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Is there a relation between priapism occurring after penile doppler ultrasonography and international erectile function index score and erection hardness score levels?

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ABSTRACT

Objective: The relation between Erection Hardness Score (EHS) and The International Erectile Function Index (IIEF) Questionnaire- Erectile Function Domain Score (IIEF-EF score) used in erectile dysfunction (ED) evaluation and the prevalence of priapism after penile Doppler ultrasonography (PDU) was examined in this study.

Material and methods: A total of 62 patients who had PDU were included in the study. Patients were divided into two groups; there were 33 patients in IIEF-EF score ≤10, EHS <2 group (Group 1) and 29 patients in IIEF-EF score >10, EHS ≥2 group (Group 2). The two groups separated according to their scores were compared for age, body mass index (BMI), prevalence of priapism, vascular comorbidities and duration of erection.

Results: When compared to Group 2, median age, rate of vascular comorbidities rate and BMI were detected to be higher in Group 1 with IIEF-EF score ≤10 and EHS <2. But contrary to age and rate of vascular comorbidities (p=0.035, p=0.049 respectively), higher BMI was detected to be statistically insignificant (p=0.093). Duration of erection, IIEF-EF score and number of cases with priapism were significantly higher in Group 2 with IIEF-EF score >10 and EHS ≥2 (p<0.001, p=0.027, p=0.049 respectively).

Conclusion: High IIEF-EF and EHS scores, younger ages and lower rates of vascular comorbidities in patients from whom PDU was demanded increase the prevalence of priapism.

Keywords: Erection hardness score; IIEF score; penile Doppler ultrasonography, priapism.

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Introduction

Erectile dysfunction (ED) is the most frequently encountered sexual dysfunction in clinical practice.[1] It has been reported that it affects 52% of the men between 40-70 years of age, and impairs their quality of life.[2] For the investigation, and grading of erectile dysfunction Erection Hardness Score (EHS) and The International Erectile Function Index (IIEF) Questionnaire- Erectile Function Domain Score (IIEF-EF score) are frequently used.[3] Penile erection is realized as a result of psychological, neural, vascular, and hormonal factors, and healthy interaction among them. Erectile dysfunction becomes manifest due to problems arising from these factors. Since penis has a special vascular network of its own, etiologies of vascular origin place an important place in the etiology of ED.[4] in the evaluation of vasculogenic ED, The role of penile Doppler ultrasound (PDU) in the evaluation of was firstly described in the year 1985.[5] Nowadays, clinicians use this technology generally to measure objective, and cost-effective vascular parametres in ED. As minimally invasive approach, it is prevalently used worldwide.[6] Intracavernosal vasoactive agents

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are used to maintain penile erection during PDU.[7] Some studies have demonstrated the occurrence of priapism while using vasoactive agents for PDU. Priapism is a state of involuntary painful erection persisting for more than four hours. Glans, and corpus spongiosum do not involve in this process.[8] It is rarely seen in men (0.3-1/100.000).[9] Though potential causes of priapism differ based on the type of priapism, most of them appear to be related to idiopathic, and iatrogenic etiologies. Recently the number of cases with priapism have increased, because of PDU performed with the aid of intracavernosal injections.[10] Though a prominent increase in the incidence of priapism has not been detected, use of phosphodiesterase-5 enzyme inhibitors (PDE5i) in PDU, and in the treatment of ED may rarely induce priapism. [11]

In this study the correlation between IIEF, and EHS scores used in the evaluation of ED, and frequency of development of priapism after PDU has been investigated.

Material and methods

Patients with complaints of erectile dysfunction have been included in the treatment. The presence or absence of vascular comorbidities as hypertension (HT) diabetes mellitus (DM), cardiovascular disease (CVD) have been questioned. A meticulous, and detailed history were obtained so as to eliminate, psychogenic, and neurologic factors, genital, and neurologic examinations were performed. Body mass indices (BMIs) were calculated based on bodyweights, and heights of the patients. According to patient's history The International Erectile Function Index (IIEF) Questionnaire (IIEF) was completed, and Erectile Function Domain score (IIEF-EF score) which evaluates the sum of the responses given to the 1.,2.,3.,4.,5., and 15. questions was calculated, and EHS scores were measured. Based on IIEF-EF scores, the questions related to the classification of ED grades, and evaluation of EHS are seen in Table 1.

