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Scientific Article

Superficial radiation therapy in peyronie's disease: An effective and well-tolerated therapy

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Abstract

Purpose: This study aimed to assess the safety, efficacy, and patient satisfaction of superficial radiation therapy in the treatment of Peyronie's disease (PD) in a retrospective analysis.

Methods and materials: We performed a retrospective analysis of 83 patients who underwent radiation therapy between 1999 and 2008 with 8 fractions of 4 Gy over a period of 6 months. With a mean follow-up time of 52 months, patients responded to a comprehensive questionnaire that covered patient characteristics, disease duration before radiation therapy, course of disease, treatment response, side effects, and patient satisfaction.

Results: After a mean follow-up time of 52 months, 78% of the treated patients reported that PD progression had stopped. Furthermore 47% of patients had a symptom regression. Only 7% of patients reported PD progression. The penile curvature was improved in 49% of patients, and plaque induration could be reduced in 42% of patients. Moreover, 71% of patients reported substantial pain relief, as measured by a visual analogue scale (1 = not satisfied; 10 = very satisfied). Treatment satisfaction was rated with a median of 8 in a visual analogue scale out of 10. Side effects included transient erythema in 38.6% of patients and 9.6% reported of transient or chronic dryness. No severe side effects were observed.

Conclusions: Radiation therapy for PD in the disease's early stages proved to be a safe and well-tolerated method with good results in pain relief, especially in patients aged <62 years. No serious adverse events or malign transformations are expected using doses up to 32 Gy.

Conflicts of interest: None.

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Introduction

Peyronie's disease (PD) is a connective tissue disorder that is characterized by the formation of fibrotic plaques in the penile tunica albuginea. The plaques generate typical PD symptoms such as induration, deviation, pain during sexual intercourse, or even erectile dysfunction.[1] Prevalence is estimated between 3.2% and 11% depending on patient age, geographic region, and comorbidities in men.[2,3] The etiology is not clear, but it is assumed that microtraumas of the penile tunica albuginea, which are acquired during sexual intercourse, can cause the disease. Similar to wound healing disorders and dermatofibrotic disease such as keloids, the pathway of fibrosis is initiated.[4]

Although many therapies have been established, no curative treatment is known and therapy outcome is not satisfactory for the majority of patients. Therapies for early PD including oral medication and penile injections show moderate success and efficacy. In advanced cases, surgical interventions are applied.[5-9] Currently, surgery and collagenase injections are the most recommended therapy options for patients with PD, but if PD is still in the early stages, superficial radiation therapy is an effective and well-tolerated therapy option.[10,11]

Methods and materials

Between 1999 and 2008, a total of 234 patients with PD were treated with superficial x-ray therapy. In 2009, 6 months after the last treatment, questionnaires were sent to the patients, and of these, 83 questionnaires could be included in the statistical evaluation. In cases of radiation-relevant data evaluation, only 82 patients could be included because 1 questionnaire could not be assigned radiation data. The mean age of these 82 patients was 59 years (standard deviation: 8.3 years; range, 44-74 years), and the mean treatment time was 175 days (standard deviation: 19 days).

Radiation therapy

Radiation therapy was administered with superficial x-rays (Dermopan II, Siemens) after informed consent was obtained in accordance with previous protocols.[12] The radiation therapy consisted of 50 kV photons at 25 mA with a 2 mm cellon filter and a 1 mm aluminum filter to avoid side effects. With a focus-skin distance of 15 cm, radiation was applied through a tube with a diameter of 4 cm. The half-value depth was 15 mm. Afterward, a single dose of 4 Gy was applied 2 days in a row, followed by an 8-week interval break. Repeating this cycle 4 times resulted in a total applied dose of 32 Gy in 24 weeks. The statistical analysis of the received data was performed with the χ^2 test.

Results

The mean follow-up time was 52 months (4 years and 4 months), with a standard deviation of 23 months (1 year and 11 months) and a median of 49 months (4 years and 1 month), ranging from 8 to 98 months.

The most common symptom combination was penis deviation and permanent plaque-induration in 20 men (25%), followed by deviation and pain during erection in 18 men (21.7%). Another frequent combination was deviation and dragging pain during an erection in 15 patients (18%).

A total of 24 men (28.9%) experienced very rapid progression of PD, 33 men (39.8%) had a rapid progression, and 18 patients (21.7%) reported a slow progression. Only 1 person (1.2%) had batch-wise progression, and 7 men (8.4%) provided unclear answers (Table 1).

