

Comparison of audiovisual sexual stimulation test with nocturnal penile tumescence test in the evaluation of erectile dysfunction by using RigiScan

RigiScan ile erektil disfonksiyonun değerlendirilmesinde noktural penil tūmesans testi ile vizüel seksüel stimūlasyon testinin karşılaştırılması

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Abstract

Objective: Nocturnal penile tumescence (NPT) test is a time-consuming, cumbersome, and relatively expensive method which is used for the diagnosis of erectile dysfunction (ED). The aims of the study were to clarify the relationship between erotic and nocturnal erections and to evaluate the diagnostic efficacy of the audiovisual sexual stimulation (AVSS) test with and without medication.

Materials and methods: A total of 30 patients with ED were examined. Each patient filled in an International Index of Erectile Function-5 (IIEF-5) questionnaire. AVSS and NPT tests were performed using the RigiScan Plus. AVSS test was performed with and without medication (sildenafil citrate 50 mg). Patients were divided into two groups (psychogenic and organic groups) according to NPT and AVSS test results.

Results: The mean age of the patients was 46.4 (23-69) years and IIEF-5 score was 10.8±4.5. Positive AVSS test was found in 18 (85.7%) of the 21 patients with positive NPT test. Negative AVSS test was found in 7 (77, 8%) of the 9 patients with negative NPT test. The specificity of AVSS test was 85.7% and sensitivity was 77.8% for the psychogenic groups. The overall accuracy rate was 83.3%.

Conclusion: The NPT test is more expensive, cumbersome, and uncomfortable than the AVSS test. Although efficiency of both tests is similar, the AVSS test seems more advantageous. We suggest that the AVSS test without medication should be performed as the first step in the diagnosis of the patients with ED. In patients with negative test result, the AVSS test with medication should be performed as the second step diagnostic method.

Key words: Audiovisual sexual stimulation; erectile dysfunction; nocturnal penile tumescence; penile erection; RigiScan.

Özet

Amaç: Eretil disfonksiyon (ED) tanısında noktural penil tūmesans (NPT) testi zaman kaybına ve rahatsızlığa neden olan, rōlatif olarak pahalı bir yöntemdir. Bu çalışmanın amacı noktural ve erotik ereksiyon arasındaki ilişkiyi açıklamak ve medikasyonlu ve medikasyonsuz vizüel seksüel stimūlasyon (VSS) testinin tanisal etkinliğini incelemektir.

Gereç ve yöntem: ED'si olan toplam 30 hasta çalışmaya alındı. Hastalara International Index of Erectile Function-5 (IIEF-5) formu doldurtuldu. RigiScan Plus ile tüm hastalara VSS ve NPT testleri uygulandı. VSS testleri medikasyonlu (50 mg sildenafil sitrat) ve medikasyonsuz olarak yapıldı. Hastalar NPT ve VSS test sonuçlarına göre psikojenik ve organik olarak iki gruba ayrıldı.

Bulgular: Çalışma grubundaki hastaların ortalama yaşı 46.4 (23-69), IIEF-5 skoru 10.8±4.5 idi. Pozitif NPT testi olan 21 hastanın 18'inde (%85.7) VSS testi de pozitif bulundu. Negatif NPT testi olan 9 hastanın ise 7'sinde (%77.8) VSS testi negatif idi. Psikojenik grupta VSS testinin spesifitesi %85.7 ve sensitivitesi %77.8 olarak bulundu. Toplam doğruluk oranı ise %83.3 idi.

Sonuç: VSS testi ile karşılaştırıldığında NPT testi daha pahalı, can sıkıcı ve rahatsız edicidir. Her iki testin etkinliği benzer olmasına rağmen VSS testi daha avanyajlı gibi durmaktadır. ED tanısında tanı yöntemi olarak medikasyonsuz VSS'yi başlangıç değerlendirmesinde önermekteyiz. VSS negatif olan hastalarda ise medikasyonlu VSS tanıda ikinci aşama olarak kullanılmalıdır.

Anahtar sözcükler: Eretil disfonksiyon; noktural penil tūmesans; penil ereksiyon; RigiScan; vizüel seksüel stimūlasyon.

