietnam, wrote in his article, *Army Aeromedical Evacuation Procedures in Vietnam: Implications for Rural America*, “The helicopter is not a form of treatment; it is but a machine. To improve medical practices, the helicopter must be incorporated into an integrated medical system.” Helicopters deployed in the evacuation and transport of injured patients no doubt save lives; justifying the risks, costs and problems created, however, is a major issue confronting law enforcement agencies and the medical community.

Historical Background

Medical advancements during the Napoleonic and American Civil War laid the foundation for the concept of modern medical transport. Napoleon was the first to use a structured ambulance corps. He assigned to each division a surgeon, approximately 170 medical personnel, and horse-drawn carriages for casualty evacuation. Two of Napoleon’s medical officers, Larrey and Percy, are given credit for the design and deployment of carriages for the rapid evacuation of casualties from the battlefield.

During the First and Second Battles of Bull Run, the Army of the Potomac encountered serious problems with the care of battlefield casualties. Literally thousands of wounded soldiers were neglected, deserted and even looted by those entrusted with their care. During the aftermath, Major Jonathan Letterman, Medical Director for the Army of the Potomac, fought for



SWAT team members training to prepare the helicopter and litter kit for an evacuation. Photo courtesy the author.

fundamental reform of the ambulance system. With the cooperation of President Lincoln and General McClellan, Dr. Letterman was able to see the passage of an act of Congress that authorized an independent ambulance corps dedicated exclusively to the transport of the sick and wounded.

Civilian air medical transport services were not deployed until the early 1970’s, however the U.S. military had been using fixed-wing aircraft for transport of casualties as early as World War I. World War II saw the introduction of helicopters to the battlefield, and aeromedical evacuation gained widespread acceptance, because hundreds of thousands of casualties were transported by air all over the world. However, it was not until the Korean War that the true advantage of rotor-wing aircraft for evacuation of casualties became truly apparent. In the 1960’s, the Vietnam War produced an efficient medical evacuation system using vertical take-off aircraft, because of the inaccessible jungle terrain and tactical situations. “Dust-

Off” operations, the familiar call-sign used to designate medevac helicopters, was to become commonplace during the ten-year conflict.

1973 saw the passage of Public Law 93-155 and the authorization of military aviation units in the United States to provide emergency helicopter transportation to civilians.

Soon a variety of local, state and federal helicopter programs were formed. The most noteworthy of the state-funded programs involved Maryland and the famous trauma specialist R.A. Cowley, M.D. Dr. Cowley coined the term “Golden Hour,” which refers to the importance of providing advanced emergency medical care to a critically injured person within the first hour.

According to statistics from The Journal of Air Medical Transportation, the number of hospital-based helicopter programs has increased from 31 in 1980 to 178 in 1991, with over 98,000 patients owing their lives to helicopters. Helicopters will never replace traditional ground transportation, but the higher skill level of

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flight crews and reduced transport time can mean the difference between life and death, especially in rural areas where ground transport time may be extensive.

Logistical Issues

Rotor-wing aircraft is an expensive form of medical transportation, and not without considerable risks. However, as more and more law enforcement agencies add helicopters to their department, with proper training they can be integrated into special operations for tactical emergency medical support. The private sector is also a source for those agencies without rotor-wing capabilities. Emergency aeromedical evacuation is not without hazard, and has greater operational restrictions. Special operations are often carried out in unfamiliar terrain, sometimes at night. Landing zones may be unstable, with overhanging wires or power lines, as well as trees to avoid.

A common problem in aeromedical evacuation is weather. Fog and freezing rain are the weather conditions most likely to ground flight crews and make response dangerous.

Special operations in urban areas are often heavily congested, and a landing zone may be both difficult

to establish on the ground and to locate from the air. In those circumstances, where no safe landing zone can be identified and ground transport time for a seriously injured patient would be excessive, a highway rendezvous with EMS can be arranged a short distance from the area of operation.

The assessment of need for aeromedical evacuation will depend on the level of care available at the scene and the amount of time required to transport the patient to the nearest hospital, which should be a level I or II trauma center.

Medical Indications for Aeromedical Transport

Appropriate indications include injuries such as internal bleeding secondary to penetrating or blunt trauma, severe life-threatening burns, and profound hypothermia. Other critical medical conditions include dislocations and/or fractures, with limb- or life-threatening circulatory or neurologic deficits. A Trauma Score of 12 or less generally is the accepted level mandating critical care at a trauma center. The Trauma Score is a numerical grading system used for estimating the severity of injury. The score is composed of measurements of neurological and cardiopulmonary function. The lowest score is 1, and the highest score is 16. Keep in mind that this is only a useful criterion in requesting aeromedical deployment,

but the Trauma Score does not take into consideration all of the circumstances associated with appropriate aeromedical evacuation.

After patient assessment, the on-scene team physician or paramedic can best advise the commander or team leaders if aeromedical evacuation is justified. Physician assessment at the scene can lead to communication from the air to the trauma center that can ready an operating room and mobilize the trauma team to prepare to receive the patient. The call for aeromedical evacuation should not be carried out without the notification of the existing EMS agencies which may be responding to the scene, or that may or may not have been alerted. For those law enforcement agencies that have aeromedical emergency support integrated into their special operations, evacuation flights should be dispatched and carried out within the medical guidelines established by the regional EMS system.

