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Endoscopic Partial Plantar Fasciotomy as a Treatment Alternative in Plantar Fasciitis

Endoskopická částečná plantární fasciotomie jako alternativní řešení plantární fascitidy

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ABSTRACT

PURPOSE OF THE STUDY

One of the most common causes of chronic heel pain is plantar fasciitis ("calcaneal spur"). This condition most frequently occurs in patients over the age of 40. In most cases pain can be reduced or ceased by conservativ treatment, but in some patients therapy-resistant chronic pain can also develop. In these cases surgery may provide long term solution. The aim of this prospective observational study was to analyse the effectiveness of endoscopic surgery in patients with plantar fasciitis.

MATERIALS

Between 2001–2006 83 operations were performed on 74 patients (age: 47±11 years) by the same surgeon. All patients underwent conservative therapy before the operation, which did not solve their pain. In 41 cases the right and in 42 cases the left foot was affected. In 11 patients both sides had to be operated on.

METHODS

In each case endoscopic partial plantar fasciotomy was performed as described previously, modified by us. Patients were allowed to load full body weight on the operated foot on the first postoperative day. The patients' body mass index (BMI) was also recorded. Pain was assessed by using a visual analog scale (VAS) from 0–10. Patients had been followed-up 1, 3, 6 and 12 months after surgery.

RESULTS

Pain was significantly lower at every assessment point as compared to preoperative values ($p<0.01$). The average period of time during which patients became pain free (i.e.: VAS=0) was 9.6 weeks. Most patients were overweight as indicated by the BMI=32.8±5.9 kg/m^2. All but 3 operations proved to be successful as indicated by disappearence of pain. Two patients had reoperation of whom the BMI>30 kg/m^2.

DISCUSSION

Patients with heel spur may benefit from operation if the conservative treatment is unsuccesful. The aim is to relieve the inflammation and irritation of the plantar aponeurosis. One alternative is endoscopic partial plantar fasciotomy. During the operation at least the two-third of the aponeurosis is released without the exstirpation of its calcificated part. As indicated by our results complaints disappeared in most cases within one month after surgery. There were only 3 complications two of which had incresed BMI, suggesting, that obesity may have an important impact on the symptoms and success of surgery. However, further studies are required to come to firm conclusion regarding BMI and plantar fasciitis.

CONCLUSIONS

In this prospective observational study it was found that endoscopic partial fasciotomy successfully releived pain in therapy-resistant cases of plantar fasciitis.

Key words: heel pain, heel spur, plantar fasciitis, endoscopic partial plantar fasciotomy, plantar fascia release.

INTRODUCTION

Chronic heel pain syndrome is a relatively common complaint in the outpatient clinic (4). One of the main causes of the disease is plantar fasciitis, which occurs most commonly in patients over the age of 40. The syndrome develops most frequently in patients who are obese, or those who are on their feet most of the day (4, 5). The ethiology of the disease is not clear. It can be the result of irritation because of the overstrain of the fascia (chronic micro injuries), which induces pathological deformations such as mucoid degeneration, reparative imflammation, then calcification (5). Clinically it is characterized by sensitivity and pain on exertion of the medial process of the tuber calcanei. The pain is most intensive in the morning or taking the first steps after rest.

By conservative therapy the pain can be reduced or ceased in most cases but some patients develop therapy resistant chronic pain. In these latter cases operation may prove to be beneficial (1–5, 7–9, 11, 12, 15). Partial incision of the aponeurosis with an endoscopic surgical technique has been shown to solve the patients' complaints (1–3, 7, 9, 11, 13, 15). It has the advantage of being minimally invasive and as it can be performed as day surgery makes it an optimal treatment alternative.

The aim of this study is to analyse the outcome, especially on pain relief after endoscopic partial plantar fasciotomy over a 5 year period.

MATERIALS AND METHODS

Between 2001 and 2006 we performed partial plantar fasciotomy in 83 cases on 74 patients with the diagnosis of plantar fasciitis. Surgery was indicated according to American Orthopaedic Foot and Ankle Society Position Statement on Endoscopic and Open Heel Surgery (AOFAS) directives. In addition, our criteria required the following: typical local tenderness and positive isotop bonescan (increased density at the origin of the plantar aponeurosis on the calcaneus) (Fig. 1), plus at least 6 months of unsuccesful conservative therapy (5). Conservative therapy consisted of oral use of nonsteroid anti-inflammatories, therapeutic X-ray irradiation and physiotherapy.

Operations were undertaken under spinal or general anaesthesia. Bloodless operating field was provided with a tourniquet inflated to a pressure of 300–350 mmHg on the patients' thigh.

The original biportal endoscopic plantar fasciotomy was described by Barrett SL, et al. (1, 2), which was partially modified by us. The advantage of this technique over the uniportal method is that the dimension of the release can be seen during the operation.

