Development and Long Term Evaluation of a Critical Pathway for the Management of Microvascular Decompression

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Purpose: In order to provide a systematic and standardized treatment course for MVD patients, a critical pathway (CP) program was developed and the results of its long term application were analyzed. Methods: This was a methodological study. The CP was established and applied to 75 (step I) and 1,216 (step II). Another group of 56 with similar features was used as a control group. Results: The application of CP turned out to be useful in many regards: the rate of hearing loss was reduced from 1.8% to 0% (step I) and 0.5% (step II), and low cranial nerve palsy was reduced from 1.8% to 1.3% and 0.7%, respectively. The length of hospitalization decreased by 2.56 days (25.2%) for step I and 3.05 days (30.0%) for step II. Days of ICU stay were reduced by 7.9% and 1.8%. The total cost per patient was reduced by 14.8% (step I). The cost per day was increased by 13.7% and 52.4%. An increase in the patient satisfaction index was noted, as shown in the ICU information guide (p=.002). Conclusion: The development and application of CP was found to improve the quality of medical treatment and the efficacy of hospital management in MVD patients. Well organized and efficient system and multidisciplinary teamwork are the key component of the successful application of CP.

Key Words: Critical pathway, Microvascular decompression surgery, Quality control, Cost-benefit effectiveness.

INTRODUCTION

Microvascular decompression (MVD) is the standard treatment for hyper-functioning disorders of the cranial nerve roots such as hemifacial spasm (HFS) and trigeminal neuralgia (TN) (Li et al., 2004; Mauriello et al., 1996; McLaughlin et al., 1999; Mustafa, Weerden, & Mooij, 2003; Wang & Jankovic, 1998). HFS is an involuntary movement disorder in which spasms occur on one half of the face. Although this disease begins in the region around the eye, involuntary muscle spasms usually progress to involve the whole face, particularly around the eye, mouth, and even the neck (Wang & Jankovic, 1998). By way of contrast, TN creates intense pain along the branches of the trigeminal nerve that control facial senses. For the accurate diagnosis and effective treatment of these conditions, great efforts have been made by medical personnel and various diagnostic tools such as 3D spin echo magnetic resonance imaging (MRI) and electromyography (EMG) have been employed in attempts to achieve a successful treatment regimen.

Prior to the implementation of the critical pathway (CP), no standard guidelines had been established and public education was insufficient. In addition, the following problems existed. When patients visited the hospital for the first time, they were often subjected to great inconveniences; for example, some patients had to wait for very long times to receive examinations or treatment, and also frequently had to visit the clinic many times. Additionally, patients occasionally lacked information regarding the treatment process and the relevant operative risks. On the other hand, discomfort levels remained high until all spasms had completely disappeared after surgery (Goto, Matsushima, Natori, Inamura, & Tobimatsu, 2002; Ishikawa, Nakanishi, Takamiya, & Namiki, 2001; Samii et al., 2002). In such cases, finding a solu-
tion and preventing the commonly-encountered discomforts might prove helpful in reducing hospitalization periods, in addition to elevating patient satisfaction levels (Isla-Guerrero et al., 2001). Some studies have reported that a post-endoscopy checklist reduced the length of stay for non-variceal upper gastrointestinal bleeding (Romagnuolo et al., 2005), and that standardized patient care using a CP reduced length of stay and complication rates following bariatric surgery (Kim, 2010a; Yeats, Wedergren, Fox, & Thompson, 2005; Van Vliet et al., 2011; Zhang & Liu, 2011).

Therefore, the principal objective of this study was to enhance management efficiency during hospitalization and patient satisfaction via the use of a standard medical treatment guide for MVD. We also evaluated the treatment steps via the continuous application of these guidelines, In particular, the long-term investigation conducted to validate the usefulness and efficacy of MVD CP.

1. Study Design

This study was conducted to provide an effective management protocol for MVD patients. This was a methodological study (quasi-experimental study and long term survey). We compared 56 patients treated in the period prior to CP commencement from January 2001 to December 2001, 75 patients applied during the period from July 2002 to December 2002 (step I), and 1,216 patients were treated during the period spanning January 2003 to December 2009 (step II). The samples used in this study were selected as the total number of patients that received MVD for HFS or TN during the study period.

This study was conducted at a single institute in Korea. The setting for this study was a neurosurgical unit which included an outpatient unit, general wards, and an intensive care unit (ICU). To assess the mean differences among the three groups with regard to complications (step I: 1, step II: 5, SD: 1.0) and hospital duration (step I: 2.5, step II: 3, SD: 2), the sample size of each group was required to achieve a significance level of 0.05, with a power of 90%. The quality of treatment was evaluated in terms of the frequency of complications. The efficacy of hospital management was evaluated by the length of stay in hospital, the length of stay at the ICU, the total cost per patient, and the cost per day. CP application was evaluated via variation analysis (step I and the year 2003) and measurements of patient satisfaction.

1) Stage I: Development of critical pathway

In January 2002, with the objectives of establishing medical treatment flow and efficacy improvement, a team unit was comprised of 14 members (neurosurgeon 2, professor of nursing school 1, nurse managers 2, registered nurses 4 [neurosurgical ICU 1, general wards 2, and outpatient unit 1], clinical nurse specialist [CNS] 1, laboratory technicians 3, and hospital administrator 1). This team established a plan and studied the task by attending lectures and via a literature review.

After careful study, we established a standard treatment guide for MVD. The team then evaluated treatment progress by reviewing the relevant documents and charts. The medical records of 15 patients with MVD during the January-December 2000 period who fulfilled the selection criteria were reviewed. Medical record analysis consisted of 73 items (8 items on measures/observations, 3 items on activity/rest, 4 items on diet/nutrition, 23 items on medication, 14 items on laboratory test, 12 items on treatment, 2 items on interdepartmental consult and 7 items on patient education). A pilot CP was composed from the literature review, modification of preexisting CP for other diseases, and the opinion of the medical team. The x-axis of the pilot CP represented the time-frame, whereas the y-axis interpolated the treatment and nursing items. The devised CP was a systematically organized schedule that runs from the time of initial visit to the clinic to the time of discharge, and was designed to assist in decisions made concerning observation and measurement, activity, diet, medication, lab & tests, treatments & procedures, consultation, and education. That table was completed by placing the dates in rows and eight items in a column. All data were registered in the database, and the practitioners were able to easily use the package.

Each item was finalized after evaluation by staff nurses and neurosurgeon, validation by professionals group (neurosurgeon 2, professor of nursing school 1, nurse managers 2, registered nurses 4, CNS 1), and the approval of the CP development team. Five neurosurgeons and 62 nurses were recruited and educated regarding the objective of the study, the concept of CP, the development and application of CP, patient/family educating methods, and variations. In order to analyze its clinical adaptability, the pilot CP went through 17 experimental cases before its completion into a final MVD CP. To analyze the variations occurring during the application of CP, a clarification of the modified variation record was used (Beyea, 1996). The CP for patients was developed such that it could be readily understood by