

RETROSPECTIVE ANALYSIS OF MINIMAL INCISION, ENDOSCOPIC AND OPEN PROCEDURES FOR HEEL SPUR SYNDROME/PLANTAR FASCIITIS

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A comparison study of 44 patients (54 procedures) who presented with chronic recalcitrant heel spur syndrome or plantar fasciitis, and who underwent either minimal incision (MIS), endoscopic (EPF) or open plantar fasciotomy procedures (OPEN), focuses on patient satisfaction, pain improvement, convalescence, and postoperative problems and concerns. All patients filled out questionnaires and had weight bearing lateral radiographs taken at the time of examination. Clinical results as well as preoperative and postoperative radiographic data were also compared. Patients with isolated or concomitant heel pain not associated with acquired heel spur syndrome/plantar fasciitis were excluded from this study.

The MIS group (n=7) was the smallest group, and had the longest average follow-up time (35 months), had the most postoperative recovery symptoms (6/7), had a recovery time of <11 weeks, but had the second best overall satisfaction rate (71.9%) and had the least amount of residual pain (78.6% improved).

The EPF group (n=13) had the shortest average follow-up time (17 months), had the least postoperative recovery symptoms (7/13), had the shortest recovery time of 7 weeks (11/13), had an overall satisfaction rate of 67.7%, and had the least improvement in pain reduction (71.6% improved).

The OPEN procedure group (n=24) had an average follow-up time of 27 months, had by a small margin the longest recovery time (>11 weeks), had the highest overall satisfaction rate (78.8%), and had a median amount of residual pain (76.7% improved). All heel spurs noted preoperatively in the OPEN group (27/29 heels) were resected. None of the spurs in the MIS or EPF groups (16/20 heels) were resected.

MATERIALS AND METHODS

Forty-four patients (54 procedures) who underwent surgery from 10 podiatric surgeons in the San Diego area from 1987 to 1996 were used in this study to compare results of minimal incision (MIS), endoscopic (EPF) and OPEN plantar fasciotomies/heel spur resections. The cases analyzed were 7 MIS (8 procedures), 13 EPF (17 procedures) and 24 OPEN (29 procedures). The numbers in each group reflect the frequency performed by the 10 participating surgeons.

The group was composed of 9 males and 35 females, with an age range of 34 to 76 years. All patients were screened over the phone and scheduled for brief physical examinations and radiographs at the surgeon's office. Lateral weight-bearing radiographs were taken on all patients, and only those who had preoperative weight bearing lateral films were used for comparison of radiographic angles. Each patient filled out a two-page questionnaire with questions emphasizing their postoperative course, pain improvement, current level of pain, concerns, complications, and overall satisfaction with their result. All questionnaires were reviewed at the time of examination.

The physical examination looked at the following: use of orthotics, residual foot pain or discomfort, digital or pedal deformities, palpation and range of motion of all surgical sites and joints respectively, and skin lesions. Radiographic comparison of preoperative and postoperative films included calcaneal inclination angles (CIA), talo-first metatarsal angles, and calcaneal spurs. All measurements were made using a goniometer with angles made in reference to the supporting surface.

The minimal incision (MIS) surgery was performed under local anesthesia with or without IV sedation. A 5 mm to 10 mm plantar transverse incision was made over the distal aspect of the medial calcaneal tubercle. A hemostat was used to dissect through the subcutaneous fat and fascia down to bone. Using a Freer elevator, the medial, distal, and lateral margins of the medial tubercle were probed blindly for orientation. A small beaver blade or #67 blade was used to release only those fibers from the medial tubercle with the medial digits held in dorsiflexion. The wound was re-approximated with sutures or steri-strips. The patient was partial weight-bearing in a post-operative shoe with crutches for a period of 3 days to 2 weeks.

