Past, present, and future

The author and his family at his white coat ceremony.

Chad Klochko, MS

The author is a member of the Class of 2013 at the Michigan State University College of Human Medicine.

> Happy, cheerful, a positive outlook, a role model, Chad enjoys life, has a passion for learning, appreciates his colleagues, demonstrates his respect for medical school by his encyclopedic medical knowledge. Chad is the very first person in my life, a life filled with thousands of very deserving individuals, who has provoked my most total and unconditional respect and admiration. Chad earned it by the ease with which he walks in difficult circumstances, by his focus on achieving excellence, and by his limitless belief in his right to become an academic physician, and his unbelievable effort to qualify for a glorious career. He is one in a million and the most brilliant feather in the CHM cap.
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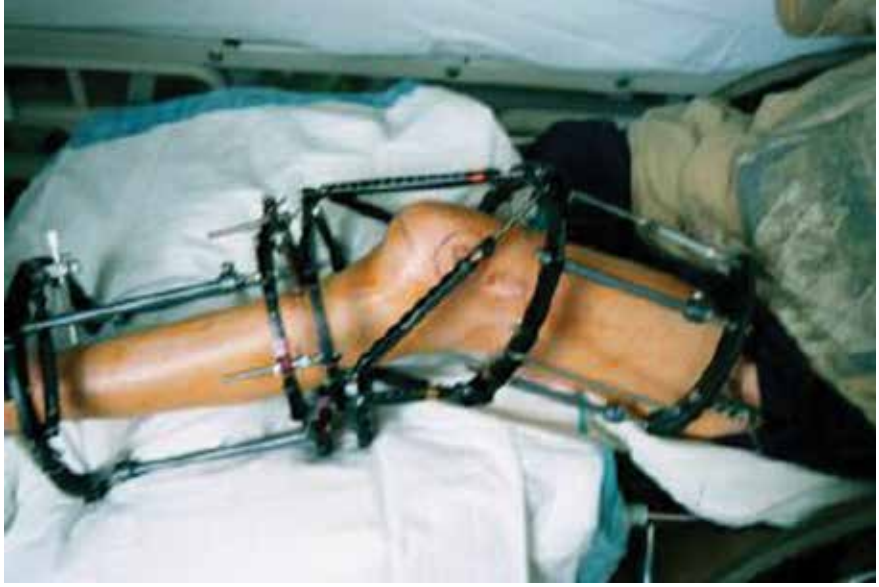
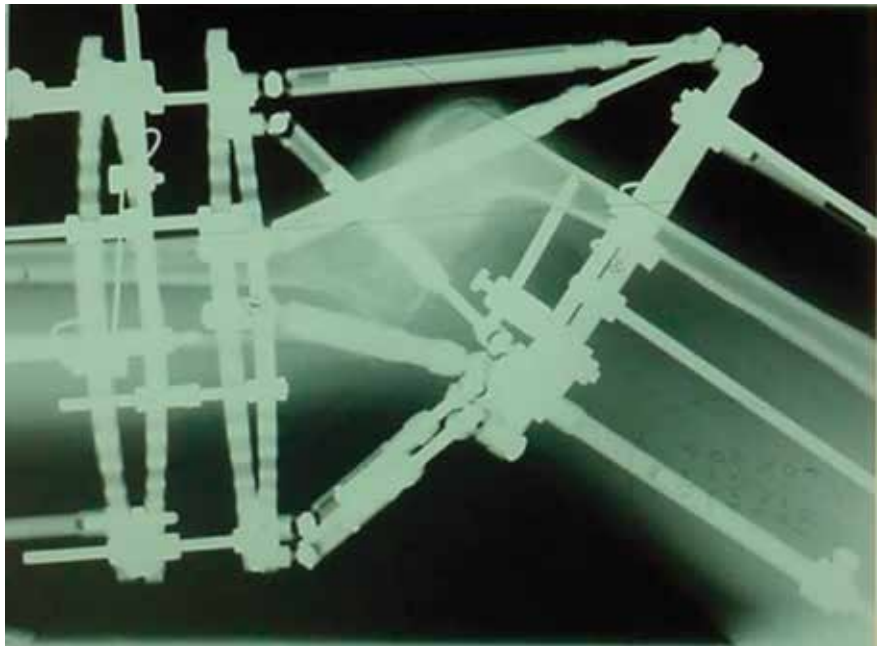
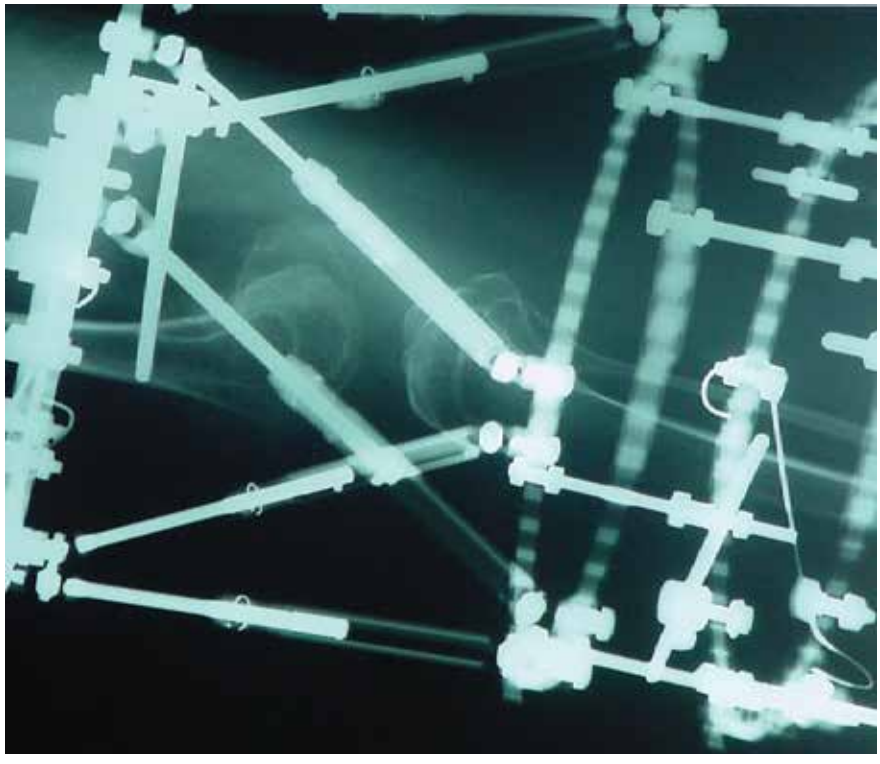
> —Houria Hassouna, MD