Operational technique

A horizontal 5-mm incision is made on the medial part of the heel. The medial portal is located over a reference point that is immediately 1 cm anterior to the inferior aspect of the medial calcaneal tubercle which is the level of the plantar fascia. An obturator is introduced via a canulla placed over the aponeurosis. In the original version the obturator was inserted under the aponeurosis (1, 2). A second 5 mm incision is made over the tip of the obturator (Fig. 2), through which our specially developed slotted canulla system is advanced (Fig. 3). The obturator is then removed from the slotted canulla leaving the canulla in place with the slot directed toward the plantar fascia. Then the endoscope is introduced medially and the fascial probe laterally. Using the endoscope the surface of the plantar fascia can be seen. The width of the plantar fascia is measured by the probe. The next step is to sever the medial two-third of the fascia with a retrograde knife, with the ankle and toes flexed dorsaly. As the fascia is severed the fatty tissue appeares (Fig. 4). The ankle and toes are again maximally dorsiflexed and separation of the edges of the plantar fascia can be seen. The canulla is removed, plantar fascia is palpated to confirm the release and the wound is closed by one single stich. In the postoperative period compression bandage is used and on the first day full weight bearing is allowed.

Pain was evaluated on a visual analog scale (VAS: 0=no pain, 10=unbearable pain) and the preoperative

Figure 1. Increased uptake can be seen at the attachment site of the calcaneal tubercle on the bone scan.

Figure 2. View of the position and instrumentation for endoscopic release.

Figure 3. Instruments (slotted canulla and obturator) for surgery.

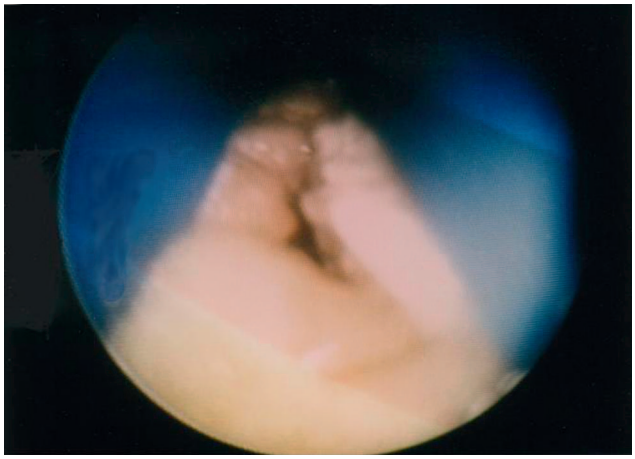

Figure 4. Intraoperative view of the plantar fascia release.

VAS score was compared to the values measured on each follow-up. Patients were followed-up 1, 3, 6 and 12 months after the operation. Body mass index (BMI) was also recorded and patients were devided into normal (BMI<25), overweight (BMI=25–29) and obese (BMI>30) categories.

Statistics

Data of normal distribution is presented as mean + standard deviation, data of not-normal distribution is presented as median (minimum – maximum). For statistical analysis Wilcoxon rank sum test was used. The result was considered significant if the $p<0.05$.

RESULTS

Demographic data is summarised in Table 1. According to the BMI 14 % of the patients had normal BMI, 34 % were overweight and 52 % of the patients were obese. Pain was significantly lower at every assessment point as compared to preoperative values (Table 2). The average period of time during which patients became pain free (i.e.: the VAS became 0) was 9.6 weeks. There was no significant difference in VAS between normal, overweight and obese patients at any assessment point (data not shown).

Complications such as vascular and neurological injury, wound healing problems did not occur. All but 3 operations proved to be successful as indicated by satisfactory pain relief. In 3 cases patients had long-term postoperative complaints lasting more than 6 months, 2 of which were operated on both sides within a short period of time. In these cases reoperation was performed because of the constant pain. Both patients had a BMI greater than 30. Scarring was found in both cases, which was excised by the reoperation. One patient had temporary numbness in the leg, which ceased after physiotherapy.

Table 1. Demographic data

Age (years)	47±11
Height (cm)	166±9
Weight (kg)	83.9±15.5
BMI (kg/m^2)	32.8±5.9
Male/Female	24/59
Left/Right	42/41

Table 2. Pain assessment preoperatively and on each follow-up

VAS_{preop}	8 (5–10)
VAS_1	2 (0–8)*
VAS_3	0 (0–7)*
VAS_6	0 (0–6.5)*
VAS_{12}	0 (0–4)*

VAS: visual analog scale; preop: values at preoperative, 1, 3, 6 and 12 months follow-up; *: $p<0.001$ vs. VAS_{preop}

DISCUSSION

One of the most common reason of painful heel syndrome is plantar fasciitis. The exact etiology is not entirely clear. However, clinically it can be described as an enthesopathy. Complaints can be treated by conservative therapy in most cases, but in some patients physiotherapy on its own may be insufficient. In these cases surgery may provide relief. The results of the current study give further support that minimal invasive endoscopic surgery reduces pain significantly, has minimal surgical complications, has a short rehabilitation period as indicated by significant improvement in pain within one month. Furthermore, the operation can be performed as day surgery.

