Tales from the Battlefield

Perspectives from a Navy Anesthesiologist in Combat

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Introduction

In March 2004, Naval medical personnel responded to the anticipated needs of the First Marine Division during Operation Iraqi Freedom and formed a small 26-person unit using personnel and supplies from two preexisting surgical companies. The Surgical Shock Trauma Platoon (SSTP) was based at Camp Taqaddum, Iraq, a former Army Command that offered a troop medical clinic with minimal trauma surgical support. Staffing initially included an anesthesiologist, a general surgeon, an orthopedic surgeon, and an emergency room physician to provide rapid resuscitative surgical care near the point of injury. The physical layout of the unit included a single tent stabilization area, a single tent operating room, and a rudimentary ward for postoperative care and minimal holding. This article details the experiences and challenges of a Navy anesthesiologist staffing this surgical unit during its first month of deployment concurrent with military operations in Fallujah in April 2004.

Preparation

While working at Naval Medical Center, San Diego in February 2004, I received two weeks notice that I was being deployed to Iraq with a surgical unit. During my mission in Iraq, I drew on previous Naval experiences with aviation and Marines to provide the best medical care possible to service members and civilians under my care. After arriving in Kuwait, our group flew to Al Taqaddum, a former Iraqi Air Force base. While waiting for supplies, we planned the physical layout of the unit and conducted trauma training lectures for nurses and hospital corpsmen. Along with the surgeons, I assisted the Army troop medical clinic with immediate surgical-related problems and reacquainted myself with peripheral nerve block techniques. I remembered Vietnam reports wherein regional anesthesia was used during peak patient-receiving periods. As a result, I quickly found the utility of doing a wrist block when I assisted our surgeon with a hand debridement after a Marine inadvertently cut himself

with a knife. After this experience, I started preparing for the possibility of using regional anesthesia on or near the battlefield and found this technique to be useful later in the deployment.

Blast and Combat Injuries

After treating the Marine with the hand injury, the surgical team had its first introduction to what would become a familiar scenario: blast injuries among troops. Fortunately, the body armor that coalition troops wore reduced significantly the numbers of abdominal and chest injuries. In stark contrast, many suspected insurgent cases involved the chest and abdomen, owing to the lack of body armor. In one instance, a young Army officer was brought to the clinic with severe damage to one foot and both legs after stepping on an improvised explosive device. The surgeon and I assisted the Army team in stabilizing and debriding the patient's wound prior to evacuation to the Army's Combat Support Hospital in Baghdad. Luckily, this patient survived his blast injury and this incident heightened my awareness of the effects of blast injuries on the population of patients in this setting, something unfamiliar to most anesthesiologists who don't practice in a trauma environment.

The unit consisted of tents placed on plywood platforms. We trained each day by working through a mock trauma case, concluding with a lecture if we were not engaged in clinical activities. On the first day our unit became operational, our training was out the window when a Humvee ambulance arrived unannounced and presented our first patient, a coalition Iraqi truck driver who sustained AK-47 wounds to his abdomen and hand. This first surgical case became a five-hour abdominal exploration and bowel repair performed in an operating room tent without air conditioning where temperatures exceeded 100 degrees. Shortly thereafter, we received a Marine who sustained a massive head wound from a bomb and arrived dead, followed by another young soldier with a penetrating neck wound requiring immediate exploration. Afterwards, I thought it would be a long deployment if it stayed this busy every day.

Equipment Challenges

The surgical team encountered equipment and operational problems during setup. One immediate challenge occurred during the first case, where it took three endotracheal tube changeovers before I had a tube that did not have a cuff leak. Consequently, we determined that many of our medical supplies were aged and heat damaged while in storage. As a result, syringes, endotracheal tubes, and other rubber fittings were cracked and leaking.

Another significant problem that I overcame was the need to use long large-bore IV catheters for central venous access. When we started, we lacked any formal central line capability. Often, a patient would present in such a profound state of shock and with such extensive extremity damage that obtaining rapid peripheral IV access was difficult to impossible. Presented with these circumstances, I found that the 2-2¼ inch, 14 and 16 gauge IV needle catheters were long enough to act as temporary subclavian, internal jugular, or femoral central lines.

In addition to the difficulties with IV access in grievously injured soldiers, the lack of standard invasive monitoring capability was another challenge. At first, I was unsettled by my inability to directly transduce arterial or central venous pressure measurements, which most would consider standard of care in the United States for the trauma patient. However, I quickly realized that it was not needed for the most part, given our relatively young and healthy active-duty population.