As an objective, noninvasive measurement of the erectile activity, nocturnal penile tumescence (NPT) has been considered as the gold standard for differentiating psychogenic and organic erectile dysfunction (ED).^[1] Previous studies noticed that although positivity of NPT test indicated presence of normal neurologic and vascular structures in penis, some diseases such as serious anxiety, depression, and sleep apnea syndrome would cause false negativity of the test.^[2,3] NPT monitoring is, however, time-consuming, cumbersome, and relatively expensive. For instance, the test takes at least 2 nights to be performed.^[4]

Several methods for the objective measurement of penile tumescence and rigidity have been described,^[5] of which the RigiScan system is most widely used.^[6] This method was firstly introduced by Bradley et al.^[7] in 1985. Although the technique was developed originally for home monitoring of NPT, it has been used for real-time assessment of penile tumescence and rigidity in response to pharmacological stimulation^[8] or audiovisual sexual stimulation (AVSS).^[9]

In the present study, we performed both the NPT test and the AVSS test (with and without medication) using the RigiScan device and compared the findings of the two tests. The aims of the study were to clarify the relationship between erotic and nocturnal erection and to evaluate the diagnostic efficacy of the AVSS test with and without medication.

Materials and methods

Between September 2003 and May 2004, a total of 30 patients visiting our hospital with a major complaint of ED (inability to develop or maintain an erection of the penis) for at least 6 months were enrolled in the study. None of the patients had experienced a loss of libido. Exclusion criteria for the study were concomitant hypertension, diabetes mellitus, hyperlipidemia, coronary artery disease, psychological diseases and chronic diseases. The mean age of the patients was 46.4 years, with a range of 23-69. The patients had a normal sleeping history and a normal physical examination. Biochemical profile including fasting blood glucose, creatinine, aspartate transaminase, alanine transaminase, total cholesterol, triglycerides, low density lipoprotein cholesterol, high density lipoprotein cholesterol; and serum concentrations of total and free testosterone, luteinizing hormone,

follicle-stimulating hormone, and prolactin were within the range of normal for our laboratory (data not shown). Each patient filled in an International Index of Erectile Function-5 (IIEF-5) questionnaire.^[10] The patients were performed NPT and AVSS test using RigiScan device (Dacomed Corporation, Minneapolis, MN, USA). Two tests were performed in five session as presented below.

1. Session: 1st day-night NPT
2. Session: 2nd day-morning AVSS with placebo
3. Session: 2nd day-night NPT
4. Session: 3rd day-night NPT
5. Session: 4th day-morning AVSS with 50 mg sildenafil citrate (Viagra, Pfizer Inc. Istanbul, Turkey)

The best test result among three NPTs was used for the statistical analysis. Medication (placebo or sildenafil citrate) was given just one hour before the AVSS test. We accepted positivity of test included at least 1 episode of rigidity at the penile tip greater than 60% and more than 10 min in duration.^[11] Informed consent was obtained from all patients, and the study protocol was approved by the ethics committee of our institution. The study was conducted in accordance to Helsinki Declaration 2008 principles.

Statistical analysis was performed with SPSS 10.0 (SPSS, Chicago, IL, USA). The tests were compared with independent sample t test. Correlation between NPT and AVSS (placebo and sildenafil citrate) was analyzed with cross table analysis. A p value of <0.05 was considered statistically significant.

Results

Mean value of the IIEF-5 scores in the study group was 10.8±4.5. Psychogenic group included 21 patients with positive NPT test and organic group included 9 patients with negative NPT test. Table 1 shows mean base rigidity percentage of these two groups in NPT, AVSS with placebo, and AVSS with sildenafil tests.

We also distinguished two groups of the patients according to AVSS results. Psychogenic group criteria was a mean base rigidity of >20% during AVSS-sildenafil test and/or a total penile rigidity of >60% (more than 10 min) during AVSS-placebo test. We

compared groups of the patients according to NPT and AVSS results (Table 2).

Positive AVSS test was found in 18 (85.7%) of the 21 patients with positive NPT test. Negative AVSS test was found in 7 (77.8%) of the 9 patients with negative NPT test. Specificity of AVSS test was 85.7% and sensitivity was 77.8% for the psychogenic groups. It was also obtained that the overall accuracy rate was 83.3%.

Discussion

It is important to know the etiology of ED since the management of the disease changes according to etiology. Three methods can be used for the assessment of erectile capacity: measurement of spontaneous erections during night sleep, the erectile response to AVSS in laboratory, and measurement of the response to intracavernosal smooth muscle relax-

ants such as prostaglandin E1. While the first two methods assess physiological responses, the third method measures the pharmacologically induced response. Of the three methods, NPT measurement is the first objective diagnostic approach to differentiate psychogenic and organic ED.^[1] The other diagnostic methods, which are more invasive than NPT test, are color Doppler sonography, dynamic cavernosometry, and cavernosography.^[12] Such invasive methods are unnecessary for differentiating psychogenic and organic etiology. On the other hand, an interest in the AVSS test has recently developed as a more physiological and cost-effective alternative to the NPT test. This technique is, however, at an earlier stage of validation, and its usefulness remains unclear.^[1] We aimed to investigate the role of AVSS test in differentiation of psychogenic and organic ED. Is it an available, simple and reliable method?