The endoscopic (EPF) procedures were performed using general anesthesia, or local anesthesia with IV sedation. Thigh tourniquets were used with general anesthesia, and ankle cuffs with IV sedation. The more recent cases (6/13 patients or 8/17 feet) involved preoperative measurements from the non-weight bearing lateral radiograph corresponding to the origin of the plantar fascia. Measurements made from the plantar fat pad to 1 cm distal to the insertion of the fascia, and measurements made at 90 degrees from the posterior heel to 1 cm distal to the insertion were placed on the heel. The earlier cases (7/13 patients or 9/17 feet) did not have preoperative measurements taken.

A .5 cm incision was made medially and parallel to the CIA. Subcutaneous and fatty tissues were dissected down to the medial margin of the plantar fascia using a hemostat. An endoscopic trocar/cannula was inserted superficial and immediately next to the plantar fascia. The trocar/cannula exited the lateral heel through a .5 cm incision. A Dyonics™ carpal tunnel endoscopic camera was inserted medially, with full visualization of the entire plantar fascia. The medial and lateral boundaries of the fascia were marked on the endoscopic camera, and a triangle-shaped cutting knife was used to release the medial half of the plantar fascia using the markings on the scope as a guide (only in recent cases). The earlier cases had the entire width of the plantar fascia released. The fascial release was inspected, using a blunt probe to visualize the underlying flexor digitorum brevis muscle belly, denoting full thickness release. The wound was then irrigated with normal saline, and

2 cc of .4% dexamethasone phosphate was infiltrated through the cannula. The skin was closed with 4-0 prolene. Patients were put into either a posterior splint or a postoperative shoe, and instructed to be non-weight bearing with crutches for one week.

Unlike the two previous procedures, there was considerable variability in surgical technique for the OPEN procedures. Most surgery was performed under local anesthesia with IV sedation. The skin incisions ranged from 4 cm to 8 cm medially; none were approached from a lateral incision. Dissection was performed bluntly through the subcutaneous tissues down to the deep plantar fascia. In all cases, the entire width of the plantar fascia was released from medial to lateral at its attachment into the calcaneus. Blind releases were performed in 28% (8/29) feet, 45% (13/29) feet had a 1 cm segment of plantar fascia resected. When a spur was present (27/29 heels), all patients had them removed using either a power or hand rasp, osteotome, rongeur or bone cutting forceps. Half the cases infiltrated steroid/local to the area of resected bone. All tissues were closed in layers, and patients were put into posterior splints or a short-leg cast with crutches. Patients with osseous work were non-weight bearing from one to four weeks in crutches, or a wheel chair with a posterior splint or short-leg cast. The remaining patients were non-weight bearing in a post-operative shoe for a period of 3 days to 2 weeks.

RESULTS

The sample group studied consisted of 80% (35) females and 20% (9) males ranging in ages from 34 to 76 with an average age of 56 years. All patients were fully ambulatory without the need for assistance, and were generally examined in the afternoon hours between noon and 5 pm. There were a total of 54 heel procedures: 23 right feet, 21 left feet and 10 bilateral cases. Each group had one revisional surgery performed.

The MIS group (8 procedures) was composed of 6 females and 1 male with an average age of 53 years. The EPF group (17 procedures) had 11 females & 2 males averaging 57 years of age. The OPEN group (29 procedures) was made up of 18 females and 6 males with an average age of 56 years.

Prior to surgery, the members of each group received numerous conservative treatments, averaging per patient: 5 for MIS, 4 for EPF and 4 for OPEN. All patients, except three, could recall their preoperative and current weights. The average preoperative weight was 180.27 lbs. and postoperative weight was 177.2 lbs. Every patient evaluated participated in some weight loss regimen as part of their preoperative or postoperative treatment regimen. The consensus seemed to suggest that only large changes in weight loss (>30 lbs) had some effect on the pain intensity, although weight loss by itself did not eliminate pain completely. Those patients that did lose over 30 pounds did eventually gain it all back at some point in the postoperative period.