Even though the temperature was warm, we received many of our patients profoundly hypothermic as a result of blood loss, shock, and environmental exposure. Given our limited equipment, it was difficult to warm patients despite the high ambient temperatures. A single-line blood warmer, a plastic bag over the patient's head and a poncho liner on the stretcher were the only means available to warm the patient or prevent heat loss.

Combat Injuries and Trauma in an Austere Environment

Following the military response to the insurgent uprising in nearby Fallujah, our surgical team cared for heavy casualties in April during Operation Vigilant Resolve. Over a four-week period, our unit received 46 patients with combat-related trauma and conducted 31 operations ranging from debridement and splinting to full damage control abdominal exploratory laparotomies and resuscitative thoracotomies. Within that set of casualties, we cared for 13 unstable patients who were either in class 3 or 4 hemorrhagic shock and/or needed emergent airway intervention. Eight of these survived evacuation and five died of wounds prior to evacuation from our unit. Of the thirteen unstable patients, three of them sustained trauma severe enough to necessitate resuscitative thoracotomies. One patient underwent a damage control laparotomy at our unit, was successfully transported to the Army hospital in Baghdad, but died of wounds shortly afterwards. Due to the severity of trauma encountered, 49 units of packed red blood cells were utilized by the surgical team over the course of a month. In retrospect, it seems hard to believe all of these procedures were performed in a single-room operating room with only a general surgeon, an anesthesiologist, and an orthopedic surgeon in attendance.

Challenges

My most challenging day as a military anesthesiologist occurred on April 7 following a firefight in Ar Ramadi between Marines and insurgents. As a result, our unit received some of the most complex cases I have encountered during my professional career. We received a patient who had taken a rocket propelled grenade round through his upper abdomen and chest. He arrived still conscious, clearly in shock, with gaping wounds in his right upper abdomen, left chest and left arm. After a relatively uneventful induction, damage control surgery was performed, and we discovered that he had grade 5 liver lacerations, a colon injury with diaphragmatic disruption, and a near amputation of his left upper arm. Despite the efforts of the surgical team, this patient passed away after becoming coagulopathic and asystolic. Immediately afterward, we received another patient with a lower extremity fracture, which we took to the OR for debridement. While in the OR, we received word that five wounded Marines would arrive soon. When they arrived, the surgeons were still operating on the orthopedic patient and the ER physician was not yet at the unit. I had planned for such an event by training a flight surgeon to maintain relatively simple anesthetics for uncomplicated OR cases if I were needed elsewhere. In this case, it became apparent that I was the only physician who could leave the OR to triage incoming casualties.

Treating Iraqi Patients

Aside from the Iraqi truck driver, during our first month, we had the opportunity to treat 12 foreign nationals. Seven of these were suspected insurgents and five were civilian contractors. In spite of different origins, most patients who could express their gratitude did. It was gratifying to see the positive reactions of insurgents who initially thought they would be harmed but soon realized that they would be treated well. Through the help of interpreters, I learned some rudimentary Arabic and was able to communicate basic medical questions and commands that were helpful for examination and treatment. Language was important because the interpreters sometimes could not immediately come to the SSTP. Also, I believed that a connection was lost in translation when information was obtained through an interpreter. By being able to speak some Arabic, I was better able to establish a physician-patient bond.

Given the small size and limited capabilities of our unit, the volume of cases, as well as the projected increase in casualties, Navy leadership decided to augment our unit with an additional Forward Resuscitative Surgery System. Their surgical capability was similar to our unit, but they were mobile and could move to different locations as needed. The combination of both units increased our surgical capability to the point where we could conduct two

damage control surgeries simultaneously if needed. Another advantage was that it allowed us to alternate operating teams, thus minimizing physician fatigue and enhancing overall patient care.

Summary

We were a small complement of personnel with pooled equipment from other sources not inherently our own, working in an austere environment and functioning under a relatively new concept in combat surgical care delivery. In spite of significant challenges, we found the selective use of single-dose peripheral nerve blocks useful. Of the injuries treated and surgery performed, I found an auxiliary block to be useful and appropriate in six cases. I believe that it is an invaluable skill to be taught in residency programs. In a short period of time, we were able to make a significant contribution in preserving life and limb of those young men and women who deserve our very best. Since my return to the Naval Medical Center, San Diego, I have renewed my efforts to focus training on practical clinical capability based on my Iraq experience that would be useful to our residents. This has included the establishment of a Regional Anesthesia Service and a Military Unique Curriculum which strives to prepare the next generation of military physicians for anesthetic care delivery in austere environments.

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