In addition to clinical signs the diagnosis of plantar fasciitis can be reinforced with ultrasound, bone scintigraphy, MRI and CT scan (5, 6, 10, 14). Using all of these investigations on these patients is time consuming, costs a lot of money and almost certainly unnecessary. In the current study the indication of surgery was supported by bone scan only which indicates the extension of the inflamed area. Although it is invasive, the reason of choosing the bone scan instead of the ultrasound or MRI and CT scans was that in our experience this proved to be the most informative investigation regarding the size of inflammation.

Open plantar fasciotomy (aponeurotomy) is a well-known method of surgery in fact, publications prove the unnecessity of the ablation of exostosis (11). An alternative, the endoscopic surgery provides similar or even better results with less surgical trauma (Kinley, 9, Tomczak, 15). We modified the method reported by Barrett et al. as we introduced the cannula above the aponeurosis, rather then below it. Although, we cannot prove it but it may have the theoretical advantage that it reduces the risk of cutting through muscular and neuro-vascular structures which can be found close to the aponeurosis.

Patients had very high VAS values preoperatively which improved significantly within one month. This is in accordance with previous reports (Kinley, 9, Tomczak, 15). Kinley et al. in a prospective study found that 80 % resolution in pain was achived within 6.3 weeks

in the endoscopic fasciotomy group and 10.3 weeks in the traditional surgery group (9, 15). In our study we found that patients became pain free (i.e.: 100 % resolution in pain) within an average of 9.6 weeks which is a similar result.

In a recent study Benton-Weil et al. reported that 29 % of their patients had normal BMI, 50 % were overweight and 21 % were obese (3). Although, we had more overweight and obese patients (34 and 52 % respectively) than in their study, but both results indicate that this condition occurs more often in patients with higher BMI. However, regarding the improvement of pain there was no significant difference between patients with different BMI. The finding that those two patients who required reoperation had high BMI (>30) suggest that there may be a relationship between bodyweight and complications, but 2 cases in the current study are far too few to come to any firm conclusions.

CONCLUSIONS

The data of this prospective study give further support to current evidence that endoscopic partial fasciotomy can be applied successfully in conservative therapy resistant cases of plantar fasciitis.

ZÁVĚR

Jednou z častých příčin chronické bolesti paty je zánět plantární povázky (ostruha). Toto postižení se vyskytuje nejvíce u pacientů nad 40 let. Ve většině případů lze bolest omezit nebo odstranit konzervativním léčením, ale u některých pacientů se může vyvinout chronická, k terapii rezistentní bolest. V těchto případech lze potíž dlouhodobě vyřešit chirurgickým zákrokem. Cílem této prospektivní studie bylo analyzovat účinnost endoskopického chirurgického zákroku u pacientů s tímto onemocněním.

V období mezi rokem 2001 a 2006 bylo jedním chirurgem provedeno 83 operací u 74 pacientů (průměrný věk 47 ± 11 let). U všech pacientů předcházela operaci konzervativní léčba, která neodstranila bolestivost. Pravá noha byla postižena ve 41 a levá ve 42 případech; obě nohy byly operovány u 11 pacientů.

Ve všech případech byla endoskopická částečná plantární fasciotomie provedena již dříve popsanou, námi modifikovanou metodou. Plná zátěž operované nohy byla pacientům povolena první pooperační den. U všech pacientů byl zaznamenán index tělesné hmotnosti (BMI). Bolestivost byla hodnocena od 0 do 10 na základě vizuální analogové stupnice (VAS). Pacienti byli zváni ke kontrole 1, 3, 6 a 12 měsíců po operaci.

Bolestivost oproti předoperačním hodnotám byla významně nižší při každé kontrole ($p<0,01$). Období, po kterém následoval stav bez bolesti (tj. VAS=0), trvalo průměrně 9,6 týdne. Většina pacientů trpěla nadváhou, jak ukazuje průměrný BMI = 32,8±5,9 kg/m^2. Všechny operace s výjimkou tří byly úspěšné, jak dokazuje ústup bolestivosti. Dva pacienti s BMI větším než 30 kg/m^2 museli podstoupit reoperaci. K potvrzení souvislostí mezi BMI a plantární fascitidou jsou však nutné další studie.

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