A total of 62 patients whose PDUs were performed based on suspicion from vasculogenic ED were included in the study. Before PDU intracavernous 60 mg papaverine HCl was injected into 1/3 proximal of penile shaft using a 2 mL 26 G syringe , and then penile arterial, and venous blood flows were evaluated at 5., 10., 15. and 20. minutes. Measurements were made using Siemens Acuson S2000, 9 Mhz linear probe. Persistence of penile erection for longer than 4 hours after PDU was accepted as the presence of priapism. In all patients priapism was treated with aspiratrion and/or phenylephrine irrigation. The patients were divided into 2 groups based on ED evaluation parametres including IIEF-EF score, and EHS. A total of 62 patients including 33 patients with IIEF-EF scores of ≤10 (severe), and EHS <2 (Group 1), and 29 patients with IIEF-EF scores of >10 (mild-moderate), and EHS ≥2 (Group 2) were included in the study.

Two groups divided based on the scores obtained, were compared according to age, BMI, incidence of priapism, vascular comorbidities, and duration of erection. This retrospective study was conducted in compliance with ethical principles defined in the Declaration of Helsinki.

Statistical analysis

Categorical, and parametric changes between groups were statistically compared using Mann-Whitney U, and Chi-square tests. P<0.05 was considered to be statistically significant Statistical evaluation of data was performed using SPSS (Statistical Package for the Social Sciences Inc.; Chicago, IL, ABD) 15.

Results

The following data were obtained for Groups 1, and 2, respectively: Age (year): 55.5±6.5 (44-67) vs. 51.8±6.8 (33-65) (p=0.035), BMI (kg/m^2): 27.94±3.1 vs. 26.72±2.2 (p=0.093), Vascular comorbidities % (n): 57.7% (19/33) vs. 31% (9/29) (p=0.049), Cases with priapism (%): 1/33 (3) vs. 7/29 (24.1) (p=0.014). Duration of erection (min): 33.2±33 (0-272) vs. 128.8±106 (15-446) (p<0.001).

In Group 1 (IIEF-EF score ≤10, severe, and EHS <2) mean age, and BMI of the patients, vascular comorbidities were relatively increased when compared with Group 2. However contrarily age, and vascular comorbidities (p=0.035, and p=0.049, respectively) higher BMI were statistically insignificant (p=0.093).

In Group 2 (IIEF-EF score >10, mild-moderate, and EHS ≥2) duration of erection, IIEF-EF score, and number of cases with priapism were significantly increased (p<0.001, p=0.027, and p=0.049, respectively). Findings, and statistical values are seen in Table 2.

Discussion

Multiple number of questionnaire forms have been developed to determine the grade of ED in patients with complaints of erectile dysfunction. IIEF scoring system was defined in 1997, and nowadays it is one of the most prevalently used forms for men presenting with sexual complaints.[12] However EHS was firsly described in 1998. EHS has been proved to be an easily applicable form which significantly correlates with the outcomes of sexual function.[13,14] PDU has been performed in patients with abnormal ED assessment scores, and those with suspect vasculogenic ED. PDU is a minimally invasive method in the evidence-based evaluation of ED.[15] Prominently used intracavernosal vasoactive agents to induce erection during PDU include papaverine hydrochloride, and prostaglandin E1. Priapism may occur secondary to administration of these agents.[8] To prevent development of priapism Bimix

(papaverine +phentolamine), and Trimix (papaverine + phentolamine + prostaglandin E1) have been produced.[16] However in our country Bimix, and Trimix are not frequently available, generally papaverine hydrochloride has been used during PDU. Priapism has 3 different types: Ischemic (veno-occlusive), non-ischemic (arterial, high-flow), and stuttering (recurrent). Pathophysiologic causes, and treatment modalities of each type of priapism differ from each other. Generally priapism occurring during PDU secondary to vasoactive agents is of ischemic type.[8]

Secil et al. [17] indicated occurrence of priapism in 11.1% of 72 patients following PDU who had undergone 60 mg intracavernosal papaverine injection. Kilic et al.[16] performed the largest series in the literature, where PDU was performed using intracavernosal papaverin injections, and reported development of priapism in 2.8% of 672 patients. In this study younger patients suffered from priapism, comorbidities were found in 16.6% (3/18) of the patients.

In the literature various studies have been performed on methods which may predict development of post-PDU priapism. Metawea et al.[18] used papaverine –phentolamine combination for intracavernosal injection (ICI) during PDU, and described persistence of erection longer than 6 hours in 25 of 250 (10%) patients. Besides median peak systolic velocity (PSV) of these patients during PDU had been relatively higher (74 cm/sec). In this study predictive value of higher PSV in the development of priapism was indicated.

