TRAUMA CARE

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Spotlight: Allergy
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CONTRIBUTING WRITERS

GUEST EDITOR

Paul King, MD. Dr. King is a board-certified neurosurgeon specializing in complex spinal surgery, cerebrovascular disease and neuro-trauma. Dr. King graduated from Fisk University, received his MD from Michigan State University and completed a spine fellowship at Emory University's department of neurosurgery. Before coming to Atlanta, King was in academic practice in Detroit, where he was the chief of neurosurgery at Grace Hospital and the co-director of a spinal cord injury unit at Detroit Receiving Hospital. To date, he has organized several medical missions to Ghana, Africa, and helped to furnish, equip and train personnel for the health center in Prampram, Ghana. More recently he has partnered with Korle Bu Neuroscience Foundation to provide neurosurgery healthcare to underserved patients in Ghana and other parts of West Africa.

Vernon J. Henderson, MD, F.A.C.S. Dr. Henderson received a B.S. degree in Biochemistry at U.C. Davis and entered Stanford Medical School in 1976, receiving the MD degree in 1980. He completed his surgical residency at Stanford in 1987 and began working at Highland General Hospital in Oakland, Calif., and later served as Assistant Professor of Surgery at UC Davis. He became Associate Professor of Surgery at Morehouse School of Medicine in 1998 while also serving on the trauma service at Grady Hospital. Appointed as Trauma Medical Director at Atlanta Medical Center in 2002, he remains in practice today.

Steven M. Kane, MD. Dr. Kane is chairman of orthopaedic surgery and the orthopaedic residency program director at Atlanta Medical Center since 2008. He graduated Magna Cum Laude as a member of Phi Beta Kappa from the University of Utah Salt Lake City. He attended medical school at Baylor College of Medicine and completed an orthopaedic residency at Carolinas Medical Center, then did a fellowship in athletic and sports. Dr. Kane is a board-certified orthopaedic surgeon who has achieved many awards and is a member of multiple professional medical and orthopaedic societies. He has a keen interest and experience in orthopaedic sports injuries and traumatology.

Mark L. Walker MD, F.A.C.S., was born and raised in Brooklyn, N.Y. He attended public schools there and graduated from City College with a B.S. in Biology, then received the MD degree from Meharry Medical College. He completed a general surgical residency at Howard University Hospital and then a trauma fellowship at Baltimore Shock Trauma. Dr. Walker is board certified in general surgery and surgical critical care and serves as medical director of the Surgical Health Collective.

Kanye Willis MD, M.B.A., completed plastic surgery training at the Medical College of Georgia in Augusta, where she received the R. Christie Wray Award for scholastic aptitude. She completed a burn surgery fellowship at Jacobi Medical Center in the Bronx, N.Y., and general surgery residency at Henry Ford Hospital in Detroit. At Hand and Plastics Specialists of Atlanta, she treats a variety of plastic surgery issues including hand, reconstructive, trauma and cosmetic.

Philip T. Ramsay, MD, FACS, Dr. Ramsay is a graduate of the Georgia Institute of Technology and Mercer University School of Medicine. He completed his general surgery residency and surgical critical care fellowship training at the University of Tennessee – Chattanooga. He is board certified in general surgery and surgical critical care, and he is a Fellow of the American College of Surgeons. Dr. Ramsay currently practices general surgery and trauma/critical care surgery at Atlanta Medical Center, where he is the program director for the General Surgery Residency Program.

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To qualify for one of these scholarships a senior medical student must have matched and committed to a residency program located in Georgia. Preference will be given to those students who have joined the Medical Association of Atlanta and attended MAA events.

The MAA board of directors feels it is important for medical students to participate in organized medicine and to that end charges no dues to medical students who are members. The board of directors has committed to provide these scholarships for five years and then will reassess their effectiveness.

As a result of working with Emory and Morehouse leadership to establish these scholarships, MAA has a better relationship with both of these Medical Schools as we all work toward the goals of providing excellent care to all the citizens of Georgia and developing physicians who are leaders in medicine and their communities.
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The Trauma Service at Atlanta Medical Center

Taking a Multi-Disciplinary Approach to the Trauma Patient

By Paul King, MD

A trauma network is an organized, coordinated effort that delivers the full range of care to all injured patients in a defined geographic area and is integrated with the local public health system. An effective trauma network enables a seamless transition between each phase of care in a patient-centered, cost-effective manner.

The trauma service at Atlanta Medical Center has provided an organized, coordinated effort to deliver the full spectrum of trauma services to the Metro Atlanta area and the Southeast United States for more than 25 years. Transfer of patients by air or land is a seamless transition and considers the patient and family as members of the trauma team.

The multi-disciplinary team approach includes evaluation and treatment by multiple specialties and related services throughout the hospital. These specialties include general surgery, vascular surgery, orthopedic surgery, otolaryngology, neurosurgery, plastic surgery, internal medicine, pulmonary medicine and radiology. The related services include respiratory therapy, nutrition, physical therapy, occupational therapy, speech therapy, case management and pharmacy.

A. Trauma Team specialties

1. Trauma surgery and critical care
2. Orthopedic traumatology
3. Neurosurgery
4. Plastic surgery
5. Otolaryngology
6. Internal medicine
7. Pulmonary medicine and critical care
8. Radiology
9. Anesthesiology
In this issue, we will provide an overview of the trauma service at Atlanta Medical Center. The contributors all have a keen specific interest in the treatment of traumatic injuries, and each value the team approach and embrace the patient-centered concept. They bring experience and enthusiasm to the care of the multiply injured patient.

Mark Walker, MD, a general surgeon and trauma surgeon, has vast experience in trauma and critical care. He will discuss resuscitation of the multiply injured patient.

Philip Ramsay, MD, is the director of the general surgery residency program and will discuss the residency program and the role of the resident in treating the multiply injured patient.

Paul K. King MD, a neurosurgeon, has more than 25 years of neuro trauma experience. He will discuss the role of the neurosurgeon as a member of the trauma team.

Steven Kane, MD, is an orthopedic surgeon and director of the orthopedic residency program. He has a long history of providing orthopedic traumatology services and training doctors in orthopedic traumatology. He will discuss the role of the orthopedic surgeon in trauma and the education of the resident in orthopedic traumatology.

