Urol Res (1983) 11:187–189

Urological Research


# Validity of Monitoring Nocturnal Penile Tumescence for a Single Night

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Accepted: March 23, 1983

**Summary.** 19 patients had nocturnal penile tumescence monitored on two occasions. No statistical relationship was shown between the two examinations.

**Key words:** Nocturnal penile tumescence, Impotence, Erectile response.

## Introduction

The differential diagnosis of impotence is now easier through the measurement of nocturnal penile tumescence (NPT) during sleep. Karacan et al. [3, 4] and Hursch et al. [2] have described this phenomenon in varying age groups. Monitoring NPT allows the determination of the physiological integrity of the neurological and circulatory regulation of erectile activity during sleep without the presence of psychological disturbances. One of the major limitions in using this diagnostic tool is the necessity for repeated monitoring and the use of a sophisticated sleep laboratory environment for adequate studies. This greatly adds to the time and expense of the investigation. We have compared the results of repeated NPT monitoring in a cohort of males complaining of impotence to see if any significant change in NPT occurs with repeated examinations.

## Materials and Methods

Nineteen men from 32–67 years old with a mean age of 49.2 ± 2.9 years and with varying diagnoses were studied (Table 1). 12 patients had diabetes mellitus, 4 impotence with no accompanying organic disease, 2 lumbar disc disease, and 1 cauda equina injury. All patients complained of varying degrees of erectile incompetence ranging from total loss of erections to mild decrease in tumescence with a marked decrease in erectile duration. Patients were hospitalized on two non-consecutive nights and were monitored for NPT using the AMSI 7600 nocturnal penile tumescence monitor manufactured by Browne Corp., Carpenteria, Calif., USA. This monitor records penile erections using two mercury filled silicone elastic strain gauges at the penile tip and base. During erections, the stretching of the tubing and the corresponding resistance in the mercury is recorded as a deflection in calibrated amplitude on the recording paper, thus graphically recording the number of erections, their duration, and degree of tumescence. Sleep was reported through hourly nursing staff inspections.

**Table 1.** Patient data

| Patient no. | Age | No. of Children | Diagnosis |
|---|---|---|---|
| 1 | 52 | 2 | Impotence |
| 2 | 45 | 3 | Diabetes Mellitus |
| 3 | 32 | 2 | Diabetes Mellitus |
| 4 | 49 | 2 | L4-5 Disectomy |
| 5 | 34 | 3 | Diabetes Mellitus |
| 6 | 36 | 2 | L5 Disectomy |
| 7 | 51 | 3 | Diabetes Mellitus |
| 8 | 64 | 2 | Diabetes Mellitus |
| 9 | 44 | 3 | Diabetes Mellitus |
| 10 | 40 | 2 | Diabetes Mellitus |
| 11 | 67 | 4 | Impotence |
| 12 | 34 | 0 | Cauda equina injury |
| 13 | 49 | 3 | Diabetes mellitus |
| 14 | 61 | 2 | Diabetes Mellitus |
| 15 | 59 | 2 | Diabetes Mellitus |
| 16 | 63 | 2 | Impotence |
| 17 | 35 | 0 | Impotence |
| 18 | 59 | 1 | Diabetes Mellitus |
| 19 | 67 | 2 | Diabetes Mellitus |

The following criteria were recorded for each examination and the differences were compared: number of erectile episodes, total amount of tumescence time, % time in erectile activity, mean erection duration, erection of maximum duration, mean circumferential change for all episodes (penile tip and base) and greatest circumferential change (tip and base).

Total time of monitoring is reported as examination time. An erectile episode is defined as a deflection of at least 10% of the maximal erectile circumference change. Circumference changes are reported in millimeters. Statistical analysis was by the paired t-test comparing the mean difference for each variable for each night of monitoring. To examine whether two groups of independent measurements (first night examination and second night examination) have been drawn from the same population, the Mann-Whitney non parametric two sample test was employed.