Landing Zone (LZ)

During special operations, it is not unreasonable to expect circumstances will arise which will make a helicopter landing and evacuation unsafe. It is the responsibility of the team commander or a team leader to identify as early as possible existing problems, so time will not be wasted preparing the perimeter for the arrival of the helicopter when time could be better spent loading and transporting the patient by ground.

When tactical units must create and prepare a landing zone, guidelines must be followed to ensure a safe landing and takeoff to avoid accidents. The landing zone (LZ) should be solid and flat. It should be cleared of vehicles, personnel and debris that might be blown into the rotor system. The LZ should be approximately the size of the helicopter.

An area 60 × 60 feet during daylight, and 100 × 100 feet during night operations is usually required for a small helicopter landing zone. Larger helicopters require 120 × 120 feet during daylight, and 200 × 200 feet for night operations.

Approach and Departure

The approach and departure paths should be made free of all possible obstacles, such as trees, poles and



Members of the Kern County Sheriff's Dept. SWAT team participate in an aeromedical evacuation exercise. Photo courtesy of Sgt. Wim Leijder.



A McDonnell Douglas 500-E approaches the LZ. Photo courtesy the author.

wires. A clear path allowing an ascent at a 15 degree angle is sometimes preferred to a vertical takeoff, especially when the aircraft is fully loaded.

A minimum approach path is usually 100 feet, and a minimum departure path 300 feet. As with most aircraft, helicopters take off and land into the wind, and a means to indicate wind direction is necessary. Smoke grenades are commonly used in military operations, while civilian pilots use wind socks, flags or plastic streamers. Plastic barrier tape is usually readily available and streams out nicely to indicate the wind direction.

Night Operations

Flares should be avoided during aeromedical operations because of the risk of fire. Lights from the ground may be used to illuminate wires or trees to make these hazards more visible, but lights should not be directed toward the aircraft. Vehicle headlights, strobes and emergency lights can be used to direct and orient the pilot to the landing zone. Low intensity lights should be placed to outline the landing zone. As the aircraft approaches the LZ, all bright lights should be extinguished to avoid blinding the pilot.

Aeromedical Evacuation Team Safety

Eye protection and helmets with fastened chin straps should be worn by all team members working near

the aircraft. Once the aircraft has landed, no one should approach the helicopter until given instructions to do so by a flight crew member. Only approach the helicopter from the front or sides in full view of the pilot, and not until the rotor has come to a full stop, unless instructed to do otherwise by flight personnel. The main rotor blades dip lowest to the ground as they slow down just before coming to a complete stop, and are most likely to cause injury at that time. The tail section must be avoided at all times. Board and exit the aircraft only when instructed to do so by the pilot or a flight crew member. Once the patient is packaged and ready for air transport, make sure the patient has eye, head, and ear protection. Also make sure that the patient package does not exceed the aircraft's weight and space limitations.

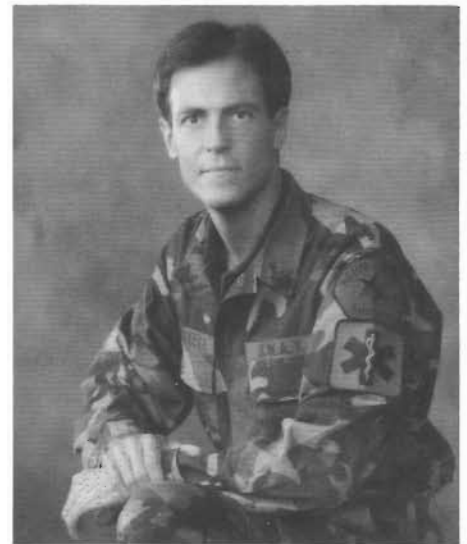
Departmental Experience

The Kern County Sheriff's Department Special Weapons and Tactics unit provides law enforcement coverage to an area of roughly 8,000 square miles. A large percentage of our special operations involve the delivery of high-risk warrant service in remote areas. We deploy two McDonnell Douglas 500 Series E helicopters equipped with a Tracor litter kit. Each kit is capable of carrying two patients. Aeromedical evacuation training is a vital part of our tactical emergency medical sup-

port, and we routinely include air operations in our tactical training exercises.

Conclusion

Emergency aeromedical services, whether they are agency controlled or civilian operated, can play a critical and lifesaving role in the tactical environment. Helicopters used in tactical emergency support should function to enhance the trauma care system, but not to replace it. Rotor-wing aircraft should be used only for appropriate medical indications and in appropriate conditions. Used effectively, an aeromedical evacuation unit deployed in special operations has the ability to transport medical personnel with advanced skills over a wide geographic area and, with the element of speed, are important elements in preventing death and permanent disability in the tactical environment.



About the Author

Lawrence Heiskell is a senior emergency medicine resident in the Department of Emergency Medicine, Kern Medical Center, Bakersfield, California. Doctor Heiskell completed surgical internship at the University of Maryland, and is residency trained-board certified in Family Practice. Doctor Heiskell is a peace officer in the State of California with a commission of Reserve Deputy Sheriff with the Kern County Sheriff's Department. He is SWAT trained, a graduate of the American Pistol Institute and an H&K certified MP5 Instructor. He is currently assigned to the Special Weapons and Tactics unit as the team physician.