Kenya Willis, MD, a plastic surgeon and hand surgeon, has provided plastic surgery and hand surgery to the trauma patient. She will discuss the role of the plastic surgeon in the care of the trauma patient.

Vernon Henderson, MD, a general surgeon and trauma surgeon, has a long history and a special interest in trauma care. He will discuss the trauma service at Atlanta Medical Center past present and future.
Trauma is a unique illness that presents several challenges in the early period after injury. Time is of the essence as vital functions must be restored quickly to minimize ongoing damage from shock, severe brain injury or multiple fractures across several anatomic compartments.

To complicate matters trauma physicians are often working with an incomplete data base. The patient may be unresponsive and consequently there is limited information available about medications or prior medical history.

An organized team familiar with Advanced Trauma Life Support Airway, Breathing, Circulation (the ABC’s)

An organized team familiar with advanced trauma life support will meet the critically injured patient in the resuscitation bay. Emergency room physicians and general surgeons are critical members of the team. Specific tasks are assigned and a rigorous search for acute life-threatening conditions is undertaken.

Airway obstruction, tension pneumothorax, cardiac tamponade and exsanguinating hemorrhage must be excluded during the primary survey.

Airway

The first priority is to secure the airway. Most often this will be accomplished with orotracheal intubation using c-spine precautions. A chest x-ray is then done to confirm the position of the tube.

Breathing

The diagnosis of tension pneumothorax is a clinical diagnosis based on diminished to absent breath sounds on the injured side, hyperresonance to percussion and shift of the mediastinum to the unaffected side. Tension pneumothorax is addressed with needle decompression followed by chest tube decompression.

Circulation

Cardiac tamponade will often require pericardiocentesis, followed by operative intervention to repair the damaged heart or great vessels. Exsanguinating hemorrhage is addressed with direct pressure combined with the use of a tourniquet if the bleeding is coming from an extremity. We have adopted this technique from lessons learned during military combat. We are always thinking about the underlying source of blood loss and a rapid abdominal ultrasound can help to exclude an abdominal source. The chest and pelvic cavities are important sources of hemorrhage as well. Plain films of these areas will provide some clue regarding sequestered blood. CT imaging will also help to define sites of blood loss.

The importance of approximating whole blood resuscitation for patients with massive hemorrhage is another principle garnered from military experience. It has been applied successfully in the civilian setting. Fresh Frozen Plasma and Packed red blood cells are available in the trauma bay and are used liberally when shock and massive blood loss is evident. Thromboelastography has emerged as a useful tool to guide blood product administration.

Rapid Operative Intervention

Rapid operative intervention is the hallmark of quality trauma care and this must be part of any protocol to address ongoing shock. In 1994 Bickell and Mattox questioned the efficacy of pre-hospital fluid resuscitation in the landmark paper “Immediate versus delayed fluid resuscitation for hypotensive patients with penetrating torso injuries”.1
Limiting crystalloids and tolerating a lower blood pressure until definitive control of vascular injuries has been achieved is a vital part of resuscitation in the current era. This is called permissive hypotension and is reasonable if the patient is on the way to the operating room for definitive control of bleeding.

**Staged Operative Interventions**

We have also learned that staged operative interventions may be needed in the setting of shock, hypothermia and coagulopathy. This vicious bloody cycle or triad can be interrupted if judicious surgical intervention focused on packing, rapid control of vascular injuries, limiting peritoneal contamination and temporary closure of the abdomen is implemented. This damage control approach should not be applied to every patient in shock but has a vital role to play in those with the most serious injuries. Combining damage control resuscitation (1:1:1 ratio of packed cells to fresh frozen plasma and platelets) with a damage control laparotomy results in more rapid resolution of shock with clearing of elevated lactate levels and resolving acidosis. This in turn may have a positive impact on outcome as the speed of lactate clearance is correlated with mortality and morbidity.

**Multi-Disciplinary Effort**

Trauma resuscitation is a multi-disciplinary effort. The general surgeon with training or special interest in trauma serves as the team leader and helps to coordinate care. Close coordination with interventional radiology and orthopedics has improved the management of complex pelvic fractures with on-going hemorrhage. Pelvic binders combined with angiographic embolization and the application of external fixators have been life-saving in several instances.

Close coordination with neurosurgery and the use of intracranial pressure monitoring along with surgical decompression has improved outcomes in select patients with severe cerebral trauma.

Close communication with vascular surgery and their use of an endovascular approach has made a significant difference in the outcome of patients with blunt aortic injury.

Close communication with anesthesiology during operative interventions has improved intra-operative resuscitation.

**Ongoing Resuscitation**

Once the patient leaves the trauma bay or the operating room, our work to achieve adequate resuscitation continues. We must correct hypothermia as this can contribute to coagulopathy and platelet dysfunction. We must maintain oxygen delivery with judicious transfusions and we must plan additional operative interventions as needed. This takes coordination and close communication with our specialists. All of this underscores the multi-disciplinary nature of trauma resuscitation.

**Principles of Ongoing Resuscitation**

1. Correct Hypothermia
2. Maintain oxygen delivery
3. Optimize metabolic and coagulation function
4. Coordination and communication between consultants and hospital services
5. Serial imaging

**Nutritional support**

Nutritional support is an important part of care and is usually addressed within 48 hours of the initial injury. We have learned from multiple studies that enteral nutrition is best. It preserves the gut barrier and minimizes infection risk.

**Prevent, monitor, and treat infections**

From this point forward we are vigilant regarding the development of infection and antibiotics are initiated based on culture data and the clinical course.

**Summary**

In summary, trauma resuscitation is very complex and predicated on attention to detail. ATLS protocols are rigorously adhered to. Rapid assessment, treatment, specialty, and hospital service coordination is imperative during resuscitation.

The airway must be secured; shock must be diagnosed quickly and addressed definitively. Each phase of trauma care is focused on providing the patient the very best opportunity to recover from devastating injuries. Oftentimes the care provided on the front end will determine the ultimate outcome.

