



## Low-Dose Radiotherapy as an Effective Treatment of Trochanteric Bursitis in Elderly Patients

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### Abstract

**Purpose:** To determine the analgesic response to a low-dose radiation therapy (RT) in trochanteric bursitis in elderly patient's refractory to conventional therapies.

**Methods:** We evaluated sixty consecutive patients diagnosed with trochanteric bursitis receiving RT in our institution from July 2010 to August 2014. All patients were treated with a total dose of 10 Gy in 10 daily fractions. The median age was 68.0 years (mean 68.5 years, range 40-89 years). All patients were evaluated for the pain assessment using a visual analogue scale (VAS) before the radiotherapy, at 1 and 4 months after radiotherapy and then yearly thereafter.

**Results:** Patient's population analyzed according to patients' age: patients at diagnosis: patients aged ( $\geq 70$  years old and patients  $<70$  years old. Basic characteristics in the group of elderly patients ( $\geq 70$  years old) and the rate of response to radiotherapy were similar in both groups. No complications were observed after radiotherapy. The decrease of pain according to subjective evaluation with VAS scale was significant in the total of patients (VAS mean pre-RT 7.48, standard deviation (SD) 1.27, range 3-10 vs. VAS mean post-RT 3.81, SD 2.54, range 0-8), and for each group separately ( $p=0.000$ ). In the group  $<70$  years: VAS mean pre-RT was of 7.57 (SD 1.12, range 3-10) and VAS mean post-RT was of 4.00 (SD 2.64, range 0-8). In the group  $\geq 70$  years VAS mean pre-RT was of 7.24 (SD 1.45, range 4-10), and VAS mean post-RT was of 3.46 (SD 2.43, range 0-8).

**Conclusion:** The percentage of response was similar in patients with  $\geq 70$  years at diagnosis and the group  $<70$  years. A low-dose radiation therapy is an effective treatment of trochanteric bursitis in elderly patients.

**Keywords:** Low-dose radiotherapy; Trochanteric bursitis; Elderly patients

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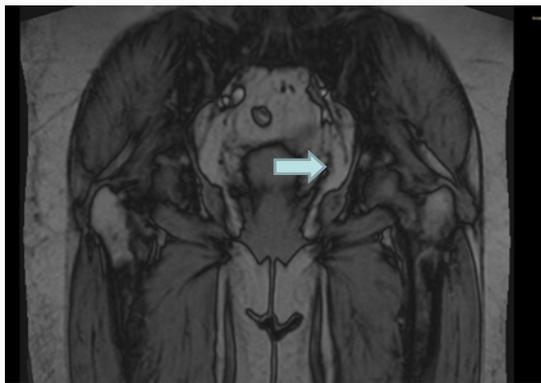
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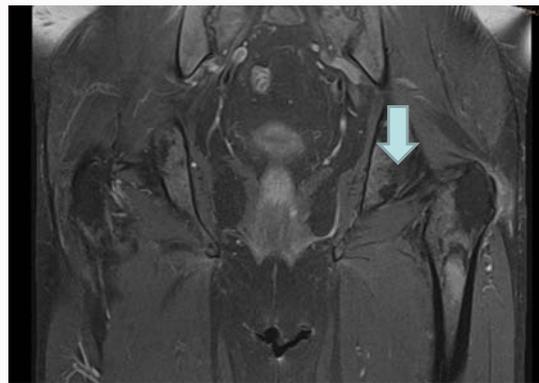
### Introduction

Trochanteric bursitis, also called trochanteritis, is a disorder caused by inflammation of the bursa, and is the most common cause of hip pain, more prevalent in women. It is more frequent among elderly patients and among athletes above the age of 40, being related both with degenerative or inflammatory changes, which may include also trochanteric enthesopathy (calcifications, ossific antenchesopathy, trochanteric tendinitis). Symptoms of trochanteritis include hip pain that spreads down the outside of the thigh to the knee area, which may be worse during physical activities such as walking or running or when patient lies on the affected side. In the medical examination the main sign is tenderness while pressing on the affected area. The main cause of this disorder is the continuous rubbing of the hip to perform movements of flexion and extension. There are other risk factors to consider, such as overweight or obesity, osteoarthritis of the hip, herniated discs, flat feet or have a leg slightly longer than the other. The treatment to alleviate the discomfort consists of a rest for an average of 10-15 days and systemic anti-inflammatory drugs. In case of refractory trochanteritis, and depending on the intensity of pain and swelling, a treatment with ultrasound, shock waves and other physical therapies to strength the area may be indicated. When those treatments do not provide the expected results, classically the alternative option is a local infiltration with corticosteroids and anaesthetics. If the symptomatology persists, a surgical resection of the affected burse may be considered as a definitive action. In 2011 Lustenberger et al. [1] published a systematic review of 24 articles about the efficacy of treatment of trochanteric bursitis including a total amount of 950 patients with the mean age of 53 years (range 12-88 years).

