



## EVALUATION OF PENILE DOPPLER US AND IIEF SCORING RESULTS IN PATIENTS WITH ERECTILE DYSFUNCTION DUE TO HYPOTHYROIDISM AFTER TREATMENT

Sedat Altay<sup>1</sup>, Bora İrer<sup>2</sup>, Yasin Ceylan<sup>2</sup>, Derya Keskin<sup>2</sup>, Muzaffer Bilgin<sup>3</sup>

<sup>1</sup> Department of Radiology, Izmir Katip Celebi University, Atatürk Training and Research Hospital, Izmir, Turkey

<sup>2</sup> Department of Urology, Izmir Metropolitan Municipality Esrefpasa Hospital, Izmir, Turkey

<sup>3</sup> Department of Biostatistics and Medical Informatics, Eskisehir Osmangazi University Faculty of Medicine, Eskisehir, Turkey

### ABSTRACT

**Aim:** To evaluate the effect of hypothyroidism treatment in patients with hypothyroidism on erectile dysfunction (ED), complaints using penile artery Doppler ultrasonography (PADUS) and the International Index of Erectile Function (IIEF)-5 questionnaires.

**Methods:** This study was retrospective. Erectile dysfunction was diagnosed using the clinical IIEF-5 scoring scale system in 523 patients. We evaluated in all the participants; thyroid stimulating hormone, thyroxine, follicle stimulating hormone, prolactin, luteinizing hormone and free testosterone levels who came to the urology clinic diagnosed with ED. Fifteen patients with isolated hypothyroidism were evaluated who were diagnosed with ED. Patients were evaluated using IIEF-5 scores and PADUS results, before and after treatment for hypothyroidism. The Shapiro-Wilk test was used to compare hypothyroidism treatment effect PADUS and IIEF-5 results.

**Results:** All patients have determined the positive change in IIEF-5 scores and PADUS findings after hypothyroidism treatment. But no significant difference was observed before and after treatment in the PADUS findings. However, a significant difference was observed before and after treatment between IIEF-5 scores ( $p < 0.05$ ). We used the Holm-Sidak multiple comparison tests with unadjusted p-values and the critical level method that  $A p < 0.05$  was considered significant.

**Conclusion:** Isolated hypothyroidism must be included in the differential diagnosis of ED. It is a treatable cause of ED. In this study, we find positive change in ED clinical complaints and Doppler US findings after hypothyroidism treatment.

**Keywords:** Hypothyroidism, Erectile dysfunction, Penile doppler

### INTRODUCTION

Erectile dysfunction (ED) etiology includes endocrine diseases such as diabetes mellitus and atherosclerosis as well as chronic diseases that cause multiple organ failures, arterial hypertension, and neuropathy (1,2). ED can also be caused by psychosomatic conditions, substance abuse, and psychological trauma (3). Thyroid gland disorders are a cause of ED (4-6).

Multicenter studies have shown improvement in ED clinical symptoms and International Index of Erectile

Function (IIEF) scores following hypothyroidism treatment (7,8). But there is no study literature followed by post-treatment changes with penile artery Doppler ultrasonography (PADUS).

We believe necessary to evaluate the arterial effects of the therapy. We researched the effect of hypothyroidism treatment on IIEF-5 score values and PADUS findings in patients with isolated hypothyroidism and ED complaints.

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Correspondence Address

**Seday Altay**

Department of Radiology, Izmir Katip Celebi University,  
Atatürk Training and Research Hospital, Izmir, Turkey

E-mail: sedataltay@yahoo.com

## MATERIALS AND METHODS

The present study was a retrospective single institutional study. It was approved by the institutional review board.