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**References**

Plastic surgery is a specialty that repairs, reconstructs and replaces defects of form or function. The defects may involve the skin, musculoskeletal system, craniofacial system, hand, extremities, trunk and external genitalia. In addition, aesthetic surgical principles are used to improve an undesirable physical appearance.

According to the CDC, there were more than 30 million non-fatal injuries in the United States in 2013. Common causes include falls, motor vehicle crashes, assaults and animal bites. With a wide variety of traumatic mechanisms and involved anatomic systems, plastic surgeons contribute to the care of trauma patients in a variety of ways.

The American Society of Plastic Surgery in-service exam is divided into multiple sections including craniofacial, hand and lower extremity, breast and cosmetic, and comprehensive, which includes many reconstructive principles. Each of these areas can apply to traumatized patients. (See Figure 1.)

**Craniofacial.** Humans live in a complex social structure that depends not only on words for communication, but the emotive subtext of facial expression that infuses our words with greater meaning. Thus restoration of facial form and function is necessary to preserve normal social interaction.

Plastic surgeons are frequently consulted to repair facial lacerations and traumatic soft tissue defects. In 2011, there were more than 2.2 million emergency department visits for open wounds of the head. Injuries requiring special attention include those involving the vermilion border of the lips, cartilaginous structures (ears, nose) and the eyelids. (See Table 1 on page 12.)

Facial wounds necessitate meticulous cleansing of particulate matter to prevent permanent discoloration from traumatic tattoo. Minimal debridement is used to salvage irreplaceable soft tissue structures. Careful approximation of important landmarks minimizes unsightly visual step-offs. Careful timely suture technique and removal gives patients the best possible cosmetic outcome. Some wounds benefit from local or regional flaps for closure. Occasionally, wounds will need tissue expansion or free tissue transfer for complete restoration of function and appearance.

Additionally, facial fractures are a common source of morbidity in trauma patients. Facial trauma in an urban setting is most often caused by assaults, followed by motor vehicle crashes and industrial accidents. The kinetic energy present in a moving object is a function of the mass multiplied by the square of its velocity. The dispersion of kinetic energy during deceleration produces the force that results in injury.

High-impact and low-impact forces are defined as greater or lesser than 50 times the force of gravity. These parameters impact on the resultant injury because the amount of force...
required to cause damage to facial bones differs regionally. (See Table 2.) The supraorbital rim, maxilla, mandible (symphysis and angle) and frontal bones require a high-impact force to be damaged. A low-impact force is all that is required to damage the zygoma and nasal bone.

The nasal bones, mandible and the zygoma are the most commonly fractured bones during assaults. Motor vehicle accidents produce fractures that often involve the midface, especially in unrestrained patients. Other important causes of facial trauma include penetrating trauma (knife and gunshot wounds), domestic violence and the abuse of children and elderly persons.

Current facial injury treatment minimizes potentially morbid exposures. The principle of immediate skeletal stabilization in anatomic position has been enhanced by the use of rigid fixation with plates and screws. Soft tissue position and volume over this expanded skeleton is maintained, preventing soft tissue shrinkage, displacement and contracture. These techniques improve the functional and aesthetic results of facial fracture treatment. (See Figure 2.)

Hand and Extremities. Injury to the fingertip and nail bed is the most common injury of the hand and includes lacerations, crush injuries and avulsions. These types of injuries are repaired primarily with skin grafts and a variety of local and regional flaps. (See Figure 3.) Tendon lacerations and hand fractures are common. Fractures of the phalanges and metacarpals are the most common fractures in the upper extremity and account for 10 percent of all fractures. The goal of fracture management is to reduce and stabilize the fracture, maintain the reduction and begin rehabilitation to restore function.

Traumatic amputation of digits or limbs requires replantation or revision amputation to address loss of severed structures. The most critical factors in replantation surgery is management of the patient and the amputated part. The amputated part should be wrapped in moist saline gauze, placed in a waterproof plastic bag, then placed in a container of ice. The severed part should not come into direct contact with ice, as freezing can cause irreversible damage to the microvascular system.

Muscle undergoes irreversible damage with ischemia times greater than six to nine hours, while digits tolerate longer ischemia times and have been successfully replanted after more than 24 hours of cold ischemia time. Resuscitation and stabilization of the patient is instituted while preparing to transfer the patient to a replantation center.

Wounds. Reconstructive surgeons use the concept of a “reconstructive ladder” – the more problematic the wound, the higher up the ladder the surgeon has to climb. (See Figure 4 page 14.) Simple wounds may be closed by primary suturing, however others require complex reconstruction, including free tissue transfer.

All traumatic wounds should undergo debridement and thorough irrigation before closure. Debridement removes contaminated and devitalized tissue along with foreign material. If primary closure is not warranted due to contamination, wounds may be allowed to heal by secondary intention. Skin grafts are used to replace areas of skin loss. Split skin grafts consist of the epidermis and a variable amount of dermis. The skin is typically harvested from the thigh using a specially designed knife or powered dermatome. The donor area heals within 10 to 14 days from remaining dermal adnexal structures. Full thickness grafts consist of the epidermis and dermis but are size limited as the donor area must be directly closed.

<table>
<thead>
<tr>
<th>Area of injury</th>
<th>Special Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cheek Injury</td>
<td>Examine for parotid duct and/or facial nerve injury</td>
</tr>
<tr>
<td>Lip Injury</td>
<td>Requires careful alignment of vermillion border</td>
</tr>
<tr>
<td>Intraoral injury</td>
<td>Tongue, cheek, palate, and lip wounds require suturing</td>
</tr>
<tr>
<td>Eyelid injury</td>
<td>Align grey line and close layers — consider temporary tarsorrhaphy</td>
</tr>
<tr>
<td>Ear injury</td>
<td>Hematoma — incision and drainage of hematoma and well-molded dressing to prevent cauliflower ear deformity Through-and-through laceration—requires 3 layer closure incuding cartilage</td>
</tr>
<tr>
<td>Animal bites</td>
<td>Debridement, irrigation, antibiotics, and possible wound closure</td>
</tr>
<tr>
<td></td>
<td>Be particularly careful of cat bites which can infect with a very small puncture wound</td>
</tr>
</tbody>
</table>