Recently, more attention is paid to the treatment of elderly patients. The painful degenerative



**Figure 1:** Radiological findings prior to radiotherapy increased signal insertion tendons (ossificans enthesopathy) into the left trochanter.



**Figure 2:** Radiological findings prior to radiotherapy signs of trochanteric bursitis.

disorders of joints and entheses are very common in this population, but due to the age and comorbidities, these patients frequently are not candidates to invasive treatments nor can tolerate prolonged treatments with oral anti-inflammatory drugs.

As the estimated prevalence of pain syndrome secondary to trochanteric pathology is of 15 percent of women and 6.6 percent of men (and bilateral pain is reported in 8.5 and 1.9 percent of women and men, respectively) and according to the increasing aging, there is a strong need to search for more conservative but effective treatment options [2].

Given that the data on the effect of radiotherapy in the treatment of elderly patients with nonmalignant disorders are scarce, we revised the data of our prospective study carried out in a series of 60 consecutive patients presenting trochanteritis. The main goal was to analyze the potential differences between the group of patients under and above 70 years old considering the potential benefits of radiotherapy [3].

## Objectives

To evaluate the efficacy of a low-dose radiation therapy in treatment of trochanteric bursitis in elderly patients and the differences between basic characteristics and therapeutic results of patients aged  $\geq 70$  years and less than 70 years old.

## Material and Methods

The database of patients referred with trochanteric bursitis and treated with low dose External Beam Radiotherapy (EBRT) at our institution from July 2010 to August 2014 was reviewed. Approval to carry out this study was obtained from the Institutional Review Board (IRB) of our hospital.

A series of 60 sequential patients with a mean age of 68.5 years (median 68.0 years, range: 40 to 89 years) was included in the analysis. The series was divided in two groups: patients  $<70$  years ( $n=35$ ) and patients  $\geq 70$  years ( $n=25$ ) in order to compare the clinical characteristics before radiotherapy and the clinical outcome after the treatment. The diagnosis of trochanteritis was made according to clinical and radiological criteria: increased tenderness to trochanter palpation with compatible radiological and/or ultrasound images (Figure 1 and 2). All patients received the same standard dose of EBRT: 10 Gy in 10 fractions (doses of 1 Gy/day/5 days a week). After irradiation the patients were followed at one and four months to evaluate the response. All patients received low dose radiotherapy

to achieve an anti-inflammatory and analgesic effect. The treatment was designed using planning systems based on CT. The target volume included the trochanteric region, the bursas and the fascio-tendinous areas affected.

The radiation course was administered using a multiple conformal field technique using a linear accelerator photon beam of 6 MV or 18 MV. For this analysis, the following parameters were evaluated: associated processes, previous treatments received, radiological alterations, clinical outcome as well as the need for re-irradiation or not and patient outcome. We recorded medication details and categorized analgesics according to the World Health Organization analgesic ladder into minor analgesics and opiate derivatives and major opiate derivatives. Pain assessment was based on the VAS scale (Visual Analog Scale), a scale from 0 to 10 in which 0 indicates no pain and 10 indicates the maximum level of pain.

The statistical analyses were performed using the SPSS v. 23, according to the results of two side tests. A  $p$  value  $<0.05$  was considered statistically significant. The Chi-square and Student's  $t$ -test were used in the statistical analysis of this study. The results were analyzed in tabular form and the Chi-square test was used to compare patients in whom specific determinations were or were not obtained.

## Results

A total of 60 consecutive patients diagnosed with recurrent trochanteric bursitis refractory to conventional therapies underwent treatment with low dose irradiation and were followed for a median of 18.1 months. All patients were refractory to the usual therapies; 81% had undergone previous treatment with local corticosteroid infiltrations, and nearly half of them required major opiate analgesic prescription (38% received minor opiate derivatives and anti-inflammatory and 44% major opiate) (Table 1). The radiological evaluation involved a simulation CT in all patients included in the study, with most patients (73%) also having previous MRI and ultrasonography studies. The most relevant findings at diagnosis were: gluteal enthesopathy (25%), tendon calcifications (21.7%) (Figure 1), tendon rupture (12.5%) and bursitis (12.5%) (Figure 2).