**Table 2.** Second exam minus first exam differences

| Patient | Number of erectile episodes | Total tumescent time (min) | % Time in erectile activity | Mean erectile duration (min) | Errection of maximal duration (min) | Mean circumferential change for all episodes (mm) | | Greatest circumferential change (mm) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Tip | Base | Tip | Base |
| 1 | 2 | 13 | −5.7 | 0 | −4 | −4 | −4 | −5 | −4 |
| 2 | −8 | −5 | 9.2 | −6 | 1 | 4 | −4 | 3 | 4 |
| 3 | 0 | −14 | −2.3 | −4 | −27 | 4 | −4 | 5 | 2 |
| 4 | 1 | 80 | 5.5 | 14 | 9 | 2 | −1 | 1 | −4 |
| 5 | −8 | 33 | 6.7 | 9 | 33 | 1 | −1 | −1 | −8 |
| 6 | 3 | 105 | 3.6 | 24 | 30 | −1 | −4 | 0 | 4 |
| 7 | −4 | −107 | −2.0 | −22 | 23 | −2 | −7 | 2 | 2 |
| 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 9 | 5 | −78 | −14.1 | −25 | −54 | 0 | 7 | 0 | −2 |
| 10 | −1 | 2 | 1.7 | 1 | −17 | 0 | −1 | 1 | 0 |
| 11 | 2 | 38 | 2.7 | 9 | 11 | −3 | 4 | 5 | 9 |
| 12 | −2 | −175 | −18.4 | −33 | −45 | −2 | −4 | −3 | −1 |
| 13 | 8 | 67 | −24.3 | 13 | −13 | −6 | 1 | −2 | 1 |
| 14 | 2 | 1 | −19.0 | 3 | −12 | −2 | −4 | −4 | −6 |
| 15 | −3 | −99 | −6.5 | −23 | −2 | −10 | −16 | −8 | −8 |
| 16 | 3 | 46 | −22.0 | −9 | 0 | 0 | 1 | 1 | 1 |
| 17 | 0 | 64 | 6.4 | 9 | 32 | 7 | −12 | 7 | 0 |
| 18 | 0 | 77 | 14.5 | 17 | 16 | 6 | 8 | 0 | −2 |
| 19 | 2 | 69 | 2.4 | 11 | 1 | 6 | 2 | 5 | −9 |
| MEAN | 0.1 | 5.1 | −2.2 | 0.6 | −0.9 | 0 | −2 | 0.4 | −1.1 |
| S.D. ± | 4 | 75.9 | 10.3 | 15.7 | 23.9 | 4.3 | 5.8 | 3.8 | 3.8 |
| $P >$ | 0.9 | 0.7 | 0.3 | 0.8 | 0.8 | 1.0 | 0.1 | 0.7 | 0.3 |

## Results

Table 2 shows the differences between the second examination minus the first examination for all nineteen patients. Mean values for all the differences for each parameter were very close to zero or in one case zero. In the cases of % time in erectile activity and the erection of maximum duration the mean difference showed a negative value indicating that the first examination showed better function. In the cases of mean circumferential change at the base of the penis, the first examination showed a greater mean change. Statistical evaluation showed the minimum value in the paired t-test of $p > 0.1$ indicating no statistical correlation between the first and second examination. The Mann-Whitney test of non parametric values also showed no statistical relationship between the first examination and the second examination.

## Discussion

The evaluation of impotence using NPT as measurement of erectile function is fraught with pitfalls. Wasserman et al. [6] recommend the use of 3 consecutive nights of penile base and tip monitoring with simultaneous sleep monitoring for rapid eye movement (REM) sleep. Beutler and Gleason [1] recommend two nights of monitoring. Karacan et al. [3, 4] performed three additional nights of monitoring after the first night. Kenepp and Gonick [5] describe home monitoring with at least three nights of recording. Our results show that there is no statistical relationship between the NPT recordings on two separate occasions. This supports the report of Hursch et al. [2] who reported that in early middle-aged males neither REM time nor NPT time is sensitive on the first night of monitoring. One night of NPT measurement is sufficient to evaluate the presence of a functioning erectile mechanism. Other less expensive methods cannot evaluate the presence of erectile competence. Application of adhesive strips or postage stamps to a flaccid penis prior to sleep and the inspection of these strips to verify the presence of tearing upon awakening does not measure the duration of the erection nor the amount of tumescence. Direct penile observation is impractical for extended periods of time during waking hours and is certainly not conducive to sleep. Thus, while a supervised setting is required to observe both the patient's sleep and the rigidity of the erectile circumferential changes indicated by the NPT monitor to evaluate the quality of the erections, the NPT allows evaluation of the total erectile response. Sophisticated sleep laboratory monitoring is also unnecessary. The basic interest is the presence of NPT and not REM sleep. The important factor is that the patient sleeps.

*Acknowledgement.* I am very grateful to Mrs. Ayala Lusky for statistical analysis in preparation of this manuscript and to Mr. Israel Wagner for his generous support in this project.

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