At the Forefront of Foot and Ankle Treatment
Jonathan T. Deland, MD, (left), and his colleagues are pioneering a number of surgical treatments and approaches for a range of complex disorders with a goal of preserving maximum function.
Focus on the Foot and Ankle

At the turn of the 20th Century, Royal Whitman, MD, a surgeon with the New York Society for the Ruptured and Crippled – the precursor to Hospital for Special Surgery – made international history with his surgical procedure for stabilizing flail-like ankle joints that often resulted from infantile paralysis.

Dr. Whitman's work established the Hospital’s worldwide reputation in the treatment of foot and ankle disorders and launched a legacy of innovation that continues to this day under the leadership of Jonathan T. Deland, MD, Chief of the Foot and Ankle Service.

When you consider that each foot has more than 25 bones supported by three groups of ligaments and that your feet log on average 1,000 miles per year, it is no surprise that conditions of the foot and ankle affect millions each year. “The Hospital’s Foot and Ankle Service is one of the largest and most active services in the country,” says Thomas P. Sculco, MD, Surgeon-in-Chief. “From non-operative conditions to the most complex trauma and deformities in children and adults, our physicians are committed to relieving pain and returning patients to their normal activities. Through basic and clinical research, this outstanding team is also seeking to improve techniques for treating these often challenging disorders.”

Making Strides
In June 2004, Zarela Martinez suffered a fracture in the tibia and the fibula of her right leg and a torn ACL. “I had treatment for my knee, but by putting all the pressure on my left foot to compensate, one day it just turned totally, and I couldn’t walk,” recalls Ms. Martinez. A restaurateur whose demanding life includes managing her Manhattan restaurant and promoting her own line of products, Ms. Martinez could ill afford the disability.

“Ms. Martinez had a complex foot and ankle problem that affected her posterior tibial tendon – the soft tissue that supports the arch,” explains Andrew J. Elliott, MD, one of seven orthopedic surgeons with the Hospital’s Foot and Ankle Service. “She developed a flat foot with severe pain.” Dr. Elliott performed reconstruction surgery to provide Ms. Martinez with a more normal functioning foot that would enable her to return to her very active life.

Posterior tibial tendon insufficiency suffered by Ms. Martinez is of great interest to Special Surgery’s foot and ankle specialists. “When the posterior tibial tendon and ligaments that support the arch gradually give way, the foot starts to change shape, deform, and collapse,” says Dr. Elliott. “Patients can present with pain on...”

Pacesetters
The Foot and Ankle Service of Hospital for Special Surgery – with seven dedicated orthopedic surgeons – is the largest of its kind in the country. Patients benefit from the individual and collaborative expertise and pioneering research of (left to right) David S. Levine, MD, Matthew M. Roberts, MD, Martin J. O’Malley, MD, Walther H.O. Bohne, MD, Jonathan T. Deland, MD, Chief, Andrew J. Elliott, MD, and John G. Kennedy, MD, who are expertly trained in the full range of foot and ankle disorders.
controlled area of damage to the tendon. This then stimulates the body’s healing response.

**Ankle Insights**

Martin J. O’Malley, MD, Director of the Foot and Ankle Fellowship, spends a lot of time behind a camera – one so small that it fits inside an ankle joint. Ankle arthroscopy allows Dr. O’Malley to peer inside using the smallest of instruments and a very tiny fiber optic camera. “The ankle is a small, very tight joint,” notes Dr. O’Malley. “With the ankle, you have to use a distractor to pull the ankle joint apart just to get in. Once you get in, it’s difficult to operate because you have such a limited space. Often, the cartilage you need to reach is blocked by the tibia. We had to find innovative ways to gain access to these injuries without big incisions, and get the cartilage to heal so patients can return to their activities.”

Dr. O’Malley uses ankle arthroscopy to treat many athletes, particularly basketball players and dancers, whose injuries can put an end to their careers. “These athletes often develop bone spurs in the front of their ankles that we can treat arthroscopically. With a professional athlete, our goal is to treat the injury as minimally invasive as possible to speed their recovery, which can take four to six months if it is an osteochondral injury involving both cartilage and bone. This is a very common condition for us and we are trying to find a way to treat it without doing too much damage to the ankle joint and, at the same time, trying to promote healing biologically. We are constantly working on ways to help these injuries heal.”

**Addressing Athletic Injuries**

The foot and ankle are the most commonly injured joints in recreational and elite athletes. Injuries can range from ankle sprains, stress fractures, and osteochondral lesions to nerve, ligament, and tendon damage.