Table 1

<table>
<thead>
<tr>
<th>Area of injury</th>
<th>Special Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nasal fracture</td>
<td>30 g</td>
</tr>
<tr>
<td>Zygoma fracture</td>
<td>50 g</td>
</tr>
<tr>
<td>Mandibular (angle) fracture</td>
<td>70 g</td>
</tr>
<tr>
<td>Frontal region fracture</td>
<td>80 g</td>
</tr>
<tr>
<td>Maxillary (midline) fracture</td>
<td>100 g</td>
</tr>
<tr>
<td>Mandibular (midline) fracture</td>
<td>100 g</td>
</tr>
<tr>
<td>Supraorbital rim fracture</td>
<td>200 g <strong>g</strong> standard acceleration due to gravity</td>
</tr>
</tbody>
</table>

Table 2
Some wounds involving fracture sites, exposed bone or tendon are not suitable for grafting, and techniques further up the reconstructive ladder, such as a flap, are warranted. A flap is a unit of tissue that can be moved to cover a wound while surviving on its own vascular supply. Random pattern flaps rely on random cutaneous vessels for their blood supply. Occasionally no options are available for local wound coverage, and tissue is harvested from elsewhere on the body using microvascular techniques. This transfer of tissue, known as a free flap,

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represents the top rung of the reconstructive ladder. Any tissue that can be isolated on a suitable vascular pedicle can be used and may include muscle, skin, fascia, fat, nerve and bone.

**Burn care.** More than 15,000 procedures for management of burns were performed by plastic surgeons in 2014. Destruction of the skin from thermal energy, chemical reactions, electricity or cold results in severe local and systemic alterations. The management of patients with major burns requires understanding of the pathophysiology, diagnosis and treatment of both the local skin injury and derangements in hemodynamic, metabolic, nutritional, immunologic and psychological mechanisms. Table 3 describes patients who will receive optimal care in an inpatient setting.

Burn excision and grafting are recommended for all full-thickness burns and for deep partial-thickness burns that one expects will take longer than two to three weeks to heal. The concept of early removal of burn eschar and immediate wound closure is generally accepted. Evidence suggests that early eschar removal is effective in decreasing morbidity and improving the mortality rate. The goal is to excise the wound within the first week of injury. Temporary wound closure for major burns can be obtained using allograft (cadaveric human skin). Cultured autologous epidermal autograft (Epigraft) is cultivated from patients’ own skin to cover severely burned patients with limited donor sites.

Burn patients are at risk for developing contractures over joints that result in decreased range of motion. Aggressive attention to occupational and physical therapy is necessary to ensure optimal results. Treatments for contractures include surgical techniques such as Z-plasty and excisions with full-thickness skin grafts.
Cosmetic. After an acute traumatic injury is addressed and function is optimized, some patients may seek additional surgery for revision of scars or improvement of residual defects. Repair of severe scarring, such as keloids, hypertrophic scars or contractures, are considered reconstructive if the scarring impairs function or reduces mobility. Minor scars that do not affect mobility or functionality can be minimized with cosmetic surgery. More than 170,000 scar revisions were performed by plastic surgeons in 2014. Scar revision surgeries include Z-plasty and local flaps to reposition scars. Tissue expansion is used to stretch normal skin adjacent to the scar allowing it to be excised and replaced with expanded skin. Skin grafts may be used to replace the scar with skin that is not as thick.

Furthermore, numerous minimally invasive techniques exist to minimize scars and include:

- **Topical treatments.** Gels, tapes or external compression to reduce production of irregular pigment and scar tissue
- **Injectable treatments.** Fillers to improve depressed or concaved scars and steroidal-based compounds to reduce collagen formation and alter appearance size and texture of raised scars
- **Surface treatments.** Dermabrasion uses a mechanical burr to remove top layers of skin. Laser or light therapy causes changes to the skin surface, allowing new healthy skin to form. Chemical peel solutions penetrate the skin’s surface to decrease irregularities in texture and color. And skin bleaching agents lighten hyperpigmentation.

It is important to make patients aware that neither surgical nor non-surgical scar revision treatments will make scars disappear entirely. They can, however, reduce their appearance and make the scarred area smoother.

Plastic surgery is not limited to a given organ system, region of the body or age group, and it can best be described as a specialty devoted to the solution of difficult wound healing and surgical problems. Its ultimate goal is to restore the best function, form and structure of the body with a superior aesthetic appearance. These principles guide the plastic surgeon when managing trauma patients to restore balance and enhance quality of life. ■

### Table 3

<table>
<thead>
<tr>
<th>Burns that Require Admission to Hospital or Burn Center</th>
</tr>
</thead>
<tbody>
<tr>
<td>2&lt;sup&gt;nd&lt;/sup&gt; and 3&lt;sup&gt;rd&lt;/sup&gt; degree burns &gt; 10% BSA in patients under 10 or over 50 years old</td>
</tr>
<tr>
<td>2&lt;sup&gt;nd&lt;/sup&gt; and 3&lt;sup&gt;rd&lt;/sup&gt; degree burns &gt; 20% BSA in any age</td>
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<td>2&lt;sup&gt;nd&lt;/sup&gt; and 3&lt;sup&gt;rd&lt;/sup&gt; degree burns that over cosmetically or functionally sensitive areas such as face, hands, feet genitalia, perineum, major joints</td>
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<td>3&lt;sup&gt;rd&lt;/sup&gt; degree burns &gt; 5% BSA any age</td>
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<tr>
<td>Electrical burns including lighting</td>
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<td>Serious chemical burns</td>
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<td>Burns associated with major trauma</td>
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<td>Inhalation injury</td>
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<td>BSA = Body surface area</td>
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### References

The Atlanta Medical Center department of orthopaedics is responsible for training 20 residents and providing comprehensive musculoskeletal trauma care to our patients.

The practice of orthopaedics covers a wide range of subspecialties, including trauma, joint reconstruction, foot and ankle, hand, pediatric, oncology and sports medicine surgery. The Atlanta Medical Center focuses its care on trauma and joint reconstruction as well as the post-traumatic care of these patients. This begins with the Director of Orthopaedic Traumatology, Dr. Daniel Schlatterer, in concert with a team of orthopaedic surgeons and residents.