I move aided by crutches and troubled by a question: What's next? Physical therapy and minor surgeries help my musculoskeletal imbalance, but despite years of testing and multiple surgical interventions, a definitive cause for my symptoms has never been identified.

After two years of sheltered existence in the classroom, I am a third-year student at Michigan State University College of Human Medicine, aloft in the whirlwind of the rapidly moving world of hospital rooms, nurses, surgeons, midwives, and medical students. I struggle to stand for hours without flinching; I cannot run down halls to respond to an emergency or speed to catch the next bedside teaching round.







From top to bottom, September 12, 2001. Two weeks after frame was attached. Two months after that.

It is awkward to get close to the operating table while using my crutches, and without them I cannot keep my balance for more than ten minutes. I waited two months for permission from mothers-to-be to attend the delivery of a newborn, an experience that affected me profoundly. I have cleared the required pediatric, obstetric/ gynecology, and internal medicine clerkships.

I have wanted to be a physician since I was a child.

I have yet to be asked by any of my attending physicians why I use crutches.

I was born with bilateral hip dislocation, identified when I was just over a year old. Scoliosis was diagnosed when I was four and because of other symptoms I was loosely categorized under muscular dystrophy.[1] My pediatric neurologist correctly predicted the strengthening of my muscles with age. He did not, however, expect the orthopedic problems that plagued my youth. In an attempt to pair me with a known medical syndrome, he relied on batteries of tests, annual EMGs, and repeated muscle biopsies. Symptoms and test results seemed to agree with a diagnosis of muscular dystrophy: I used the Gower maneuver to stand up; EMG tests produced a "popcorn" sound, and in biopsied muscle sections the tissue looked "grey." However, as I became older, biopsied muscle tissue had a more "normal appearance," my joints from connective tissue adhesions became distorted in varying degrees of flexion or extension, and I was reclassified under metabolic myopathy.

It was extremely difficult to be confined to a wheelchair as a child, and the joint stiffness meant I needed multiple forms of rigorous therapy aimed at sustaining my muscle strength. I persevered through nerve stimulation to water therapy, from traditional physical treatments to medicinal karate methods. I attended the Muscular Dystrophy Summer Camp with children similarly afflicted with diseases that restrict mobility, all of us in wheelchairs. Most of the friends I made at the camp, because

of the nature of muscular dystrophy, have not survived.

I was thirteen months old when I had my first surgery, after my pediatrician identified bilateral hip dislocation. By the time I was three years old, I had had bilateral adductor tenotomies, iliopsoas release and distal femoral pin placement, with two weeks of traction, multiple closed reductions, and manipulation of both hips. After five months I had open reduction of the left hip and a derotation osteotomy of the left distal femur with crossed Steinman pins. The right hip open reduction with capsulorrhaphy and femoral derotation osteotomy was performed using the mini-Hoffman fixator.