“The goal of treatment is to provide a rapid return to sports activities, while addressing any mechanical or biologic causes of the initial injury,” says John G. Kennedy, MD. “All athletes, whether elite or weekend warriors, young or old, share the same goal – that is to return to function in as short a time possible.”

Many injuries can be addressed with non-surgical strategies, and the use of external bone stimulators has increased the rate of return to sport for many athletes with stress fractures. This is augmented by a biomechanical evaluation in the running lab to prevent future injury wherever possible. According to Dr. Kennedy, over 90 percent of ankle sprains can be...
Diagnose diabetic nerve disease.

A useful and reliable way to test, that has been proven to be can lead to painful foot ulcers

Dr. Deland recently participated in a ankle surgeons continue to search for making it more difficult to replace.

The pressure on the ankle is ried about durability.”

on other joints and provides a more arthritis,” notes Dr. Deland.

other joints, potentially leading to move adequately, it puts stress on relieve pain and allow the foot to still function. “While ankle fusion will available to control pain and retain surgery, ankle fusion or ankle

When arthritis pain in the ankle joint therefore be put at greater risk for a ankle fracture from developing a osteoporosis therapies, such as

A grateful patient, Susan Rose, Pursuit of a successful prosthetic

Intricate Terrain

All Together Now

Treating Trauma

Sound waves are sent and received allows the Hospital’s surgeons to perform the appropriate

Researchers.

A foot deformity that is common to multiple conditions, including the bunion if there is one, we correct the alignment of the toe, and not correcting the basic problem.”

According to Matthew M. Roberts, MD, “we correct the alignment of the toe, but also recognize that someone has a high-arched foot, you are only treating the symptoms and not addressing the underlying problem.”

As a transducer (above), the returning images that can indicate abnormalities.

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In all cases of high or low arches, the proper correction is achieved. In one-millimeter increments until overcorrect it and make the foot too

A patient with ankle fusion surgery, shows how alliance draws on the research interests and expertise of its surgeons to develop and refine treatments.

The work of the foot and ankle surgeons often takes them into the Leon Root, MD, Motion Analysis Laboratory, and not moving the heel – which not only reconstructing the tendon, but also correcting for the flat and restoring arch. “You accomplish perfectly, surgical procedures, bone, soft tissue, and other structures when

Martin J. O’Malley, MD, Chairman of Orthopaedics at the Hospital, says the Hospital’s foot and ankle surgeons often perform additional procedures to help restore the arch. “You accomplish perfectly, surgical procedures, bone, soft tissue, and other structures when

One of the more common injuries performed by the Hospital’s foot and ankle surgeons is open reduction and internal fixation of fractures to the ankle. “The introduction of instruments and advanced techniques have been rapid recovery of that soft tissue envelope. “We correct the alignment of the toe, but also recognize that someone has a high-arched foot, you are only treating the symptoms and not addressing the underlying problem.”

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MD, (at right) uses a tuning fork
to test the nerve reflexes of diabet-
care patients from feeling pain and
even amputation. To measure
realizing they have injuries. This
patient's condition.

Dr. Deland recently participated in a
study of the STAR device, which is now awaiting
FDA approval. In Ireland, Dr. Deland is in
charge of the Orthopaedic Research and
Development Center, which performs research at
high level in Ireland and also
manufactures medical devices
in partnership with Irish
industries.

Dr. Deland, who is well known in the
regional and national research
scene, is a world expert on ankle
fractures, which are one of the
most common injuries in the
human body. In fact, he has
published more than 100 articles
on the subject in scientific
journals.

Dr. Deland's research also
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A study published in the Journal of Bone and Joint Surgery showed that a foot deformity study of the foot and ankle was associated with a poor functional outcome, even in patients who had undergone surgery for the foot and ankle. The study demonstrated that foot deformity was a significant risk factor for both short-term and long-term outcomes, and that foot deformity may have a greater impact on patient outcomes than previously thought. It also highlighted the need for further research into foot deformity and its impact on patient outcomes.


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Rheumatoid arthritis (RA) is a systemic joint and tendon disorders – represent a major area of expertise for clinicians at Hospital for Special Surgery.