Orthopaedic traumatology covers broken bones and traumatic soft tissue injuries including muscle, tendons and ligaments in both upper and lower extremities as well as the pelvis and hip/acetabulum. It also encompasses the post-traumatic reconstruction of joints that have developed arthritis as well as bones that have either not healed (nonunion) or not healed in proper alignment (malunion). Orthopaedic traumatology also specializes in infection management of the musculoskeletal system in both acute and chronic settings. Atlanta Medical Center offers comprehensive care of all of these complex orthopaedic issues.

In its simplest form, orthopaedic traumatology focuses on fixing broken bones and caring for the soft tissues that surround these bones. This can be accomplished in many ways. Current forms of treatment include external fixation, internal fixation with plates/screws/intramedullary nails, joint replacement and/or a combination of these methods. Each fracture and injury is unique, so having a center and a team that specializes in managing these injuries allows a high level of care to be delivered and ensures the patient’s best chance for a full recovery. The goal of fracture fixation is to allow the bones to maintain an anatomic alignment while they heal so the patient can regain their function in as short a time frame as possible.

In some instances, a fracture that extends into the joint is better served by replacing the joint, especially in the geriatric population where prolonged immobilization can be a large burden to their overall health. The orthopaedic trauma team at AMC specializes in these surgeries, providing joint replacements in both traumatic and arthritic situations affecting the hip, knee, shoulder, ankle and elbow. Joint replacement allows for immediate weight bearing with the goal of returning the patient to their pre-injury level of function.

It takes a team of specialists to provide comprehensive care, and Dr. Schlatterer is responsible for overseeing the education of future orthopaedists in the treatment of musculoskeletal trauma at the AMC orthopaedic residency program. The residents receive comprehensive training concerning trauma care in both a surgical and clinical setting over a five-year period. Roughly half of this time is spent at the trauma center, and this serves as the backbone of all orthopaedic education.

The residents play an integral role in assisting Dr. Schlatterer and the rest of the orthopaedic trauma team in caring for the traumatically injured patient. This begins the moment the patient enters the trauma bay until they are discharged home or to a rehab facility and continues in the outpatient clinics. As a teaching institution, the Atlanta Medical Center is on the cutting edge of providing orthopaedic trauma care as the faculty and residents ensure the latest advancements are being employed and researched.
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Neuro trauma is trauma and injuries to the nervous system and its supporting structures. This includes the brain, spinal cord, peripheral nerves, spine and skull. These injuries are related to motor vehicle crashes, falls and assaults, mostly in young males.

The neurosurgeon is one member of a multi-disciplinary team who supports the trauma surgeon by consultation for evaluation and treatment of patients with suspected trauma to the nervous system and its supporting structures. This includes patient examination, review of imaging studies, communication with the trauma surgeon and often time decompression of neuro structures and intracranial monitoring.

These patients are typically the most critical patients in the hospital and have multiple organ injury and failure. These patients need frequent evaluation with imaging, serial neurologic examination and frequent communication with the trauma surgeon and the intensive care nursing staff.

The neurosurgeons at Atlanta Medical Center who support the trauma service include Paul K. King, MD, Gregory Cumberbatch, MD, and Sandea Greene-Harris, MD.

Each is a dedicated to neuro trauma care and have years of experience treating patients with severe trauma to the nervous system.

Dr. King’s keen interest in neuro trauma began during medical school and residency at Henry Ford Hospital in Detroit and the Detroit Receiving Hospital, where he was the co-director of the spinal cord injury unit and neuro trauma ICU.

Dr. Green-Harris’s interest began during neurosurgery training at Tulane University and Charity hospital in New Orleans. She further developed her skills and interest during two tours in Iraq.

Dr. Cumberbatch also became interested in trauma during his neurosurgery training in Washington, D.C., at Georgetown University.

Types of Injuries

There are three main types of traumatic injuries that we see as neurosurgeons supporting trauma care.

- **Traumatic brain injury (TBI).** Includes a concussion, sutural hematoma, epidural hematoma and cerebral contusions. *(See Fig 1 and 2)*
- **Spinal cord injuries.** These include injuries that cause quadriplegia (paralysis that results in partial or total loss of all limbs and torso) and paraplegia (paralysis similar to quadriplegia but that does not affect the arms).
- **Spinal fractures.** *(See Figure 3 and 4)*
- **Peripheral nerve injuries.**

Figure 3 cervical spine fracture
TBI

Traumatic brain injury (TBI) is a major cause of death and disability in the United States, contributing to about 30 percent of all injury deaths. (1) Every day, 138 people in the United States die from injuries that include TBI. Those who survive a TBI can face effects lasting a few days to disabilities that may last the rest of their lives.

Effects of TBI can include impaired thinking or memory, movement, sensation (e.g., vision or hearing) or emotional functioning (e.g., personality changes, depression). These issues
not only affect individuals but can have lasting effects on families and communities.

A TBI is caused by a bump, blow or jolt to the head or a penetrating head injury that disrupts the normal function of the brain. Not all blows or jolts to the head result in a TBI. The severity of a TBI may range from “mild” (i.e., a brief change in mental status or consciousness) to “severe” (i.e., an extended period of unconsciousness or memory loss after the injury). Most TBIs that occur each year are mild, commonly called concussions.

How Big is the Problem?

In 2010, about 2.5 million emergency department (ED) visits, hospitalizations or deaths were associated with TBI – either alone or in combination with other injuries – in the United States. Of those, TBI contributed to the deaths of more than 50,000 people, and TBI was a diagnosis in more than 280,000 hospitalizations and 2.2 million ED visits. These consisted of TBI alone or TBI in combination with other injuries.

From 2001 to 2010, while rates of TBI-related ED visits increased by 70 percent, hospitalization rates only increased by 11 percent and death rates decreased by 7 percent.

Yet in the same time period, the rate of ED visits for sports and recreation-related injuries with a diagnosis of concussion or TBI, alone or in combination with other injuries, rose 57 percent among children (age 19 or younger). In 2009, an estimated 248,418 children were treated in U.S. EDs for sports and recreation-related injuries that included a diagnosis of concussion or TBI.