A total of 523 patients (age range, 45–68; mean, 57.3 years) were evaluated retrospectively that came to the urology clinic with ED symptoms 2007 between 2013. Patients were diagnosed using the IIEF-5 scoring system in a clinical setting. Patient blood thyroid stimulating hormone (TSH), thyroxine (T4), follicle stimulating hormone (FSH), luteinizing hormone (LH), prolactin (PRL), and free testosterone levels were recorded. Penile Doppler USG was planned in 245 patients with mild to moderate (6–24) IIEF-5 scores. Twenty-five patients with normal blood LH, FSH, PRL and free testosterone levels were diagnosed with isolated hypothyroidism. We were found a normal level to glycaemic and lipid of the patients. The vascular reasons for ED were eliminated after those 25 patients showed normal penile Doppler USG results, and treatment for isolated hypothyroidism was planned for those patients. The patients have not psychogenic ED. Cases were not grouped for hypothyroidism etiology. Patients were admitted for control. Twenty patients who became euthyroid returned to the clinic for control. Five patients who did not come for control were excluded from the study. Follow-up periods for patients were 3–13 months (mean, 6 months). Serum LH, FSH, PRL, TSH, T4 and testosterone levels were reviewed at that time. All cases had normal levels of hormone including all thyroid hormones. One patient was excluded from the study at this point for myocardial infarction. Four patients who did not accept control Doppler USG were evaluated using IIEF-5 scoring. Fifteen patients were reviewed using control penile Doppler USG and IIEF-5 scoring. There is no control group because of this a retrospective study.

IIEF-5 scoring was done in a clinical setting. Scores for ED severity ranged from 6 to 30 (6–10, severe; 11–16, moderate, and 17–25 minimal). Scores of 25–30 indicated no ED (9, 10).

Penile Doppler USG was performed by measuring peak systolic and end diastolic velocity 5, 10, and 20 min after intracavernous injection of 5 mg papaverine. All measurements were taken by the same radiologist using a linear 5–12 MHz probe with proper Doppler parameters and LOGIQ 9 sonographic equipment (GE Healthcare, Milwaukee, WI, USA). Patients were prepared for USG imaging using a routine penile Doppler USG protocol after the 5 mg papaverine injection (11).

Five patients had hypertension controlled by medication. No other chronic conditions that required treatment were found in any patient.

## RESULTS

The average IIEF-5 score for 19 patients was 17.79 before and 20.63 after treatment (Table I). The IIEF-5 score did not change in 2 patients, whereas scores increased in other 17 patients. Penile Doppler USG findings were reviewed in 15 patients. Average peak systolic arterial flow velocity values 5 min after the intracavernous papaverine injection were 36.9 cm/s before and 38.7 cm/s after hypothyroidism treatment. Average peak systolic arterial flow velocity values 10 min after the intracavernous papaverine injection were 40.6 cm/s before and 42.9 cm/s after hypothyroidism treatment. Average peak systolic arterial flow velocity values 20 min after intracavernous papaverine injection were 41.4 cm/s before and 43.1 cm/s after hypothyroidism treatment (Table II).

## STATISTICAL ANALYSIS

The Shapiro–Wilk test was used to compare normally distributed data of patients who received hypothyroidism treatment. The patient data before and after treatment were compared using two-way repeated measures analysis of variance (two-factor repetition). Multiple factors were compared for each data group using the Holm–Sidak method. A paired t-test was used for dual repetition repeated-measures analysis with a normal distribution, and the Wilcoxon signed-rank test was used to analyze repeated measures data that were not normally distributed. No significant difference was observed before and after treatment in the 5 and 20 min groups. However, a significant difference was observed before and after treatment between the 10 min group and IIEF-5 scores ( $p < 0.05$ ). Importance was graded using the Holm–Sidak multiple comparison tests with unadjusted p-values and the critical level method. A  $p < 0.05$  was considered significant.

## DISCUSSION

In this study, we evaluated the effect to ED of hypothyroidism treatment clinically and radiologically. The outcomes were the average IIEF-5 score before treatment was 17, 78 which increased to 20, 63 after treatment but penile artery Doppler ultrasonography (PADUS) values were increased.

Endocrine diseases are a serious etiological factor for patients with ED (12, 13, 14). Hypothyroidism has negative effects on both the male and female reproductive systems (1, 6, 8). Hypothyroidism is the third most frequent endocrine disease, with 3.1% of cases having an ED etiology (14). In the same study, low serum testosterone levels (15%) and hyperprolactinemia (13.7%) were the first and second most frequent etiological factors, respectively (14). The negative effects of hypothyroidism on the reproductive system are reversible (5, 8, 17). Clinical recovery of a loss in reproductive system function has been observed following thyroid hormone disorder treatment (8).