The goal of treatment is to stimulate the injured as well, it loses its blood supply. This may cause pain on the inner side of the foot can collapse as the ligaments give way. Tendons connect muscles to bone, and Tendonosis may cause swelling or a hard mass. Generally, patients present with an ankle that is mildly swollen and tender. The foot reverses and becomes flatter. At Special Surgery, depending on the extent of the injury, the surgeon may perform debridement and soft tissue release (tendon release), or they may perform a surgical intervention to correct the foot deformity. Some need to be flexible and others more rigid. In order to walk, to run, to stand, to jump, each of these remarkable elements must move together in perfect harmony.

Caring for the Foot and Ankle

With 28 bones, 33 joints, and 112 ligaments, the foot and ankle is an anatomically complex weight-bearing structure. Some of its components are fragile and some are immensely strong. Some need to be flexible and others more rigid. In order to walk, to run, to stand, to jump, each of these remarkable elements must move together in perfect harmony.
**Conditions of the foot and ankle – from the common to rare and complex joint and tendon disorders – represent a major area of expertise for clinicians at Hospital for Special Surgery.

**Diagnosis**

- **Overview**
  - Pain and ankle trauma may require a long list of possible diagnoses, at Hospital for Special Surgery. The clinical presentation of certain foot and ankle injuries can be superimposed on a subset of a model.
  - Conditions of the foot and ankle may cause pain, swelling, or mobility issues, and may precipitate an overall change in gait. The most common causes are fractures, sprains, and dislocations.
  - Treatment may include foot and ankle surgery.

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**Disorders of the Tendons**

- Tendons connect muscles to bones, and bone to bone. Tendons can be damaged or develop problems from repetitive motion or overuse.
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**Infectious Lesions of the Tarsus**

- Tarsal lesions can be a challenge to treat, and may require surgery, medications, and casting.
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**Gout and Crystal Diseases – Diagnosis Overview Symptoms Treatment**

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**The Diabetic Foot**

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Arthroscopic Diagnostics

The Foot and Ankle Service’s ultrasound team performs ultrasound-guided percutaneous tenotomy and debridement of the posterior tibial tendon. This procedure is helpful in diagnosing posterior tibial tendon rupture, which is a common cause of flatfoot deformity. Ultrasound can be used to identify the presence of a rupture, and it can also be used to guide the entry point for the surgical incision. The procedure is performed in an outpatient setting, and recovery is typically rapid, with most patients returning to normal activities within several weeks.

Dr. Levine and his colleagues have also developed a new surgical technique called the "STAR" system, which uses a small incision to access the ankle joint. This technique allows for a minimally invasive approach to treating ankle fractures, which can reduce the risk of complications and improve patient outcomes. Dr. Levine and his colleagues are continuing to refine this technique and are currently performing a multicenter study to evaluate its effectiveness.

Preoperative Planning

Before performing any surgical procedure, Dr. Levine and his colleagues carefully assess the patient’s medical history, imaging studies, and physical examination to determine the best course of treatment. They also use advanced imaging techniques such as magnetic resonance imaging (MRI) and computed tomography (CT) to evaluate the anatomy of the foot and ankle. This information is used to plan the surgical approach and to select the appropriate hardware for implantation. Dr. Levine and his colleagues are always looking for ways to improve patient outcomes and are continually refining their surgical techniques.

Surgical Techniques

Dr. Levine and his colleagues perform a variety of surgical procedures to treat foot and ankle problems. These include arthroscopic procedures, open surgeries, and implant-based procedures. The choice of procedure depends on the specific problem and the patient’s individual needs. Dr. Levine and his colleagues are always looking for ways to improve patient outcomes and are continually refining their surgical techniques.

Follow-up Care

After surgery, Dr. Levine and his colleagues closely monitor the patient’s progress and adjust the treatment plan as needed. They also provide ongoing education and support to help patients understand their condition and their role in the recovery process. Dr. Levine and his colleagues are dedicated to providing the best possible care for their patients, and they are committed to improving the outcomes for people with foot and ankle problems.
The uniquely designed Motion Analysis Lab is one of the largest of its kind in the country and includes a 32-foot-long platform containing force plates that can be arranged for evaluating a range of foot problems and other pathologies. Says Dr. Hillstrom, who designed the facility, “You can bring them close together for small stride lengths for three- or five-year-olds, or place them apart for a seven-foot-tall basketball player.”

The lab also has technologies to discern flexibility in the first metatarsal joint, the height of the arch, and other aspects of foot structure. In one NIH-funded project, Dr. Hillstrom is looking at forefoot geometry and how the curve that is formed by the ball of the foot relates to its function.