Leading Causes of TBI

From 2006 to 2010, falls were the leading cause of TBI, accounting for 40 percent of all TBIs in the United States that resulted in an ED visit, hospitalization or death. Falls disproportionately affect the youngest and oldest age groups:

- More than half (55 percent) of TBIs among children 0 to 14 years were caused by falls.
- More than two-thirds (81 percent) of TBIs in adults aged 65 and older are caused by falls.

Unintentional blunt trauma (e.g., being hit by an object) was the second leading cause of TBI, accounting for about 15 percent of TBIs in the United States from 2006 to 2010. Close to a quarter (24 percent) of all TBIs in children less than 15 years of age were related to blunt trauma.

Among all age groups, motor vehicle crashes were the third overall leading cause of TBI (14 percent). When looking at just TBI-related deaths, motor vehicle crashes were the second leading cause of TBI-related deaths (26 percent) for 2006 to 2010.

About 10 percent of all TBIs are due to assaults. They accounted for 3 percent of TBIs in children less than 15 years of age and 1.4 percent of TBIs in adults 65 years and older from 2006 to 2010. About 75 percent of all assaults associated with TBI occur in persons 15 to 44 years of age.

Spinal Cord Injury

Estimates of the incidence of acute traumatic SCI in the United States range between 28 and 50 injuries per million persons per year. At present, there are more than 200,000 cases of SCI in the United States. Older adolescent and young adult males are at high risk for SCI.

The consequences of injury for persons in these age groups include reduced lifetime employment, limited productivity and decreased quality of life. Injured individuals may also need special services throughout life.

The direct medical costs of these injuries to the federal government exceed $4 billion per year, and lost earnings associated with SCI are estimated to be $3.4 billion (in 1987 dollars) annually.

Do All Neuro Trauma Patients Need Neurosurgery?

No. Most patients just need to be evaluated, observed, monitored and discharged home for outpatient care.

Unfortunately, some patients need to have surgical decompression such as a craniotomy for subdural hematomas, epidural hematomas and/or contusions. Some patients may need to have intracranial

Fig 1 epidural hematoma and temporal bone fracture
pressure monitoring and medical treatment for raised intracranial pressure.

Some may even need more aggressive treatment, such as hemi craniectomy, to treat poorly controlled intracranial pressure that is refractory to medical management. (See Figure 2.)

Often, spinal fractures need decompression of the spinal cord and stabilization of the spine with screws and rods.

The injuries are mostly falls and motor vehicle accidents in young people, and the elderly do comprise a significant challenge. The neurosurgeon who provides neuro trauma care must have a keen interest and dedication to providing care to very critically ill patients. The neurosurgeon must be willing to work within a team concept with multiple specialists along with hospital services.

The role of the neurosurgeon in the evaluation and treatment of the trauma patient is critical and he/she is a key member of the trauma team. As a trauma team member, neurosurgery is responsible for evaluation, treatment and monitoring traumatic injuries to the nervous system and its supporting structures.

Fig 2 subdural hematoma


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Since 1997, Atlanta Medical Center has been a key center in providing trauma services for Georgians. Designated as a Level II trauma center at that time, Atlanta Medical Center has demonstrated a continuous and ongoing commitment to caring for seriously injured patients.

This commitment is unique among Georgia hospitals given that only 14 of Georgia’s 152 hospitals can claim this level of continuous involvement in the trauma system. As reported in December 2004 by the Georgia Department of Human Resources, only 9,612 of Georgia’s suspected 40,000 annual serious trauma patients were being treated in designated trauma centers in 2003. As a result of this disproportionate treatment of seriously injured patients in designated trauma centers, Georgia’s death rate from trauma was 65 per 100,000 compared with the national average of 56 per 100,000. Accordingly, more than 750 Georgians per year were dying unnecessarily due to our relatively poor delivery of quality trauma care in Georgia.

In 2003, designated trauma centers were located in only 10 of Georgia’s 159 counties, and large geographic areas were completely devoid of trauma services. Many rural areas in South Georgia were located more than two hours from a designated trauma center. The concept of regional trauma care whereby local trauma resources could be shared with areas devoid of trauma resources was essentially non-existent at that time.

When I became Trauma Medical Director at Atlanta Medical Center in April 2002, the development of a regional trauma center at our facilities became the focus of my vision for our trauma program. With the commitment and assistance of William E. Moore, CEO; Ellie Post, R.N., trauma and ER service line administrator; Julie Lewis, R.N., ICU manager; and Rochella Mood, R.N., trauma program manager, we actively sought transfers of trauma patients from surrounding counties that had no trauma resources at the time, and the hospital encouraged those centers to transfer trauma patients from their emergency rooms to Atlanta Medical Center for definitive trauma care.

Rescue Air, a Georgia helicopter ambulance service, partnered with us during the initial phases of this effort. They were successful in providing air transport of critically injured patients from Metro Atlanta and throughout Georgia to Atlanta Medical Center for definitive care of serious trauma-related injuries. As a result of this successful strategy, trauma admissions rose from 1,046 in 2002 to more than 1,250 trauma admissions in 2004. As a result of our continuous efforts, trauma volume has grown steadily at Atlanta Medical Center since 2003. (See chart on page 23.)

Atlanta Medical Center has been able to deliver skilled trauma care in a number of vital service lines. Neurosurgery, a service line unavailable in many hospitals despite a status as a designated trauma center, has been continuously available at Atlanta Medical Center since 2002.

Orthopedic trauma care has been a traditionally strong service line. Given our volume of blunt trauma, more than 80 percent of our admitted patients have orthopedic injuries. In 2002, operative fixation of complex fractures, such as pelvic ring fractures, and fractures involving the acetabulum (hip socket) were typically delayed for seven to 10 days following admission due to the high risk of major bleeding associated with these injuries. Today, such injuries routinely undergo surgical fixation within the first 24 hours of hospital admission due to the expertise we offer in the field of orthopedic trauma.