Although the associated clinical conditions most frequently seen in patients were chronic lumbar pain (72%), polyarthrosis (37%), osteoporosis/osteopenia (27%), obesity (20%), and fibromyalgia (12%), surprisingly these comorbidities were not more frequent in elderly patients (Table 1).

**Table 1:** Characteristics of all the patients included in the study (n=60) and comparison of these characteristics in patients according to the age of diagnosis (cut-off 70 years).

Characteristics	All patients (n=60, %)	Patients <70 years (n=35)	Patients ≥ 70 years (n=25)	p (Chi-square, Fisher test)
<b>Patients characteristics</b>				
Sex (women/men)	54 (90%)/6 (10%)	22/13	16/9	0.66
<b>Comorbidities</b>				
Low back pain	43 (72%)	26	17	0.6
Osteoarthritis	22 (37%)	13	9	0.93
Osteoporosis	16 (27%)	6	10	0.05
Obesity	12 (20%)	9	3	0.19
Fibromyalgia	7 (12%)	6	1	0.12
<b>Pain characteristics</b>				
Localization				0.69
- bilateral	16 (27%)	9	7	
- unilateral	44 (73%)	26	18	
Pain irradiated (pain that spreads down the outside of the thigh to the knee area)				0.43
- no	36 (60%)	20	16	
- yes	24 (40%)	15	9	
Number of events (pain exacerbations in one week)				0.82
- one	34 (58%)	21	13	
- two	24 (40%)	13	11	
- three	2 (3.3%)	1	1	
Previous treatment with oral analgesic drugs according to steps of analgesic ladder				0.74
- 1 step	7 (11.7%)	3	4	
- 2 step	23 (38.3%)	15	8	
- 3 step	26 (43.3%)	13	13	
- no treatment	4 (6.6%)	4	0	
Previous invasive treatment				0.66
- no	10 (16.7%)	5	5	
- local infiltrations	49 (81.7%)	29	20	
- electrostimulation	1 (1.7%)	1	0	
<b>Radiological findings</b>				
- enthesopathy	15 (25%)	10	5	0.38
- tendon rupture	7 (12.5%)	5	2	
- bursitis	7 (12.5%)	5	2	
- calcifications	13 (21.7%)	5	8	

The pain presented was predominantly unilateral (75% of the patients), being exclusively localized in the trochanter area in 60%. Baseline evaluation with the VAS was carried out on the first visit in our department, with a mean score of 7.43 being observed (SD 1.27, range 3-10). This mean was slightly lower in the group of elderly patients (pre-treatment VAS mean 7.24, range 4-10, SD 1.45) vs. group <70 years (pre-treatment VAS mean 7.57, range 3-10, SD 1.12). Post-radiotherapy evaluation was carried on 1 and 4 months after the treatment finalization, with a mean score of VAS of 3.81 for all 59 evaluated patients (SD 2.54, range 0-8). One patient from the group <70 years did not continue the study after radiotherapy and could not be evaluated. As at the baseline evaluation, VAS mean was slightly lower in group of elderly patients (mean 3.46, SD 2.43, range 0-8) vs. group <70 years (mean 4.0, SD 2.64, range 0-8), with statistically significant difference observed in both pre-radiotherapy and post-radiotherapy evaluation (n=59, p=0.000). However, no difference

was seen comparing pre-radiotherapy VAS scale between two groups according to age at diagnosis, in the same way as post-radiotherapy results.

In the subjective evaluation, 37% of patients reported a complete response and 50% a partial response. Only 8% did not respond to radiotherapy. Seventeen patients (28%) required reirradiation due to exacerbation of pain at some time during the follow up, with a mean of 5.8 months after the initial irradiation treatment, with no difference among two groups (p=0.37). No secondary effects related to the irradiation were observed throughout the study follow-up period. There was no difference in response duration between the two groups (p=0.44).

## Discussion

According to data published in 2015 by Seegenschmiedt et al.

**Table 2:** Evaluation of response to radiotherapy of all the patients included in the study (n=60) and comparison of this response in patients according to the age of diagnosis (cut-off 70 years).

