Nocturnal activity and the enuresis alarm device

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Summary

The effect on nocturnal activity of the wire mesh element within the 'buzzer and pad' enuresis alarm device was studied using healthy adult volunteers in a single or double cross-over design. On the nights when the mesh was in the bed there was less activity, supporting the finding of improved polygraphic sleep on the mesh and suggesting an unexpected therapeutic mechanism.

KEY WORD: sleep.

Introduction

Although the 'buzzer and pad' enuresis alarm device is a relatively safe, effective and widely-used treatment for nocturnal enuresis (Berg, 1981), its mode of action is difficult to explain on a classical learning model (Morgan, 1978). Crisp and Hafner (1974) studied nocturnal activity in an enuretic adult and found an inverse relationship between nocturnal activity and enuresis. They postulated that a component of the effect of the enuresis alarm device could be the increase in nocturnal activity resulting from discomfort due to lying on a pair of wire meshes. We report here a systematic study of the effect on nocturnal activity of lying on a pair of wire meshes, our hypothesis being that the motility score for the night would be increased under these conditions. A concurrent polysomnographic study was undertaken and is reported elsewhere (Sireling and Crisp, 1983). It revealed that sleep on the mesh was characterized by fewer sleep-stage shifts especially within light non-REM sleep and also by a reduction in light sleep and wakefulness.

Methods

The subjects comprised one female and 15 male volunteers aged 16-53 years, with no history of sleep difficulty or enuresis. On the appropriate nights the

pair of wire meshes was arranged as if for use under the bottom sheet of the bed, connected to the alarm, the effect of which was demonstrated to each subject before the study. The alarm device adopted was the Eastleigh MOH 1 model used by the Department of Child Psychiatry. Since polygraphic sleep recordings were also undertaken on certain nights, subjects always slept with scalp electrodes attached.

The first eight subjects spent one night adapting to the sleep laboratory, and were then randomly allocated in balanced pairs to spend the next four pairs of nights alternately with and without the mesh in place. As a 'rebound' or 'carry-over' effect could not be excluded in the third and fourth pairs of nights, the remaining eight subjects were studied for only two pairs of nights in the same design, following two adaptation nights (Fig. 1).

Nocturnal activity was measured by means of a motility bed (Crisp, Stonehill and Eversden, 1970) which provided a quantitative record of activity for each 5-min interval throughout the night. Scores for motility for the whole night were calculated on the basis of the first 6 hr of the night, which was the maximum number of hours spent on the motility bed by all subjects. The two-tailed Wilcoxon Signed Rank Test was employed for statistical analysis. Due to equipment failure, data were missing for 9 nights (out of a total of 96 recording nights) and on these occasions means have been calculated from the remaining nights' data.

Results

Because of concern about a possible 'carry-over' effect to the last 4 nights, the results for the first two pairs of nights were examined separately. Significantly less activity occurred on the nights when the mesh was in place (Table 1).

No difference was found between the last two pairs of nights: this lack of confirmation of the earlier

Subject	Mesh	No Mesh	Difference
1	957	762	195
2	386	555	-169
3	544	973	-429
4	729	764	-35
5	776	1129	-353
6	393	452	-59
7	758	972	-214
8	615	891	-276
9	375	620	-245
10	360	314	45
11	136	130	6
12	116	72	44
13	739	683	56
14	145	218	-73
15	128	149	-21
16	680	1093	-412
Mean (s.d.)	490 (272)	611 (356)	-121 (184)

If the meshes have the same effect on the sleep of the enuretic patient as on our normal subjects, the earlier suggestion by Crisp and Hafner (1974) of a therapeutic effect mediated by increased restlessness could not be correct. The possibility of the reverse being the case, namely that by promoting a restful night's sleep the frequency of enuresis is reduced, is

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