Table 1. Mean base rigidity percentage of two groups in NPT, AVSS with placebo and AVSS with sildenafil tests

	Psychogenic group (n) / mean±SD	Organic group (n) / mean±SD	p value
NPT	(21) / 55.14±16.20	(9) / 37.88±27.13	0.02
AVSS-placebo	(21) / 23.09±27.32	(9) / 5.33±16.00	0.004
AVSS-sildenafil	(21) / 34.57±27.29	(9) / 7.44±12.45	0.01

NPT: Nocturnal penile tumescence, AVSS: Audio visual sexual stimulation, SD: Standard deviation

Table 2. The cross table of NPT and AVSS test results

			AVSS results		
			Psychogenic	Organic	Total
NPT results	Psychogenic	Patient number	18	3	21
		Expected patient number	14	7	21
		% in NPT test	85.7	14.3	100.0
		% in AVSS test	90.0	30.0	70.0
		% in Total	60.0	10.0	70.0
	Organic	Patient number	2	7	9
		Expected patient number	6	3	9
		% in NPT test	22.2	77.8	100.0
		% in AVSS test	10.0	70.0	30.0
		% in Total	6.7	23.3	30.0
	Total	Patient number	20	10	30
		Expected patient number	20	10	30
		% in NPT test	66.7	33.3	100.0
		% in AVSS test	100.0	100.0	100.0
		% in Total	66.7	33.3	100.0

NPT: Nocturnal penile tumescence, AVSS: Audio visual sexual stimulation

Erbağcı et al.^[9] assessed the efficiency of AVSS test with sildenafil citrate medication in the diagnosis of ED patients. They reported that sildenafil citrate medication in combination with the AVSS test has been found to give effective and reliable data which enables them to diagnose the psychogenic nature of ED on an objective basis and gives the chance to determine the efficiency of sildenafil citrate medication in impotence regardless of etiologic origin. They also noticed AVSS test was more reliable and practical than NPT test. We divided the patients into two groups (psychogenic and organic groups) according to their NPT test results and compared these two groups by using the tests described above (NPT, AVSS with and without medication). During the tests, base rigidity percentage that does not depend on duration was used because the duration of the tests was different. We found a positive correlation among NPT test results, AVSS test results with sildenafil and AVSS test results with placebo (Table 1). That data has shown that AVSS is a reliable, efficient, and short duration test and is useful for differentiating psychogenic and organic etiology in patients with ED.

Chung et al.^[13] compared NPT measurements with responses to AVSS in 137 patients. They adopted the penogram, which shows dynamic penile blood flow changes using a radioisotope, for the AVSS test and the Snap-Gauge band (Life-Tech model 1424 Tumistore) or RigiScan for the NPT test. They reported that in 32 patients with normal erotic erections, the compatibility ratio with nocturnal erection was 63%, while in 105 patients with abnormal erotic erections, the compatibility ratio was 47%. Martins et al.^[14] reported that in a total of 76 patients the AVSS test using the RigiScan differentiated psychogenic ED with 71% sensitivity and 96% specificity. Mizuno et al.^[1] compared NPT and AVSS in 43 patients with ED. They found that the AVSS test differentiated psychogenic ED with 71% sensitivity and 92% specificity. The overall accuracy of the test in their study was 77%. In the present study, unlike these studies, AVSS test was performed with and without medication (sildenafil citrate). We found that specificity of AVSS test was 85.7% and sensitivity was 77.8% for the psychogenic groups. We also found that the overall accuracy rate was 83.3%. Data in previous studies and in our study indicates that AVSS test should be preferred instead of NPT test because it is cheaper and has a shorter duration than NPT test.

In conclusion, comparing the NPT test with the AVSS test, the NPT test is more expensive, cumbersome and uncomfortable. Although efficiency of both tests is similar, the AVSS test is more advantageous. Sildenafil citrate medication in combination with the AVSS test provide effective and reliable results which enables us to diagnose the psychogenic nature of impotence on an objective basis and gives the chance to determine the efficiency of sildenafil citrate medication in impotence regardless of etiologic origin. We suggest that the AVSS test without medication should be performed as first-step diagnostic method in patients with ED. In patients with negative test result, the AVSS test with medication should be performed as second-step diagnostic method.

Conflict of interest

No conflict of interest was declared by the authors.

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