

Effects of electrical stimulation of the abdomen in inactive elderly patients with chronic indwelling urinary catheters

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Abstract: The tendency for long-term indwelling urethral catheterization in the frail elderly increases with aging. However, long-term urethral catheterization is associated with increased morbidity and mortality, limited physical activity, and an increased burden of care. This study investigated the effects of abdominal electric stimulation (ES) in such frail elderly patients. Five elderly patients who were admitted to a nursing home participated in this study. During the study period, all subjects received general physical therapy twice a week. The subjects were assigned to the ES and non-ES groups. ES was applied to the abdomen of 3 subjects in the ES group for 8 weeks. The results of this study showed a preservation in motor performance in the ES group. Therefore, abdominal ES may be among the new rehabilitation methods for frail elderly patients with long-term indwelling urethral catheters.

Keywords: electrical stimulation, abdomen, bladder urethral catheter, long-term custody, frail elderly

1. Introduction

As the nursing home population grows, the number of patients exposed to the risks of chronic indwelling urinary catheters will increase, and long-term catheterization of the urinary bladder is associated with increased morbidity, mortality, and burden of care [1]. The abdominal muscles play an important role in urination and motor performance, but their strength declines easily with disuse [2].

In the present study, we investigated the effects of electrical stimulation (ES) applied to the abdomen in elderly patients with chronic indwelling urinary catheters.

2. Methods

2.1. Subjects and Overall Design

This prospective controlled study was carried out on 5 elderly subjects (3 males and 2 females) who were admitted to an institute for nursing care. The subjects had a prolonged decrease in muscle contractile activity due to long-term urinary catheterization. Although the patients received continual general physical therapy intervention, their Functional Independence Measure (FIM) scores was stable for 3 months prior to the start of the present study. The subjects spent the major part of each day in their bedrooms. They were assigned to one of 2 groups. In one group, abdominal ES was performed in addition to conventional therapy (ES group :2 males, 1 female), while the remaining patients (Ctrl group : 1 male, 1 female) received only conventional therapy such as range of motion (ROM) exercises, muscle strengthening exercises, and so on, depending on their individual physical ability. There were no

differences between the 2 groups in terms of physical ability and duration of catheterization.

2.2. Functional Performance Evaluation

The Functional Independence Measure (FIM) is an 18-item ordinal scale (range: 0 to 126) with 7 levels per item (from complete independence to total assist) that includes assessment of disability in the areas of self-care, sphincter control, mobility, locomotion, communication, psychosocial adjustment, and cognitive function. The physical FIM sub-score refers to the sum of the sub-scores for self-care, sphincter control, mobility, and locomotion items, whereas the cognitive FIM sub-score includes the sub-scores for communication, psychosocial adjustment, and cognitive function. It is internationally accepted as a measure of functionality [3].

2.3 Abdominal muscle strength

The measurement of abdominal muscle strength was performed by measuring the PEXmax [4]. To perform the PEXmax task, subjects were asked to produce a maximum inspiratory effort from a residual volume or expiratory efforts from total lung capacity for 5 seconds. The maneuver was cued by an audible 5 sec-long tone and repeated 3 times. At least 1 minute of rest was allowed between each effort. [5]

2.4. Procedures

ES was applied bilaterally to the abdominal muscles including the rectus abdominis, external abdominal oblique, internal abdominal oblique, and transverse abdominis. Surface electrodes were placed on the skin covering the external abdominal oblique muscle, which is located below the inferior border of the 10th rib. At the beginning of the study, as well as at 4 and 8 weeks from the start of the study, assessments of the FIM score as well as abdominal strength (PEXmax) and grip strength were carried out for all subjects to evaluate changes in their physical function.

3. Results

In the ES group, FIM, abdominal muscle power (PEXmax), and number of sit-ups were stable after 4 weeks. Conversely, in the non-ES group, the FIM score and abdominal muscle power (PEXmax) decreased over the same time period (Fig. 1-2).

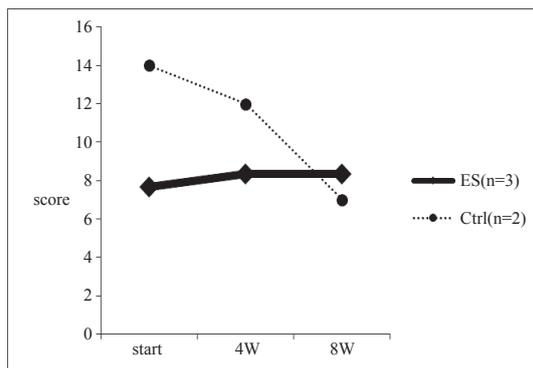


Fig. 1 Activities of daily living (Mean of FIM score)

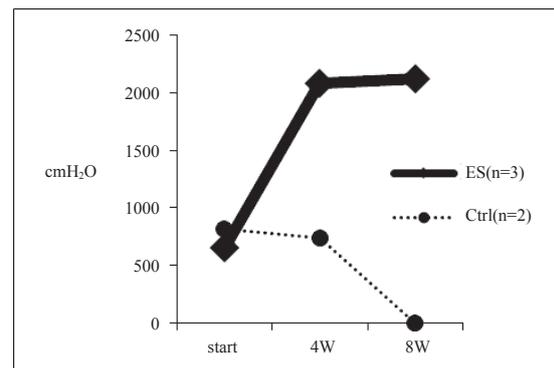


Fig. 2 Abdominal muscle strength (Mean PEXmax Score)

4. Conclusion

In long-term care facilities, 5–15% of residents have chronic urinary catheters in place [6]. Although some catheter management and infection control measures are well supported in medical literature, clinical practices still vary widely. In order to maintain and improve the ADL skills of those with long-term catheterization of the urinary bladder, we should provide adequate physical therapy. The present study showed preservation in FIM score

and muscle power in the ES group but not in the Ctrl group. Therefore, ES of the abdomen may be among the new rehabilitation methods for frail elderly patients with detained catheters.

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