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Original research article

Retrospective evaluation of the effectiveness of radiotherapy in patients with plantar fascitis (heel spurs)

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ABSTRACT

Aim: The aim of the study was the evaluation of the effectiveness of radiotherapy in patients with the feet pain caused by heel spurs.

Background: Treatment options for patients reporting these symptoms include use of suitable orthopedic footwear, the use of general or topical non-steroidal anti-inflammatory drugs or steroids, physiotherapy, manual therapy, shock wave or appropriate surgical procedures. Radiotherapy is one of the method used in patients with chronic pain syndrome.

Materials and methods: The material consisted of 47 patients treated in Radiotherapy Department at the Holycross Cancer Center. The time of follow-up ranged from 1 to 129 months. After treatment patients were observed.

Results: During the first follow-up visit a complete relief of symptoms was observed in 37 patients, and the pain was felt by 10 patients for 4 months after the treatment. One patient was re-irradiated 6 months after treatment because of persistent pain. At 16 and 17 months after the onset of treatment, pain was reported by two patients. These patients were re-irradiated. One patient had recurrence of pain 48 months after completion of radiation. After the second irradiation the pain was relieved. The remaining patients, with the exception of two, experienced remission of pain, which has been documented. Tolerance of the treatment was very good. No complications of radiation were observed.

Conclusions: Radiotherapy remains an attractive treatment for patients with inflammation of the heel fascia.

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1. Background

Heel spurs are a common cause of foot pain. The cause of the calcaneal spur is chronic inflammation at the site where the

heel aponeurosis connects to the calcaneus causing deposition of calcium, resulting in the formation of plantar spurs. Another place where bony growths occur around the calcaneus is the area of the attachment of the Achilles tendon (dorsal spur). Both types of spurs may occur in every human

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Table 1 – Characteristic of patients.

The age of patients
Min. 36 years
Max. 89 years
Mean. 61 years
Gender
Women: 31
Men: 16
The duration of symptoms
Min. 1 month
Max. 40 months
Med. 9 months
Side
Right: 16 patients
Left: 11 patients
Both: 23 patients

being, plantar spurs are more frequent, but dorsal spurs, in many cases, may be asymptomatic. Typically, heel spurs occur in the elderly.¹ The etiological factors are not known. Potential causes include overweight, wearing too tight shoes, injury to the area or overload.¹ Treatment options for patients with heel spurs include use of suitable orthopedic footwear, the use of general or topical non-steroidal anti-inflammatory drugs or steroids, physiotherapy, manual therapy, shock wave or appropriate surgical procedures.² Radiotherapy is not a frequently used method in patients with chronic pain syndrome, probably due to the possible carcinogenic effects of ionizing radiation.³ Studies have shown that radiotherapy brings good analgesic effect. The irradiated volume, fraction and total doses of radiotherapy are lower in comparison to dose used in patients with cancer.^{1,2,5–7} The ionizing radiation can affect the process of inflammation. It does not work, however, by one mechanism, but this phenomenon is composed of a variety of effects on different cell types. Ionizing radiation has anti-inflammatory effect on mononuclear immune cells such as lymphocytes, macrophages, monocytes and endothelial cells of capillaries increasing their permeability and causing the penetration of inflammatory cells into the inflamed tissue. Monocytes and macrophages are radiosensitive and produce proinflammatory cytokines which can affect the inflammatory response. Low doses of radiation reduce inflammation and cause pain relief.⁴

2. Aim

The aim of the study was the evaluation of the effectiveness of radiotherapy in patients with feet pain caused by heel spurs.

3. Materials and methods

The study included 47 patients who were treated in the Department of Radiotherapy of the Holycross Cancer Center in Kielce in 2005–2015 due to inflammation of the plantar fascia. The age of patients ranged between 36 and 89 years – mean 61 years. The duration of symptoms was 1–40 months (mean 9 months). In 23 patients, both feet were irradiated and in 24 patients one side. In 2 patients, plantar and dorsal spurs were diagnosed. Three patients were treated by radiotherapy on both feet, but with a break (Table 1).

Fig. 1 – Radiation field.

Anamnesis, physical examination and radiographs confirmed the presence of foot heel spurs.

The volume of irradiation was determined using a simulator. It covered the calcaneus with plantar aponeurosis with proper margin (Fig. 1). The patients were irradiated with two opposite fields technique using 6 MeV (49 patients) and Co-60 (5 patients). The radiation dose was calculated at the isocenter. The patient received dose of 6 Gy in fractionation of 1 Gy administered within 12 days. All patients signed informed consent before radiotherapy.

4. Results

The time of follow-up ranged from 1 to 129 months. After the treatment, patients were observed in the Radiotherapy Department. The first follow-up visit was set at one month after completion of radiation therapy, then, every three months. At the first follow-up examination, 37 patients reported a complete relief of symptoms. The pain was felt by 10 patients 4 months after the end of the treatment. One patient was re-irradiated 6 months after the treatment because of persistent pain. At 16 and 17 months after irradiation, pain occurred in two patients. These patients were re-irradiated. One patient 48 months after completion of radiation had recurrence of pain. After the second irradiation the pain completely disappeared.