**Table 1. Patients' Penile Doppler USG and IIEF-5 Scores before treatment**

	<b>5.min</b>	<b>10.min</b>	<b>20.min</b>	<b>IIEF-5</b>	<b>Age</b>
1. Patient	41	41	35	16	54
2. Patient	23	28	41	15	58
3. Patient	35	39	45	17	62
4. Patient	37	34	43	19	52
5. Patient	32	46	44	20	68
6. Patient	29	37	45	18	53
7. Patient	44	42	40	19	48
8. Patient	36	54	43	21	45
9. Patient	38	44	39	20	50
10. Patient	44	47	41	17	64
11. Patient	35	40	43	14	63
12. Patient	41	42	40	19	58
13. Patient	44	40	38	18	58
14. Patient	40	36	43	19	64
15. Patient	35	39	42	15	57
16. Patient				18	63
17. Patient				20	63
18. Patient				14	51
19. Patient				19	52

**Table 2. Patients' Penile Doppler USG and IIEF-5 Scores after treatment**

	<b>5.min</b>	<b>10.min</b>	<b>20.min</b>	<b>IIEF-5</b>	<b>Age</b>
1. Patient	44	45	41	20	54
2. Patient	36	39	46	22	58
3. Patient	37	40	45	21	62
4. Patient	36	36	45	20	52
5. Patient	33	45	41	22	68
6. Patient	40	39	49	21	53
7. Patient	31	43	36	20	48
8. Patient	36	50	46	21	45
9. Patient	39	46	43	21	50
10. Patient	44	48	40	22	64
11. Patient	36	41	42	19	63
12. Patient	40	42	40	20	58
13. Patient	44	45	45	22	58
14. Patient	43	42	44	21	64
15. Patient	41	43	42	20	57
16. Patient				19	63
17. Patient				20	63
18. Patient				18	51
19. Patient				23	52

The IIEF-5 scoring system was first developed by Rosen et al. (1997) and was translated into Turkish by the Turkish Andrology Society in 1998 (9). It is often used in clinical settings for ED diagnosis and grading. Patients were defined as severe (6-10), moderate (11-16), mild (17-25), or no ED (26-30) by their scores. In our study, Penile Doppler USG was planned in patients with scores of 11–22 and who gave us their consent (6, 10).

A multicenter study compared IIEF-5 scores before and after treatment for thyroid disease in patients with hypo- and hyperthyroidism (8). The authors evaluated the effects of thyroid gland function disorders on the IIEF-5 score and found a significant improvement in IIEF-5 scored after treatment. In addition, progress in sexual dysfunction, such as decreased libido and premature ejaculation, were also reported (8).

In our study, 4.3% of patients with hypothyroidism had an ED etiology, in accordance with previous studies (14-16). Krassas et al. reviewed ED using IIEF-5 scoring in patients with hypo- and hyperthyroidism before and after treatment. Forty-four patients with hypothyroidism were included in that study. They found that ED improved clinically with proper treatment. The average patient IIEF-5 score before treatment was 14.5; after hypothyroidism treatment, the score increased to 23 (7,8,17). In our study, the average IIEF-5 score before treatment was 17.78, which increased to 20.63 after treatment. This increase is in accordance with the literature (7,8).

Penile artery Doppler USG is often used to diagnose vascular ED. Arterial and venous insufficiency can be pinpointed using color Doppler USG of the cavernous artery (10, 15). No studies have reviewed hypothyroidism treatment results using penile Doppler USG. We found in peak systolic arterial values following hypothyroidism treatment. The average values of all arterial measurements improved as well.

There were several limitations in our study. Our study was retrospective and we believe prospective studies are required to assess the effect of treatment in hypothyroid patients with ED. Our study consisted of a short time follow. These patients required longtime follow off.

In the event, the changes in penile artery Doppler USG were not statistically significant ( $p = 0.778$ ). No significant changes were observed before and after treatment except in the 10 min group ( $p = 0.55$ ), and the Penile Doppler USG results were within normal values. Patients showed a significant increase in IIEF-5 scores following hypothyroidism treatment ( $p = 0.001$ ). Thus, follow-up of patients with isolated hypothyroidism and ED should be done using IIEF-5 scoring.

In conclusion, patients with hypothyroidism and ED are easily diagnosed and treated. Clinical and radiological improvements were seen in both IIEF-5 scores and penile Doppler USG measurements. Hypothyroidism must be kept in mind in the differential diagnosis of ED.

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- The English in this document has been checked by at least two professional editors, both native speakers of English. For a certificate, please see:

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## CONFLICT OF INTEREST DISCLOSURE

The authors declared no conflicts of interest.

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