In 2009, Atlanta Medical Center received patients from 82 of Georgia’s 159 counties, clearly demonstrating our role as a major regional and statewide trauma resource. Given the success of our outreach, we set our next strategic goal to become a Level I trauma center. This was a natural extension of our previous efforts given that Level I centers must care for a significant volume of trauma patients annually, and they must be leaders in trauma education and research. Blessed with active and continuously accredited residency training programs in General Surgery and Orthopedic Surgery, Atlanta Medical Center qualified for Level I trauma designation in June 2011.
Presently, we are working to assure our ongoing designation as a Level I trauma center. Criteria for this designation are stringent and must assure the designating bodies of our ongoing commitment to providing quality care to trauma patients. This process is one of continuous quality improvement in processes and outcomes of trauma care. During these difficult economic times, it is our duty to demonstrate, to the public and to healthcare providers, that we are improving the value of the care we offer by demonstrating improved outcomes and improved processes of care at lower costs.

Atlanta Medical Center continues its role as an integral cog in the wheel that has become the Georgia Trauma System. This entity has evolved over the past 20 plus years and is now reaching some important goals in developing a functional statewide trauma system. As a Level I trauma center, Atlanta Medical Center is expected to demonstrate a leadership role in the development of this system.

Our ultimate goal is to continue to demonstrate our leadership in trauma. As a result of our championing the concept of a regional trauma center, there is more widespread availability of trauma care throughout Georgia. Today, there are 24 centers of excellence in trauma care throughout Georgia. Many new centers have been inspired by our efforts and are actively establishing a regional trauma presence in their own geographic areas.

Today trauma care is more widely available throughout Georgia, and there are fewer geographic voids in trauma availability; however, more trauma centers are still needed. In fact, these statewide efforts initially impacted our own trauma admissions, and we saw a definite decrease in our trauma growth since 2011 as trauma care became more available.

Trauma volume at Atlanta Medical peaked at 2,355 admissions in 2011 and diminished by nearly 20 percent to 1,891 admissions by 2013. Our numbers have rebounded since that time, with 2015 our busiest year ever, when we admitted a record number of patients (2,455).

Our center is actively preparing to seek Level I verification by the American College of Surgeons Committee on Trauma (ACS-COT). This endorsement is a rigorous test of a trauma centers commitment to providing excellence in trauma care. We feel we are up to the challenge. Stay tuned!!

Figure 1. Yearly admissions to the Trauma Service at Atlanta Medical Center.
The History of Surgical Training at Atlanta Medical Center

By Philip T. Ramsay, MD

Atlanta Medical Center has been providing quality healthcare to the community for more than a century. The roots of Atlanta Medical Center began in 1901 when a local church created a small infirmary in an Atlanta home. The infirmary grew and was eventually sold to the Georgia Baptist Convention. It was renamed Georgia Baptist Hospital in 1913. The hospital moved to its current location in 1921 and has continued to grow and become one of the leading healthcare facilities in Atlanta.

The first medical school graduates were accepted for postgraduate training at Georgia Baptist Hospital in 1940, including training in surgery. Very few surgical training programs in the country were accredited at that time. In 1958, the surgical training program was accredited under the direction of Dr. Alva Hamblin Letton and Dr. John Page Wilson.

The program was small and graduated a single surgery resident each year. As the program continued to grow, it was expanded to graduate two surgery residents each year. In 1983, Dr. George Lucas established an affiliation with the Medical College of Georgia, and students began to rotate at Georgia Baptist Hospital for their core clinical clerkships. As a result, top students from throughout the southeast were drawn to Georgia Baptist Hospital and began to fill the program.

During the 1980s, Georgia Baptist hospital became known as a cancer treatment center of excellence and was a leader in the pioneering days of laparoscopic surgery. Due to developing economic challenges in the 1990s, the Georgia Baptist Convention sold the hospital to Tenet in 1997, and the name of the hospital was changed to Atlanta Medical Center in 1999. Despite the changes in leadership, the program continued to thrive as a result of the strong resident and faculty camaraderie and the development of relationships with other hospitals in Atlanta and the surrounding area.

The program faculty includes both full-time hospital-employed faculty and part-time private practice faculty. In 2011, the program and faculty expanded under the direction of Dr. George Fuhrman, and currently three surgical residents graduate each year.

Also in 2011, Atlanta Medical Center was designated as a Level I trauma center under the direction of Dr. Vernon Henderson. Over 2,400 trauma patients are treated at Atlanta Medical Center each year, and the hospital receives transfers from more than 60 area hospitals. Year after year, there has been an increase in applications for general surgery training, and this year almost 800 applications were submitted to the surgery residency program. Third-year and fourth-year medical students interested in surgery are encouraged to rotate on the surgery service at Atlanta Medical Center.

Graduates of the program have selected careers ranging from academics to urban or rural private practice. Some graduates have gone on to practice general surgery, while others have gone on to pursue fellowship training in breast surgery, vascular surgery, minimally invasive surgery and trauma/critical care surgery at institutions such as MD Anderson Cancer Center in Houston, Emory University here in Atlanta and Vanderbilt University in Nashville.

Regardless of each trainee’s career choice, the goal of the residency program is to train residents to become confident and competent general surgeons. In order to achieve this goal, the program provides an organized curriculum for study, a busy trauma and critical care service, and extensive general surgery experience at both Atlanta Medical Center and our integrated sites in the surrounding areas. Residents receive early operative experience, and graduating residents complete between 1,200 and 1,600 cases in bread-and-butter general surgery as well as complex cases typically seen at tertiary referral centers or large academic medical centers.

Perhaps the greatest strength of the program is the close relationship among the residents themselves and the relationship between the residents and attending faculty. Residents learn to work as a team and to rely on their peers to provide quality patient care.
Perhaps the greatest strength of the program is the close relationship among the residents themselves and the relationship between the residents and attending faculty.

On the trauma service, in particular, teamwork is important as these patients are often the sickest and most critically ill patients in the hospital. Attention to detail is vitally important, and effective communication is key. Younger residents look up to older more experienced residents for direction and advice. Older more experienced residents, in turn, teach what they have learned to younger residents.