The question concerning "return to normal activities" was aimed at determining how quickly a person could return to their normal preoperative activity level before the onset of heel pain. This was not intended to include any new activities that could be performed postoperatively. The EPF group had the most rapid return to their normal preoperative activity level with an average of 6.9 weeks. However, this rate excluded 2 of the 13 patients who had not returned to their normal preoperative activity level. The MIS and OPEN groups fared similarly with values of 10.86 weeks and 11.08 weeks to return to their preoperative activity level, respectively. However, all patients in the MIS group (7/7) eventually returned to their preoperative activity level. Two patients from the OPEN group (2/24), were not included in this comparison due to questionnaire responses of "not back yet" or "never." The MIS group had the longest average follow-up time of 35 months, while the OPEN and EPF groups had an average follow-up of 27 months and 17 months, respectively.

One of the most critical concerns of this survey is the quality and amount of pain reduction when comparing preoperative and postoperative results. The results indicate that the MIS group, on average had the greatest reduction of pain (78.6%). The EPF group had the least reduction of pain (71.6%), and the OPEN group received a median level of pain reduction (76.0%).

Overall satisfaction rates indicate the highest overall satisfaction in the OPEN group with 78.8%.

The MIS and EPF groups have 71.4% and 67.7%, respectively. The satisfaction rates of those patients who had preoperative spurs on radiographs were separated into two groups: all patients of the OPEN group that had spurs had them resected (22/24 patients), and all those patients who had spurs from the MIS and EPF groups (16/20 patients) did not have their spurs resected. There is a slightly higher satisfaction rate when the spur was resected (79.5%) verses those that had spurs left intact (73.1%).

A person's perception of pain improvement and satisfaction can be influenced by many factors such as expectations, compliance with postoperative instructions, doctor-patient relationship, and overlap with preexisting medical conditions. One would expect a one-to-one relationship between percentage of pain improvement and percentage of satisfaction. A linear curve with a positive slope represents improvement and consistency between the two responses. The EPF group has the greatest slope and the most linear relationship compared to the MIS and OPEN groups. All patients, except for one in the OPEN group, could assess numerical values for their percentage of pain improvement and percentage of satisfaction; this patient was excluded from this comparison. Four patients (2 EPF and 2 OPEN) responded with no improvement in pain and were assessed a zero.

Clinical and radiographic observations were made to reveal any tendencies that support or refute the subjective data. Obtaining preoperative and postoperative weight-bearing dorsoplantar and lateral radiographs for each patient was inconsistent. The largest collection of data that could be compared came from those patients who had preoperative and postoperative weight-bearing lateral films. Of the 44 patients (54 feet) in this study, a total of 29 feet were analyzed radiographically. The sample group in this radiographic comparison consisted of MIS (n=5), EPF (n=6), and OPEN (n=18). Postoperatively, the average CIA decreased approximately 4 degrees in all three groups, with the values remaining relatively consistent. Talo first metatarsal angle averaged little change postoperatively except for the OPEN group which decreased 4 degrees.

CONCLUSION

The MIS group had the longest time interval between surgery and the physical examination (37 months average). In this study of 44 patients, the MIS group fared the best in reduction of preoperative pain (78.6%). All patients did eventually return to their normal preoperative activity level. The MIS group received a slightly higher patient satisfaction rate (71.4%) than the EPF group but, less than the OPEN group, and had a time to return normal activities that was just less than the OPEN group. The revisional surgery performed on one patient in the MIS group related a long recovery period, but ended up 90% improved in pain and was 100% satisfied with her result. Postoperatively, all but one patient had some concerns. These concerns involved pain increases or new symptoms experienced during the postoperative period, not associated with preoperative complaints. One of the most common concerns patients had was lateral foot pain in the area of the sinus tarsi and the calcaneal cuboid joint. Other concerns include dorsal foot and sinus tarsi pain, swelling, prolonged recovery and exacerbation of flatfoot. Six of the seven patients continue to wear postoperative orthotics.

