Tenodesis Brace Use by Persons With Spinal Cord Injuries

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With the escalating costs of health care, the cost of prescribed equipment should be compared to its benefits. This study sought to gain information about the degree of wrist-driven tenodesis brace use for activities of daily living, communication tasks, and productivity tasks by patients with spinal cord injuries who have been discharged from Shepherd Spinal Center in Atlanta, Georgia.

**Literature Review**

In 1971, Knox, Engel, and Siebens surveyed 39 spinal cord-injured patients with a C-6 level of injury to determine their postdischarge use of the wrist-driven splint. These patients had made a verbal commitment to wear the splint 8 or more hours daily while hospitalized. The span of use ranged from 3 months to 9 years (M = 3.8 years). Fifty-one percent of the respondents used the brace for 8 hours or more daily. The highest percentage of brace use was for eating with a fork and spoon (63%), writing (60%), and brushing teeth (51%).

Wise and Wharton (1980) investigated wrist-driven splint use in 64 patients with quadriplegia. Use ranged from 6 months to 58 months (M = 29 months). The researchers found the following: (a) a positive correlation between early splinting and continued use, (b) a positive relationship between inpatient supervised training and continued use, (c) a negative relationship between provision of other equipment and introduction of the splint in new injuries, and (d) that the largest population using the splint was neither employed nor of student status.

Wise, Wharton, and Robinson repeated this study in 1986. Of the 76 quadriplegic patients interviewed, 82% continued to use the brace for writing, eating, typing, and grooming. From both studies, the researchers concluded "that the ratchet and wrist driven flexor hinge hand brace provide an effective means for the quadriplegic to accomplish a variety of activities of daily living and that a high rate of long term use is possible" (p. 113).

Kittner (1981) evaluated equipment use on 24 functional goals of rehabilitation for 15 persons with C-6 or C-7 quadriplegia. Successful completion of the set goals was based on effort, performance, adequacy of performance, efficiency, and process. The findings indicated 82.3% of the subjects chose the universal cuff for 10 of the activities of daily living. Only one person interviewed continued using the orthosis 1 year postinjury.

Martin (1987), in a study of the impact of wrist-driven braces, found that all 20 quadriplegic subjects stopped using their device 2 to 30 months after discharge except for a specific activity. Braces appeared to be used as interim devices, and smaller devices...
could not be located, and 25 did not receive tenodesis during the years 1975 through 1987. Of the 101 patients who comprised this group, 9 were deceased, 12 could not be located, and 25 did not receive tenodesis braces. The remaining 55 patients were interviewed by telephone about the frequency of brace use and the activities for which it was used. Eight activities of daily living and three activities of communication were rated with a Likert scale from never use (1) to always use (4). Use of the brace in employment and leisure activities was also investigated.

Results

The Rancho wrist-driven flexor hinge hand brace, made from aluminum and stainless steel, had been prescribed for all 55 patients; 85% wore the brace on their dominant hand; 15%, on their nondominant hand.

At the time of injury, the patients interviewed had the following education level. 1.8%, below a 6th-grade education; 23.6%, 7th through 11th grade education; 38.2%, high school graduate; 18.2%, enrolled in college; 14.5%, college graduate; 1.8%, postgraduate education; and 1.8%, vocational training. At the time of the interview, 11 patients (20%) were employed, 10 (18%) were students, 1 (2%) was a homemaker, and 33 (60%) were unemployed.

Brace Use

After discharge, 20% of the patients interviewed never used the brace, 27% used it for up to 2 years, and 53% used it for more than 2 years for specific activities.

The proportion of brace use for eight activities of daily living was examined. We found a high level of nonuse of the brace, as shown in the following percentages: dressing, 90.0%; dental care, 83.6%; hair care, 89.1%; urinary care, 85.5%; eating, 69.9%; cutting food, 90.8%; drinking, 87.3%; and cosmetic care (i.e., shaving or applying make-up), 76.4%. The brace was used the most for eating (25.5%, always use) and slightly less for cosmetic care (20%, always use).

Of the three communication skills examined—writing, typing, and telephone use—the brace was used the most for writing. More than 50% of the patients used the brace for writing in some capacity. This percentage is misleading, however, because those who responded that they always used the brace for writing may write only once a month. Approximately 13% of the patients used the brace for typing, and 7% of the patients responded that they always used the brace for telephone use.

The use of the brace for employment and leisure activities was also examined. Of the 21 patients employed or in school, 41% said they always used the brace at work or school, the highest use of the study. For leisure activities, 93% of the patients said they never used the brace.

Reasons for Nonuse

For the activities of eating, drinking, cosmetic care, telephone use, and writing, the primary reason for nonuse was "natural tenodesis," followed by "other equipment." In the areas of typing, dental care, and hair care, "other equipment" was the primary reason for nonuse and "natural tenodesis" was the secondary reason. In the activities of cutting food, dressing, and urinary care, the main reason for nonuse was either dependence in that activity or a decision not to engage in that activity. The universal cuff was the piece of "other equipment" used most often (58%).

Summary and Recommendations

Approximately 50% of the 55 spinal cord-injured patients interviewed used the tenodesis brace after discharge for more than 2 years and for specific but not necessarily daily tasks. Those who were employed or who were students had the highest percentage of use. Writing and eating were the activities for which the brace was used most often.

The main reasons for nonuse for the eight daily living skills examined were the development of natural tenodesis and the use of other equipment. This suggests that the use of loaner braces to teach natural tenodesis while the patient is still hospitalized may be cheaper than a prescription for or provision of a permanent brace.

For many patients, the brace had been ordered specifically to handle the task of intermittent catheterization. Eventually, these patients became reflex voiders and no longer needed the brace. This finding suggests that loaner braces may be a cheaper option than permanent braces for patients on intermittent catheterization.

Of the 21 patients treated before 1982, 7 (33%) were full-time brace users (they used the brace for most activities of daily living or wore it all day). At that time, our occupational therapy department was small,
had a philosophy that brace use was mandatory for all activities, and offered few options for small equipment. Of the 34 patients treated after 1982, 4 (12%) were full-time brace users. During this period, more options for small equipment were available and a larger occupational therapy department, supporting a philosophy of varied equipment use, existed. This finding suggests that agencies should review periodically their philosophy regarding brace prescriptions.

Acknowledgments

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References