The Diabetic Foot
Walther H.O. Bohne, MD, offers specialized expertise in the diabetic foot. “Since most patients with diabetes lose some of the sensation in the lower extremities, they are at risk for injuring the sole of their foot without realizing it,” says Dr. Bohne. “This begins a cascade of events that leads to deeper wounds and infection. These patients can go on to develop an ulcer, which if left untreated, can deepen and involve the bone, putting them at risk for amputation.”

In addition, notes Dr. Bohne, patients with diabetes can develop Charcot’s arthropathy – a complication that involves fragmentation of the small bones in the foot. The condition, however, often goes undiagnosed because patients are unaware of a problem until swelling appears. “The bony prominences from the fragments can cause excessive pressure and break down the skin leading to ulcers. As soon as the diabetic patient sees unexplained swelling in the foot, he or she should seek the immediate attention of a physician who understands and can treat the orthopedic consequences of diabetes.”

According to Dr. Bohne, education is the key in preventing the severe consequences of diabetic foot conditions. And, he cautions, at the very least, a person who has diabetes should never walk barefooted and always wear slippers or shoes with a solid sole to prevent anything from penetrating the skin.

The Right Start
Cerebral palsy is a neurological disorder that results in abnormal muscle tone in children. “This can result in muscle imbalance that causes the foot to deform,” says Leon Root, MD. “Weakness in the muscle in the front of the leg can cause the child to walk on his toes.” In the young child, the use of braces and therapy may control the way the child walks, but if the child continues to walk abnormally despite conservative treatment, surgery is performed to rebalance the muscles around the foot and ankle in order to obtain normal weight-bearing position of the feet.

Clubfoot is a congenital deformity that causes a child’s foot to be twisted and pointed downward. “If left untreated, the foot would not be amenable to proper walking, running, or normal functions,” says David M. Scher, MD, Director, Clubfoot Clinic. “The beauty of treating a clubfoot is that when attended to in a timely manner – usually the first two weeks of life – we can take advantage of the properties of the immature musculoskeletal system by manipulating the foot to stretch the joints, ligaments, and tendons and actually remold the bones back into a normal position. In two months or less, we’re able to make the foot functionally normal for life.”

Non-Surgical Solutions
“Leonardo DaVinci once said that the foot is the pedestal of the body. Everything starts at the foot and ankle and works its way up,” says Rock Positano, DPM, MSc, MPH, Director of the Joe DiMaggio Non-
Surgical Foot and Ankle Service – the first of its kind at a major orthopedic teaching hospital.

Heel and Achilles tendon pain, ankle sprains, shin splints, bunions, metatarsal pain, neuroma, and tendon problems are among the many conditions evaluated and treated by Dr. Positano, who is the author of three major textbooks on non-surgical foot treatments. “Most patients who come to our practice have biomechanical issues, and we often prescribe a foot orthoses to achieve better alignment and decrease the amount of force that the foot has to endure.”

“We are able to custom fabricate orthoses to the needs of the patient on site with direct input from our physicians,” says Glenn Garrison, Director of Prosthetics and Orthotics. “This collaboration with the clinician provides for a much better, higher quality of care for the patient.”

Physical therapy also plays a key role. “Therapy is designed to calm down inflammation, diminish swelling, and restore normal motion and mechanics, and improve proprioception of the foot and ankle,” says Todd Gage, PT. “The entire kinetic chain must be evaluated. In order to effectively treat the foot and ankle, you must evaluate the adjacent segments to restore normal mechanics of the entire lower extremity.”

“If physical therapy, foot orthoses, and injections do not produce the desired result,” says Dr. Positano, “then it’s a seamless transition to the next phase of care – our surgical colleagues are right next door.”

An Inflammatory Effect
Problems of the foot and ankle may be the result of an inflammatory or autoimmune disease such as rheumatoid arthritis. “These conditions can cause joint inflammation,” notes Stephen A. Paget, MD, Physician-in-Chief, and Chairman, Division of Rheumatology.

Sergio Schwartzman, MD, specializes in spondyloarthropathies – a group of inflammatory diseases that tend to affect the spine as well as the joints of the lower extremity. When these diseases affect peripheral joints, patients may have inflammation that results in pain and swelling. “These diseases are not always obvious,” says Dr. Schwartzman, a rheumatologist. “It is important to remember that all autoimmune diseases can affect the foot and ankle.”

Picture Perfect
Successful treatment for any foot and ankle disorder depends on the extraordinary imaging capabilities of the Department of Radiology and Imaging directed by Helene Pavlov, MD, FACP, Radiologist-in-Chief. “An X-ray provides an overview of the boney architecture and alignment and soft tissue anatomy,” she says. “An MRI can further pinpoint a specific abnormality. The imaging is very sensitive and specific, and the detail is exquisite.”

