Devastation after the Haiti Earthquake: A Neurosurgeon’s Journal

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On January 12, 2010 a 7.0-Mw earthquake struck Port au Prince, Haiti. The devastation, obvious from media footage, was unparalleled in recent history. An estimated 194,000 Haitians were killed, and roughly 200,000 were injured (Figure 1). In the weeks following the quake a massive international effort was mobilized to assist the nation of Haiti.

WEEK 1

Within 24 hours of the incident, neurosurgeons arrived in Port au Prince to provide medical care and assistance. Barth A. Green, M.D., chairman of Neurosurgery at the University of Miami, led one of these efforts as he has had a long-standing program to provide medical care in the impoverished nation: Project Medishare, a nonprofit international aid organization at the University of Miami.

A 300-bed tent medical campus was quickly erected and opened to accept patients from the temporary United Nations (UN) medical compound. The facility was immediately filled to capacity, with one tent housing a surgical suite equipped with four operating rooms and connected to a 75-bed pediatric ward. A second tent housed the adult hospital, consisting of 225 beds (Figures 2 and 3). Volunteers, including doctors, nurses, therapists, and engineers flew from the Project Medishare Command Center in Miami on chartered flights to staff this new facility.

Dr. Green was joined by John Ragheb, M.D., a pediatric neurosurgeon who had been performing third ventriculostomies to treat hydrocephalus in Haiti for years. Allan Levi, M.D., Ph.D., director of the University of Miami Spine Program, and Ian Armstrong, M.D., a neurosurgeon from California, did triage and began treating the numerous spinal cord and head injured patients in an area of the hospital, which is to become a new specialized unit.

WEEK 2

James Guest, M.D., Ph.D., arrives in Haiti to organize the spinal care unit. By now, the Medishare tent hospital has become one of

![Figure 1. Devastation of the poorly constructed buildings in Haiti led to massive devastation in terms of infrastructure and human life.](image1)

![Figure 2. Dr. Barth Green and Amy Wang, Occupational Therapist Registered, at the Project Medishare Medical Compound.](image2)
the major centers caring for neurologically injured patients. Neurosurgery patients now compose 15% of the adult census, with daily calls for transfers of new paraplegic and quadriplegic patients (Figure 4). Evacuation to other countries for definitive care is also becoming less frequent, worsening the situation. In addition, patients with nontraumatic neurosurgical disorders continue to arrive at the hospital through its emergency triage center (Figure 5).

Recognizing the desperation of the situation, a team is mobilized to attempt specialized neurosurgical and spinal treatment for the roughly 25 patients with spinal cord injury (SCI). Specialized equipment for spinal fixation surgery is collected and we solicit actively for donations of capital and expendable medical supplies.

Due to the difficulties inherent to treating these patients in Haiti, we opt for a minimally invasive technique for spinal fixation using percutaneous pedicle screw and rod constructs. We hope that this technique will accomplish spinal stabilization while:

1. Reducing the historic 100% infection rate to an acceptable level
2. Minimizing blood loss in an environment where allogeneic blood transfusion is impossible and electrocautery is of limited availability
3. Operating under conditions without specialized lighting and minimal suction
4. Avoiding the need for midline skin incisions where there is already pre-existing cutaneous breakdown (Figure 6)

WEEK 3

We are in regular communication with Nick Boulis, M.D., a neurosurgeon from Emory University who is caring for numerous head injured patients. His experience treating an open, depressed skull fracture, hydrocephalus, and brain abscesses proves invaluable to help us prepare for spinal surgery at the Project Medishare Hospital.

Doug Bireley and Rob Keller of Depuy Spine have donated Viper III-D extend tab screws for the mission, with an extremely low screw and extension profile. Using peel-pack sterilization, kits are made to care for a dozen patients, each including eight
screws, eight set screws, two rods, and K-wires. There is still no steam or gas sterilization capability, and the surgeons have been relying on bleach and alcohol baths for instrument antisepsis (Figure 7).

We assemble a seven-person team, with an acute SCI nurse, a bowel/bladder nurse specialist, physiatrist, occupational therapist, our Spine Fellow, Vartan Tashjian, M.D., an instrument rep, and myself. At 3 AM on February 6, we board the charter plane bound for Port au Prince.

**SURGERY AT THE MEDISHARE HOSPITAL**

Recognizing that many are skeptical that spinal surgery will be feasible under these conditions, we meet with Steven Kalandiak, M.D., an orthopedic trauma surgeon from the University of Miami. He has been serving as the Chief Surgical Officer at the Medishare Hospital. Steve has graciously cleared the operation room schedule in the largest of the four surgical “suites.”

Our team makes rounds on the patients with SCI. The situation is unlike anything I have seen before. Virtually all of the 25 surgical candidates have nearly identical injuries: a fracture-dislocation at the thoracolumbar junction with coronal and sagittal plane displacement. Surprisingly, not all are complete injuries, but our team physiatrist, who had just left Haiti 3 days prior, reports that two of the patients with ASIA grade C have deteriorated to ASIA grade B, despite the best efforts to maintain spinal precautions. This is not surprising given the precarious stability of their spinal column.

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On our first day we perform one surgery to fixate a thoracolumbar fracture dislocation from T11 to L3 with eight percutaneous pedicle screws (Figures 8 and 9). The procedure goes uneventfully. During the next 2 days, 10 patients are treated in this fashion. A second trip with implants donated from Globus Medical allows us to treat an additional five patients with the same percutaneous surgical technique. To date, 2 of our 15 patients have had wound breakdown or infection, with the remainder in stable or improving neurological condition.

THE CURRENT AND FUTURE SITUATION

The Medishare Hospital continues to care for new patients as the emergency triage center receives newly injured trauma victims, and also receives transfers from outside hospitals without neurosurgical expertise. Although the hospital’s technological capabilities are improving daily (with the arrival of a steam autoclave and two additional C-arms), neurosurgical problems are continuing to arise in Haiti amidst its devastated medical infrastructure.

Neurosurgical expertise is scarce, yet in high demand and is likely to remain so for the foreseeable future. Project Medishare is in the process of building a permanent surgical hospital and rehabilitation facility, particularly because of the impending dangers associated with the looming hurricane season. Those interested in volunteering can contact Project Medishare at http://www.projectmedishare.org.

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