CHAPTER **54**

THE EFFECTIVENESS OF EXTRACORPOREAL SHOCK WAVE THERAPY FOR THE TREATMENT OF PLANTAR FASCIITIS: A Prospective Study

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Heel pain makes up about 15% of all adult foot complaints, and it has been estimated that each year some 40 million Americans suffer from this condition. Although there are many other known causes of heel pain the vast majority of patients present with plantar fasciitis. Conservative treatment is usually successful for heel pain and can include oral or injectable anti-inflammatory drugs, strapping or tapings, orthotics, night splints, stretching, physical therapy, and change in shoes. Studies regarding the outcome of nonsurgical treatment for insertional plantar fasciitis report total relief of pain in 44 to 82% of the patients. Those patients unresponsive to conservative treatment often will require surgical intervention. The outcome of surgery in patients failing to respond to conservative care is a 48 to 90% satisfaction rate regardless of the surgical treatment, which can include release of the plantar fascia, partial or complete, resection of the plantar heel spur or a combination.

Recently, extra-corporeal shock wave therapy (ESWT), a non-invasive treatment modality for plantar fasciitis, has been introduced. ESWT has been used for over 10 years in the treatment of several types soft tissue pain in orthopedic disorders such as calcifying tendonitis of the shoulder and chronic epicondylitis at the elbow. The proposed mechanism of action is that ESWT causes a local inflammatory reaction at the insertion of the plantar fascia. The shock waves cause a microdisruption of avascular or minimally vascular tissues, encouraging revascularization and release of growth factors, believed to stimulate a reactive healing process. Preliminary studies have shown a success rates between 48 and 88%.

There are three main techniques for generating shock waves- electrohydraulic, electromagnetic, and piezoelectric. All three have been used to treat plantar fasciitis. Electrohydraulic technique involves the use of a spark plug to generate the shock wave. This spark plug is enclosed in a soft plastic dome filled with water. During the treatment, this dome is placed closely against the heel so that the shock waves pass through the dome to the heel using a conductive gel.

Electromagnetic devices pass an electric current through a coil to produce a strong magnetic field to generate the shock wave. Piezoelectrical devices use piezocrystals to generate shock waves. These crystals are mounted in a sphere and receive a rapid electrical discharge, resulting in deformation of the crystals to induce the shock wave.

Although considered non-invasive, ESWT is not without risks. ESWT treatment is painful and in order to undergo the procedure an anesthetic must be administered. In addition to the inherent risks of anesthesia, there are other adverse reactions. These reactions include, but are not exclusive to reddening or ecchymosis of the treated foot, numbness or paresthesia may result, tearing of the plantar fascia has been reported, pain, either from the procedure or from the plantar fasciitis because of failure of the procedure itself, and finally damage to blood vessels or nerves because of the proximity to the area of treatment. The procedure is usually preformed as an outpatient surgery not requiring an overnight hospital stay.

Postoperatively, most patients are given instructions to restrict their stressful activities involving the affected foot for about four weeks. They are not to take any anti-inflammatory medication as this may inhibit the healing response. It is common for pain relief to continue to reduce over a six week period.

A study be Alvarez, et al included 20 patients who were each treated with a single OssaTron®(electrohydrolic) treatment of 1000 shocks at 16 kV. An average reduction in pain of 89% was obtained and in 85% of the cases.

Reviewing the current ESWT literature, there are few long term follow up studies regarding the success rate of ESWT in the treatment of plantar fasciitis. To date, the longest follow up was 15 months. The current study will assess the procedure at 1.3 years or 16 months. This study will be ongoing and data collection will continue until presentation of the study at the annual meeting.

In 2003, we reported the preliminary results of a retrospective study involving 22 patients from October 2001 to September 2002. An OssaTron® unit was used to

deliver the ESWT in both retrospective and prospective studies. The OssaTron unit delivered 1500-1600 shockwaves at an intensity of 18kV. The shockwaves were delivered to the point of maximal tenderness as determined preoperatively and then subsequently marked for the procedure. Light, masked general anesthesia was utilized for the procedure.The results of the study were that the average morning pain was reduced from 7.7 (out of 10) to 2.65 (out of 10), the average daily pain was reduced from 7.6 (out of 10) to 3.2 (out of 10) and the activity limitations was reduced from 3.9 (out of 5) to 2.13. The overall percent better averaged at 71.13%. Nearly two-thirds of the patients were satisfied or very satisfied and almost three-quarters would undergo the procedure again. Over 95% of the patients would recommend the procedure to others with heel pain, with the 4.35% not recommending the procedure because it did not help them.

However, in a prospective study carried out at the same time, the results were not as impressive. A total of 25 feet involving 20 patients underwent OssaTron therapy. The average morning pain decreased from 7.34 to 3.38 but by six months had increased to 4.48. The average daily pain was 6.02 and decreased to 3.2 at three months but increased to 4.2 by six months.

The current study will attempt to show the long-term results of ESWT in the prospective group of patients to determine if this treatment will be a viable option for those who have plantar fasciitis recalcitrant to conservative treatment.