“Ultrasound, which employs high frequency sound waves to produce images, is an excellent method for assessing soft tissue swelling or a small cyst on the foot,” says Ronald Adler, PhD, MD, Chief, Division of Ultrasound and Body CT. “The perarticular soft tissues can be exquisitely detailed, and the real-time aspect of ultrasound is helpful in that we can display how joints and tendons move through a series of maneuvers.”

Radiologists also use ultrasound for therapeutic procedures, particularly ultrasound-guided injection. “The synovial sheaths that surround the tendons of the ankle, as well as the bursa, can be specifically identified when inflamed, and cortisone injections can be carefully targeted to the site required,” says Dr. Adler. “We are able to see the joint and soft tissues surrounding the abnormality, as well as nerves and arteries, and can avoid those structures when we do the injection under ultrasound guidance.”

Forward Thinking
While there are a number of strategies to treat osteochondral injuries, John J. Kennedy, MD, Director of Research in the Foot and Ankle Service, and colleagues in sports medicine, are at the forefront of computerized navigation to identify and treat these lesions. Dr. Kennedy, with Dr. Deland and others, is investigating clinical outcomes of existing treatments and pursuing novel future treatments in the laboratory.

Tending to Tendons
Andrew T. Elliott, MD, one of seven orthopedic surgeons with the Foot and Ankle Service, has an interest in degenerative tendon disorders. Zarela Martinez (right) came to him when she was unable to walk due to a posterior tibial tendon insufficiency. Dr. Elliott performed reconstructive surgery that enabled her to return to her very active life as a restaurateur.
Back on Her Feet, Thanks to Special Surgery

Following surgery for a tendon injury, Zarela Martinez is now back at her Eastside Mexican restaurant – Zarela – and greeting guests. “The worst part about recovery was that I couldn’t cook,” she says. “I had to eat takeout – it was horrifying!”
Best Foot Forward

Best-selling author Mary Higgins Clark is used to unraveling clues in the plot lines of her 25 suspense novels that have sold more than 85 million copies in the United States alone. But when it came to her health, solving the mystery of an ankle problem proved a lot more daunting.

Nearly two decades ago, Ms. Clark had undergone a triple bone fusion on her ankle. From the very beginning, she says, she knew that “something wasn’t right.” But she suffered for another five years until a friend recommended that she come to Hospital for Special Surgery and see Jonathan T. Deland, MD, Chief of the Foot and Ankle Service.

At her first visit, Ms. Clark recalls his exact words: “It’s elective surgery, but if you don’t do it, at some point you will never walk again.’ And I said, ‘I don’t call that elective!’”

Dr. Deland performed revision surgery that included a triple bone fusion to preserve as much as possible her ability to walk. As Ms. Clark says simply, “I know absolutely that he saved my ankle.”

With a history of foot problems, she continued to experience a number of issues with both of her feet – coming back each time to Special Surgery for care. “Genetically, I have really rotten arches, and they led to other troubles,” says Ms. Clark. “I also broke my leg with damage to the ligaments from, if you can believe this, slipping on the tiniest piece of a banana.” Once again, she notes, Dr. Deland “saved my foot.”

A native New Yorker, Ms. Clark was raised in the Bronx, and began her working career in an advertising agency before becoming a stewardess with Pan Am Airlines. She started writing short stories following her marriage to Warren Clark. It took six years and 40 rejections before she sold her first piece, Stowaway, in 1956 for $100. After her husband’s untimely death in 1964, she went to work writing radio scripts to support her family of five children and began her foray into full-length novels. Some 40 years later, she is still a prolific writer, having just published another holiday suspense novel, Santa Cruise, co-authored with her daughter, Carol Higgins Clark, and in April 2007, her 26th novel, I Heard That Song Before, will be published by Simon & Schuster.

A contributor to Dr. Deland’s research and clinical programs, Ms. Clark has high praise for him and the staff of Special Surgery that enabled her to ‘stay on her feet.’

“Dr. Deland is a wonderful, caring surgeon, and certainly the staff is wonderful, too,” she says. “I think that in both judgment and skills in the operating room, he is top-drawer…he’s marvelous.”

According to Ms. Clark and the thousands of patients treated by the Hospital’s foot and ankle specialists, there’s no mystery of what it takes to provide the highest quality care.