The remaining patients, with the exception of two, experienced total remission of symptoms of pain, which has been documented (Table 2).

Tolerance of the treatment was very good. No complications of radiation were observed.

Table 2 – Long time outcomes of radiotherapy.

Characteristic	Number of patients	%
Total response	45	96%
Partial response	2	4%
Re-irradiation	4	8%

5. Discussion

The use of radiotherapy in the treatment of pain caused by inflammation surrounding the foot plantar fascia is not very common. Methods of choice are still drug therapy or physiotherapy. In some patients, it delivers the expected result, but the analgesic effect is maintained for a short time. Based on analysis of patients treated at the Cancer and literature data it can be concluded that radiation therapy using low doses is effective and safe.

The pain ceased already during or after treatment. However, steady analgesic effect is expected. In the analyzed group of patients, very good effect was observed 1 month after treatment in 37 patients (74%). In other patients, anti-analgesic effect of radiotherapy was observed in a longer follow-up.

All irradiated patients received the same dose – 6 Gy in 6 fractions within 12 days of treatment, which is the standard regimen nowadays. Seegenschmiedt compared various dose fractionation using 0.3 Gy and 1 Gy. Total dose ranged from 3 to 6 Gy. Patients who received a lower total dose (3 Gy) had worse effects. Similar observations were presented by Schneider et al.^{6–8,11}

Miszczyk recommended not to exceed dose of 1.5 Gy per fraction and total of 9 Gy.⁵

Muecke retrospectively evaluated the effects of treatment of 117 patients. Shorter duration of symptoms was connected with better response to treatment.⁸ In the study group, there was no such correlation.

In the study group, re-irradiation was used in 4 patients because of persistent pain or relapse. Hautmann assessed the effectiveness of re-irradiation. He confirmed a complete remission of symptoms after re-irradiation in 74% of patients.⁹ In the analyzed group, we observed a complete pain relief in all re-irradiated patients.

It was believed that radiotherapy with orthovoltage is effective because of higher absorption of radiation by the bones and soft tissues. Micke has proven high effectiveness of megavoltage radiation.² Koca described the effects of treatment in patients irradiated using a cobalt machine.¹⁰ In our group, all patients were irradiated using megavoltage machines. The reluctance for using radiation therapy in patients with heel spurs is caused by a possible carcinogenic effect. Surenkok described 20 patients irradiated due to inflammation of the plantar fascia. In a long-term average of 11.9 years of observation (max. 29 years), the risk of carcinogenesis was 1.3%. He did not notice secondary cancers.³

In our group we did not observe secondary malignancies.

6. Conclusions

Radiotherapy remains an attractive treatment for patients with inflammation of the heel fascia. The use of low doses results in pain relief. The technique of treatment is simple and cheap. There are no signs of acute and late toxicity. The analgesic effect persists for years.

Conflict of interest

None declared.

Financial disclosure

None declared.

REFERENCES

1. Muecke R, Micke A, Reichl B, et al. Demographic, clinical and treatment related predictors for event-free probability following low-dose radiotherapy for painful heel spurs – a retrospective multicenter study of 502 patients. *Acta Oncol* 2007;46:239–46.
2. Micke O, Seegenschmiedt H. Radiotherapy painful heel spurs (plantar fasciitis) – results of a National Patterns of Care Study. *Int J Radiat Oncol Biol Phys* 2004;58:828–43.
3. Surenkok D, Dirican B, Beyzadeoglu M, et al. Heel spur radiotherapy and radiation carcinogenesis risk estimation. *Radiat Med* 2006;8:573–6.
4. Perez and Brady's principles and practice of radiation oncology. 5th ed. Wolters Kluwer/Lippincott, Williams and Wilkins; 2008. p. 1933–58 [Chapter 89].
5. Miszczyk L, Jochymek B, Wozniak G. Retrospective evaluation of radiotherapy in plantar fasciitis. *Br J Radiol* 2007;80:829–34.
6. Schneider O, Stucke CA, Bosch E, et al. Effectiveness and prognostic factors of radiotherapy for plantar painful heel spurs. *Strahlenther Onkol* 2004;180(8):502–9.
7. Seegenschmiedt MH, Keilholz L, Stecken A, et al. Radiotherapy of plantar heel spurs: indications, technique, clinical results at different dose concepts. *Strahlenther Onkol* 1996;172(7):376–83.
8. Muecke R, Schonekaes K, Micke A, et al. Low dose radiotherapy for painful heel spur. Retrospective study of 117 patients. *Strahlenther Onkol* 2003;179(1):774–8.
9. Hautmann M, Neumaier U, Kobla O. Re-irradiation for painful heel syndrome. Retrospective analysis of 101 heels. *Strahlenther Onkol* 2014;190(3):298–303.
10. Koca T, Aydin A, Sezen D, et al. Painful plantar spur treatment with Co-60 teletherapy: factors influencing treatment outcome. *Springerplus* 2014;3:21.
11. Niewald M, Holtmann H, Prokein B, et al. Randomized multicenter follow-up trial on the effect of radiotherapy on painful heel spur (plantar fasciitis) comparing two fractionation schedules with uniform total dose: first results after three months follow. *Radiat Oncol* 2015;10:215.