Twenty-eight patients (33.7%) were affected with regard to the coincidence with at least another benign fibroproliferative disorder such as Dupuytren's disease (22 men), plantar fibromatosis (5 men), knuckle pads (4

Table 1 Characteristics of the study population

	n	%
Patients, total	83	100
Mean age of patients (y)	59	
Coincidence with other benign fibroproliferative disorders	28	34
Dupuytren's disease	22	
Plantar fibromatosis (Ledderhose Disease)	5	
Knuckle pads	4	
Keloids	2	
Double affection in patients	5	
Total	33	
Three most common clinical symptoms		
Deviation and plaque-induration	20	25
Deviation and pain during an erection	18	21.7
Deviation and dragging pain during an erection	15	18
Progression type of Peyronie's disease		
Very rapid (weeks until 6 month)	24	29
Rapid (over 6 months until a year)	33	40
Slow progression (in years)	18	21.7
Batch-wise progression	1	1.2
No answer	7	8.5

Table 2 Common change of symptoms after therapy in 83 patients

	Yes (n)	%	No (n)	%	Unclear (n)	%
Regression of symptoms after therapy	39	47.0	39	47.0	5	6.0
Recurrence of symptoms after therapy	1	1.2	75	90.4	7	8.4
Positive impact of therapy on sexual life	30	36.1	44	53	9	10.8
Stopped Peyronie's disease progression	65	78.3	12	14.5	6	7.2

men), or keloids (2 men). Five of 28 patients had a double affection (plantar fibromatosis and Dupuytren's disease).

The arithmetic mean period between the first PD symptoms and the first x-ray therapy session was 10.6 months (standard deviation [SD]: 9.3 months; median: 8 months).

The subjective satisfaction of patients who underwent radiation therapy was a central endpoint of the study. The measuring was done using a visual analogue scale (1 = not satisfied; 10 very satisfied). Eighty of 83 patients gave an evaluable answer. The mean satisfaction level was at scale point 6.2 (SD: 3.1 points). The median was at scale point 7. When patients were asked if they would repeat the irradiation therapy, of the 78 evaluable answers (94%) the mean score was 6.7 (SD: 3.3). The median was at scale point 8. The results are shown in Table 2.

A total of 32 men (38.6%) recognized an acute erythema after irradiation, and another 8 patients (9.6%) suffered from dry skin in the affected area.

As the most common chronic side effect, 10 men (12%) reported telangiectasias in the irradiation field, followed by 8 men (19%) who complained about atrophic skin, and 5 men (6%) with paresthesia in the irradiated area. Sixty men (72%) had no chronic side effects. Furthermore, we analyzed 3 independent variables: Age, duration of disease until therapy, and therapy success depending on the symptoms. Only age showed a significant result.

Regarding patient age and therapy success, 77 patients gave a valuable answer and their median age of 61 years was taken as a breakpoint. There was significant improvement in the 28 men age <62 years (n = 47) versus 10 men over the age of 62 years (n = 30; $P < .05$).

Discussion

In this study, after a mean follow-up time of 52 months, 47% of 83 patients reported symptom regression, and 78% reported that the PD progression had stopped. In addition, 71% reported substantial pain relief, and only 7% of men reported PD progression.

No serious adverse event or malign transformation was observed at any time during treatment or in the follow-up period. Using the range of doses in patients with PD, there is no significant higher risk of radiation-induced cancer.[13]

Although pain supposedly fades after the acute state of PD, radiation therapy seems to shorten this period by inhibiting fibroblast hyperproliferation and disease progression.[4] When comparing the results of our patient collective with corresponding studies, similar results were observed in symptom improvement and pain relief after irradiation (Table 3).[12,14-16]

Conclusions

PD is a progressive disease that worsens in the majority of untreated patients. PD progression is linked to young age and risk factors of fibrosis, as proven by Paulis et al.[17] This, in addition to the overall results in previous studies, is the reason why many authors approve the application of radiation therapy in the early stages of PD.[11,17,18]

Table 3 Outcome of radiation therapy studies in Peyronie's disease

Author, year	Number of patients (n)	Overall dose (Gy)	Improvement of deviation (%)	Improvement of induration (%)	Pain relief (%)
Incrocci et al., 2000[16]	139	13	23	39	83
Pambor et al., 2003[15]	58	30	24	28	65
Meineke et al., 2003[12]	67	32	38	59	84
Niewald et al., 2006[14]	101	30-40	23-47	23-49	50
Present study	83	32	49	42	71

The study was limited by the lack of a control group. Furthermore, questionnaire-based data may have bias due to the subjective answers. Nevertheless, patient satisfaction with irradiation therapy was high with a median of 8 (on a scale from 1-10).

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