Other significant issues, including scoliosis, an unspecified metabolic muscle disease, and a dislocated right radial head, were identified. At age eight, x-rays indicated progressive subluxation of the right hip, which led to a right acetabuloplasty. It was also determined that the left patella was dislocated and this led to a fixed flexion deformity that my parents feared would permanently affect my mobility. At age eleven, I underwent a relocation of the left patella, lateral release, medial reefing, intramuscular lengthening of the biceps tendon, and a step-out Z-lengthening of the iliotibial band. The flexion contracture was reduced to approximately ten degrees, but the success of this surgery was short-lived. Within eighteen months, the flexion contracture was up to thirty degrees and another hip surgery was scheduled. This time it was a left Staheli shelf procedure with bone graft. I was immobilized in a spica cast with the knee flexed. After the cast was removed, the fixed flexion deformity recurred. With a 30 degree left hip flexion contracture and a 20 to 30 degree left knee contracture, the orthopedic surgeon recommended manipulation under anesthesia and a possible posteromedial release of the knee structures. This unfortunately resulted in a proximal-tibia fracture and subluxed position of the knee. The fracture was reduced in a closed fashion, using C-arm intensification and pins placed across the knee joint for stabilization. Once again, I was cast in a flexed position, resulting in a fixed flexion deformity of 50 degrees. This was treated with aggressive physical therapy and Dyna-splints to no avail. At this stage I was confined to a wheelchair, needing surgery for my scoliosis and having a recent diagnosis of a metabolic bone disease. Since the active curve measured 55 degrees, surgery was my only option. I was placed in a full-body cast from which my knees and muscles did not recover.

By age seventeen, the deformed hip and scoliosis had been successfully redressed, and I was scheduled to correct the stronger right knee, which had a contracture of twenty degrees. The surgery included a bilateral hamstring release, followed by the application of an Ilizarov fixator frame. The plan was to have a gradual distraction of the knee joint, followed by gradual correction of the fixed flexion deformity along with simultaneous anterior translation of the tibia over the femur. The frame required daily corrections over the next four months. Approximately six months after the removal of the frame, the patella was still quite adherent to the underlying femoral articular surface. Arthroscopic lysis of adhesions was performed to gain further flexion. Surgery to repair the left knee contracture was scheduled at Sinai Hospital in Baltimore for September 12, 2001, the day after the terror attacks on the World Trade Center and the Pentagon. We wondered whether my surgery would be cancelled because the hospitals near the Pentagon would be filled with casualties. But the tragic reality was that there were too many fatalities and the hospitals were not overwhelmed. My surgery went forward as planned. The historical and personal significance of this event will live with me forever.

After surgery I awoke in the recovery room with a metal frame attached to my leg. The Ilizarov fixator ran from my hip to my ankle, and consisted of fourteen rods and pins driven into the flesh and anchored in my bones to secure the frame to my leg. It looked as though someone with a deluxe erector set had built a scaffold of metal around and into my leg. I spent the next three months in excruciating pain as the frame, adjusted four times by tightening bolts, slowly realigned the bones in my left knee. The severity of the dislocation is shown two weeks after the frame was attached and two months later—the results of a successful realignment. For three months I was bedridden and totally dependent on caregivers recruited from my family—parents, grandparents, cousins, aunts, uncles. They gave me the strength; I gave the effort. I lost control over every aspect of my life except for time. I had time, so much time: time spent fighting pain and thinking about what my life would be like if I ever won this battle.

Without the wheelchair and with the aid of crutches, I began my undergraduate studies at Michigan State University (MSU) in the spring semester of 2003 with a clear understanding of who I was and a profound determination about what I wanted to accomplish. Technology has always played a large role in my life. I majored in Computer Science and eventually expanded my program to include premed. College life provided personal challenges. I had been completely dependent; now I needed to be completely responsible. College brought me dedicated professors who inspired my life's direction and incredible friends who lifted my spirit and honed my skills in computer science and programming.

In 2005 and 2006 I served as a research assistant on two projects. Dr. Matt Mutka led an investigation to create a pervasive surveillance network by which a user with Internet access could connect to a network of cameras. The user would only have to specify a target; the software would then track it, and the program would automatically switch to the camera with the best view of the target. I was the first person to get the camera switching to

The author and friends at college graduation.

occur. I co-authored the published results. The abstract was presented at the 2006 International Conference on Robotics and Automation. In 2006 I was involved in Dr. Sakti Pramanik's project to locate specific sequences in the human genome database in seconds instead of hours. After graduating in 2007, I was simultaneously accepted at the Neuropsychiatric Research Center at the University of Cambridge in the United Kingdom and by the University of Michigan's Master's program in Biomedical Engineering.

I chose the University of Michigan. Working under Dr. Thomas Armstrong in the Department of Ergonomics I developed software to aid occupational therapists in optimizing treatment regimens for soldiers injured in the conflicts in the Middle East. Immediately after receiving my master's degree, I applied to medical school. In 2009 I entered Michigan State's College of Human Medicine as a member of the Class of 2013. After my last surgery in 2010, I prepared and conducted an IRB approved research proposal,[2] constructed a web site for my mentor Dr. Houria Hassouna, and cleared my USMLE Part I Board in July 2011.

Medical school basic science courses imply that modern scientific advances have no boundaries. As a medical student, I eagerly follow the rapid and significant advances in diagnostic technology. On the wards I face the reality of the limits of medical care. But I still believe in its potential.

After I graduate from medical school, I hope to decrypt childhood neuromuscular disorders like my own to help the children who, like me, will reach adulthood having received palliative treatment without the benefit of complete cure. I want to use the potential of embryonic stem cell transplantation research to uncover the hidden aspects of muscle nerve interactions and unlock the possibility of regenerative therapy.[3,4,5]

My mantra: Failure is not an option.

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