Shamloul et al.[19] reported prolonged, and painful erection longer than one hour in 29 (7.25%) out of 400 patients who had received intracavernosal trimix injections during PDU, and also indicated persistence of erection for 6 hours in 19 (4.7%) of 29 patients. Cavernosal artery blood flow of these patients had ceased completely at 1. hour, and their ischemic state had not changed 6 hours after intracavernosal trimix injections. Based on the study outcomes, the authors reported that cessation of cavernosal blood flow might have a positive predictive value for the development of priapism following PDU. Interestingly, in our study priapism was seen in 12.9% of the patients, while only 4.7% of the patients who underwent intracavernosal trimix injections developed priapism.

Yang et al.[20] performed PDU in the same patient group with the aid of oral tadalafil (20 mg), intracavernosal papaverine (30-60 mg) or oral tadalafil plus intracavernosal papaverine (15 mg) injections at different time points, and reported development of priapism in 3.6% of the patients who had received only intracavernosal papaverine injections. In this study improved vasodilatory response obtained by tadalafil plus low dose of

Table 1. Parameters used to evaluate erectile dysfunction

Grading of ED based on IIEF-EF scores
≤5: Absence of sexual intercourse
6-10: Severe ED
11-16: Moderate ED
17-21: Mild-moderate ED
22-25: Mild ED
≥26: "Normal" erectile function
Erection Hardness Score (EHS)
Grade 1: Tumescence without rigidity
Grade 2: Tumescence with minimal rigidity
Grade3: Rigidity adequate for sexual intercourse
Grade 4: Full rigid erection

ED: erectile dysfunction; IIEF-EF score: The International Erectile Function Index (IIEF) Questionnaire- Erectile Function Domain Score

Table 2. Characteristic findings of the groups (n=62)

	Total	Group 1 IIEF-EF score ≤10 (severe) EHS <2	Group 2 IIEF-EF score >10 (mild-moderate) EHS ≥2	p
n (%)	62 (100)	33 (53.2)	29 (46.7)	
Age (year)	53.8±6.6 (33-67)	55.5±6.5 (44-67)	51.8±6.8 (33-65)	0.035
BMI (kg/m^2)	27.3 ±2.8	27.94±3.1	26.72±2.2	0.093
IIEF-EF score	11.86±3.6	7.56±3.1	16.28±4.8	0.027
Vascular comorbidities, % (n)	45.1 (28/62)	57.7 (19/33)	31 (9/29)	0.049
Cases of Priapism (%)	8/62 (12.9)	1/33 (3)	7/29 (24.1)	0.014
Duration of erection (min)	77.9 (0-446)	33.2±33 (0-252)	128.8±106 (15-446)	<0.001

ED: erectile dysfunction; BMI: body mass index; EHS: Erection Hardness Score; IIEF-EF score: The International Erectile Function Index (IIEF) Questionnaire- Erectile Function Domain Score

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papaverine relative to solely papaverine injections had been emphasized.

To decrease incidence rates of priapism following penile Doppler ultrasound, ICIs using phentolamine containing bimix, and trimix solutions may be effective. However if unavailable low dose papaverine, and PDE 5i combination may decrease rates of priapism. In this study we detected that decreased number of vascular comorbidities increased rates of development of priapism. Among etiological, and especially organic factors predominantly vascular factors cause ED. In the presence of diseases leading to vascular pathologies as hypertension, hyperlipidemia, diabetes mellitus, and coronary artery disease, risk of ED increases nearly 1.5-4-fold.[21] Therefore we think that decreased number of vascular comorbidities may be positively correlated with prolonged state of erection developed after papaverine injection.

In this study we have concluded that incidence of priapism developed following PDU is directly proportional to increased IIEF-EF, and EHS scores. In patients with IIEF-EF score >10 and EHS ≥2 one should be attentive about development of priapism when PDU is requested. Therefore the patients should be warned about this issue, and informed about the management of priapism, and potential complications which may emerge in case of prolonged erection. In our patient population priapism developed in 12.9% of the cases, however in group with IIEF-EF score >10 EHS ≥2, its incidence increased nearly 2 fold (24.1%). We think that in the development of priapism secondary to PDU IIEF-EF score, and EHS have a predictive value. We also conceive that younger age, and decreased number of vascular comorbidities may increase the risk of development of priapism secondary to PDU.

In conclusion, in patients for whom PDU is requested, higher IIEF-EF, and EHS scores, younger age, lower rates of vascular comorbidities increases the rates of development of priapism. We also think that in order to be able to decrease incidence of PDU-related priapism, use of mixed vasoactive agents containing phentolamine or combination of lower doses of papaverine, and PDE5i may be beneficial in ICI.

Ethics Committee Approval: Authors declared that the research was conducted according to the principles of the World Medical Association Declaration of Helsinki "Ethical Principles for Medical Research Involving Human Subjects", (amended in October 2013).

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