Characteristics	All patients (n=60, %)	Patients <70 years (n=35)	Patients ≥ 70 years (n=25)	p (Chi-square, T-student test)
VAS pre-radiotherapy (n=60 evaluated patients)				
3-5	3	1	2	0.13
6	9	3	6	
7	13	7	6	
8	29	22	7	
9	3	1	2	
10	3	1	2	
VAS post-radiotherapy (n=59 evaluated patients)				
	n=59	n=34	n=25	0.97
0	4	2	2	
1	3	2	1	
2	9	5	4	
3	10	6	4	
4	6	3	3	
5	10	5	5	
6	6	5	1	
7	8	5	3	
8	4	2	2	
VAS pre-RT				
- mean	7.43	7.57	7.24	0.27*
- SD	1.27	1.12	1.45	
- range	3-10	3-10	4-10	
VAS 4 monthspost-RT				
- mean	3.81	4	3.56	0.43*
- SD	2.54	2.64	2.43	
- range	0-8	0-8	0-8	
Re-irradiation	17 (28.3%)	10	7	0.96
Final response				
- partial response	30 (50%)	18	12	0.31
- total response	22 (36.7%)	12	10	
- no response	8 (13.3%)	5	3	

[4], every year in Germany about 50,000 patients are referred and treated by Radiotherapy (RDT) for "non-malignant disorders". This systematic review included only two articles evaluating the efficacy of RDT in patients with painful trochanteric bursitis [5,6]. Reviewed publications were two retrospective clinical studies summarizing the outcome of 60 patients who had been treated with low-dose RT for painful trochanteric bursitis, showing a partial and complete pain reduction in 56% to 73% of irradiated patients. In both studies, the treatment was carried out in patients after more than 3 months of inflammatory signs, who did not respond to other therapeutic measures. The highest level of recommendation for radiotherapy in trochanteric bursitis was C (radiotherapy might be performed). Lievens et al. [7] reported response rate (total or partial improvement in pain) of 66% with corticosteroid injections, similar to what was found in another study, which described 61% of maintained response at 6 months.

Brinks et al. [8] performed a randomized study including 60

cases in each study arm. One group was treated with injections of triamcinolone acetonide and physiotherapy if necessary while the other group received analgesia and physiotherapy. The rate of response in the first group was 55% vs. 34% in the second. However, at 12 months these percentages were 61% and 60%, respectively.

Classically, the trochanteric bursitis is classified as an inflammatory disease. However, recently some authors have questioned these inflammatory components. Board et al. [9] examined histological trochanteric bursal samples of 50 patients undergoing primary total hip replacement, 25 of them diagnosed previously with trochanteritis. In this prospective, case-controlled, blinded study published in 2014, none of the samples showed any evidence of acute or chronic inflammatory changes. This finding casts doubt on both the terminology and the existence of this condition as a separate clinical entity and suggests that in some cases may appear an alternative cause of local hip pain. Nevertheless, the inflammatory component of non malignant disease treated with radiotherapy was

previously studied in preclinical trials and clinical series [10-14].

In a recently published by Micke et al. [15] prospective series of 166 patients with several painful degenerative disorders of joints, the German Cooperative Group on Radiotherapy for Nonmalignant Diseases (GCG-BD) evaluated prospectively the efficacy of low-dose radiation therapy in patients aged  $\geq 70$  years. A painful trochanteric bursitis was diagnosed in 27 patients. Single doses of 0.5 Gy to 1.0 Gy and a total dose of 6.0 Gy per series were used. The authors observed that the mean Visual Analogue Scale (VAS) value before treatment was 6.38 and immediately upon completion of RT was 4.49 ( $p < 0.001$ ). After a median follow-up of 29 months, a good response in 54 of 109 patients was registered ( $p = 0.001$ ). The study concluded that a low-dose RT is a very effective and safe treatment for the management of painful degenerative disorders of joints in the elderly. In our study we evaluated 25 patients with trochanteric bursitis aged  $\geq 70$  years and a partial or total response was observed in 22 patients (88%), only one patient presented no response and in two cases the symptoms exacerbated (Table 2).

This demonstrates the need to apply more conservative therapeutic strategies in elderly patients and that low-dose radiotherapy offers an effective and non-invasive therapeutical alternative.

## Conclusion

Although the painful trochanteric bursitis is a relatively frequent disorder in elderly patients, no differences were seen in co-morbidities frequency, pain characteristics or response to low-dose radiotherapy among the patients of  $\geq 70$  year old and younger patients. These results support the use of radiotherapy in treatment of trochanteric bursitis in elderly patients.

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