The busiest rotation in the surgery residency curriculum at Atlanta Medical Center is the trauma rotation. The residents are the first to respond to “trauma alerts” and “trauma responses” when patients present to the emergency department. Mechanisms of injury range from falls, motor vehicle collisions, and assaults to gunshots and stabbings. The residents are responsible for the initial evaluation of the patient and often initiate lifesaving treatment, which is based on Advanced Trauma Life Support (ATLS). They are also responsible for ordering and interpreting various diagnostic tests and consulting appropriate subspecialists. While on the rotation, residents not only learn how to perform emergency operative procedures in the operating room specific to trauma, they also learn how to manage critically ill patients in the intensive care unit. The ICU trauma team, which is made up of attending physicians, residents, pharmacists, nutritionists, and nurses, rounds daily on each patient in the ICU. This provides the opportunity for discussion of the most up to date literature on critical care issues such as shock, respiratory failure, and sepsis, to name a few. Residents follow patients throughout their hospital stay and even coordinate further treatment outside of the hospital after the patient has been discharged.

All of this is done under the supervision of experienced attending faculty. Our current trauma/surgical critical care faculty includes Dr. Vernon Henderson, Dr. Katherine Kohler, Dr. Philip Ramsay, Dr. Stantson Spence, Dr. Mark Walker and Dr. Amy Wyrzykowski. Through their experiences, residents learn the value of teamwork, which provides excellent preparation for modern-day group practice.
ALLERGY

From itchy eyes, stuffy noses and sore throats to breathing problems, digestive issues and more severe symptoms, allergies affect the lives of millions of American every day. Atlanta Medicine recently spoke with three Atlanta area allergy specialists to learn more about which types of allergies affect people living in Georgia and the treatments available to treat those allergies successfully.

Trending allergies, ongoing research

Stanley M. Fineman, MD, M.B.A., a partner in Atlanta Allergy & Asthma and adjunct faculty member at Emory University, says that one interesting trend in the Atlanta area is a spike in tree pollen allergies in the fall. Technicians at Atlanta Allergy & Asthma, which provides the official daily Atlanta Allergy Pollen Count on its website (www.atlantaallergy.com), recently traced the source of the spike to one particular tree.

“In Atlanta, there are two pollen seasons, spring and fall. Spring is the season for tree and grass pollens and fall is the time for weed pollen such as ragweed. So it was unusual that we were starting to see more people with tree pollen allergy in the fall,” said Fineman. “We were able to trace the source of their allergy to the Chinese Elm, which had not been a tree that we typically saw here in Georgia. However, it has become very popular with landscapers and homeowners in recent years as an ornamental tree because it’s pretty, hardy and grows fast. And it pollenates in the fall instead of the spring.”

Fineman also has noticed an increase in food allergies in the past 10 years.

“There are a number of theories about why we’re seeing an increased prevalence in food allergies, but we’re still not certain of the reason,” he said. “Each person is different, but we’re definitely seeing more people with allergies to nuts, milk, eggs and fish.”

Atlanta Allergy & Asthma is conducting ongoing research to help develop therapies for allergic diseases. The practice is actively recruiting participants for various clinical trials, including asthma patients who have difficulty controlling their symptoms, people who have a dust allergy and those who have an allergy to peanuts.

“The clinical trials are carefully regulated by the FDA and involve treatment methods like targeted therapy for asthma, sublingual medications for dust mite allergy or oral desensitization for peanut allergy,” Fineman said. “We hope that the data we gather will lead to the development of improved treatments for different types of allergies and asthma.”

Advances in treatments for allergies, asthma

Some of the best testing and treatment options are tried-and-true methods, according to Alan R. Redding, MD, of Redding Allergy & Asthma Center. But he also cites a new treatment as an improvement in treating certain allergies.
“Skin testing remains the mainstay of allergy testing because it doesn’t require a blood draw from the patient and it allows us to see results immediately. And subcutaneous immunotherapy is still the most widely used treatment for allergic rhinitis and asthma,” he noted. “However, there is a new FDA-approved sublingual immunotherapy (SLIT) treatment on the market for people with grass and ragweed allergies. This may signal additional SLIT treatments in the future for other allergies.”

Redding says that patients who suffer with severe uncontrolled asthma are finding relief from a new treatment, Omalizumab. Omalizumab is currently the only biologic treatment for asthma that is FDA-approved for use in the U.S.

“Omalizumab, given to the patient as an injection every four weeks, targets one of the main interleukins that causes chronic spontaneous urticarial (hives),” he explained. “This drug has multiple benefits. In addition to helping control the patient’s chronic hives, it can also reduce their dependence on oral steroids.”

Redding encourages his fellow physicians to refer patients they suspect of having allergies or who have uncontrolled asthma to a board certified allergist for treatment.

“I think it’s important to understand that a board certified allergist has very specific training in identifying and treating allergies and asthma,” he said. “Physicians who are certified by the American Board of Allergy and Immunology have completed either an internal medicine or pediatric residency and an allergy/immunology fellowship, and have passed a board exam. The American Board of Allergy and Immunology is the only allergy organization that is recognized by the American College of Graduate Medical Education.”

**Adult-onset allergies, recognizing symptoms**

Faria Khan, MD, a physician with Georgia’s Allergy and Asthma Institute and current Communications Chairman for the Medical Association of Atlanta, says she has noticed a rise in the number of adults presenting with allergies later in life.

“At least one-fourth of all people in America have allergies, but we’ve seen a noticeable trend emerge over at least the last 10 years but probably more,” she said. “While the proportions and types of allergies — to pollen, environment and food — are the same, we’re now seeing people in their 40s and 50s who are experiencing their first allergies.”

Khan says there are many theories as to why this is happening, but that no clear reason has emerged.

“Some theories suggest we are ‘too sanitary’ and are not allowing our immune systems to develop by being exposed to germs. Other ideas involve dietary factors or aspects of living in an industrialized society that we haven’t yet identified,” she explained. “But we really don’t know why we are seeing this increase in adult allergies.”

Khan says the symptoms for allergies may often mimic other illnesses, so it’s important for physicians to be aware of this and know when to refer a patient to an allergist.

“There are so many aspects of allergy. Allergies often affect the upper respiratory tract, so if a patient has chronic sinusitis or frequent colds, it may actually be allergy. Sometimes, gastrointestinal problems turn out to be an undiagnosed food allergy. A rash could be caused by an allergy. And breathing problems could actually be asthma,” she noted. “I would advise other physicians to consider allergies as a root cause of symptoms of many kinds that they can’t get to the bottom of and solve.”
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