The EPF group had the shortest follow-up time (17 month average). The EPF group had the quickest return to preoperative normal activities when the two patients (2/13) that did not return to their preoperative activity level are excluded. The satisfaction rate, however fared the worst (67.7%), just under the MIS group. Some of the earlier cases in the EPF group had poorer results due to inexperience, lack of preoperative planning, and variations in surgical technique. In some of the recent cases, more time was spent transposing the preoperative measurements than the actual procedure itself. In the two cases where the pain did not improve postoperatively, each patient had bilateral procedures performed at one time and were among the early cases where the entire plantar fascial band was released from medial to lateral. One patient is a morbidly obese, (265 pounds) sedentary female who suffers from depression, osteoarthritis of her knees, hips, low back and neck. She has seen multiple doctors for various problems in her life. When asked if she

could do it all over again, she related that she would not have surgery and would have continued with conservative measures and focused on weight loss. She was not a good surgical candidate. The other patient is of normal height and weight who developed severe calcaneal cuboid joint pain, which she described as more severe than the original heel pain.

Seven out of thirteen patients related no postoperative recovery concerns or complications. One patient had plantar-lateral numbness but was not concerned. Two patients had intermittent plantar fascial pain aggravated with increased sports activities. Another patient had tenderness over the medial scar only when she wore shoes with a three inch heel. The revisional surgery performed was uneventful; she related a 90% improvement in her pain and was 100% satisfied.

By far, the most frequently performed procedure today is the open technique with resection of the plantar calcaneal spur. This category fared the worst in time to return to normal preoperative activities which may be a consequence of more extensive soft tissue dissection or spur resections. Average follow-up time was intermediate, 25 months on average. Two patients in this group had no pain improvement after surgery. One of these was a bilateral case with spur resections who began full weight bearing ambulation the next day. He remained non-compliant and continued to have heel pain equal to his preoperative level. The other patient had revisional surgery on her left foot that never improved. She had a compliance issue with prolonged weight bearing postoperatively that may be associated with her occupation. She maintained her job as a waitress and continued to ambulate for more than 10 hours a day on tile floors. Eleven of twenty-four patients had no postoperative recovery concerns or complications. A common concern in this group was calcaneal-cuboid joint and base of the 5th metatarsal pain (4 patients). One patient experienced a fractured 3rd metatarsal while ambulating in her postoperative shoe. Once recognized, it was immobilized and went on to heal uneventfully and did not influence her overall satisfaction rate. Two patients related scar irritation and three patients continued to experience pain at the medial calcaneal tubercle with weight bearing.

SUMMARY

All of the groups with chronic recalcitrant heel spur syndrome/plantar fasciitis had significant reduction of preoperative pain and high patient satisfaction with surgery. The MIS group had all patients return to their normal activities and had a median patient satisfaction rating (71.4%), but had the greatest reduction of preoperative pain (78.6%). The EPF procedure gets patients back on their feet the quickest with minimal increase in postoperative pain. Patients seem to tolerate the size and placement of the scars with negligible shoe irritation and cosmesis concerns. Metatarsalgia, sinus tarsi and calcaneal cuboid pain are minimal when the lateral band is preserved. The patient satisfaction was 67.7% and the reduction of pain was 71.7%. A longer follow-up study of EPF patients would give more credence to this

technique, and would be appropriate in response to this study. Open procedures, although popular for their accessibility to the anatomical structures, involve more extensive tissue dissection and trauma to the plantar structures. This is reflected in a prolonged recovery time and return to activities. However, this group had the highest overall satisfaction rating (78.8%) and a 76.7% reduction in preoperative pain.

A study comparing the results of partial versus complete open plantar fasciotomies might show how lateral band preservation influences the postoperative course. The cost of the procedures was not mentioned in this paper. However, cost containment is becoming more of an issue in medicine with "discount" medicine and managed care becoming more prevalent. Procedural costs will most likely be factored into the equation of best choice of procedure when such mixed results are reported.