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Safety of microvascular decompression for elderly patients with trigeminal neuralgia

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ABSTRACT

Objective: The present study compared the safety and efficacy of microvascular decompression (MVD) in groups of elderly patients and non-elderly patients with medically refractory trigeminal neuralgia (TN) and collected detailed perioperative data.
Methods: Retrospective analysis of clinical data was performed in 99 patients who underwent MVD from May 2012 to June 2015. The outcome data from 27 MVD operations for 27 patients aged 70–80 years (mean 74.6 years) were compared with 72 MVD operations with 72 patients aged 25–69 years (mean 55.7 years). Preoperative comorbidities were recorded and postoperative worsening comorbidities and non-neurological complications were evaluated at discharge. Efficacy of the surgery and neurological complications were evaluated in July 2015.
Results: No decrease in activity of daily living was found in any patient. Complete pain relief without medication was achieved in 77.8% and partial pain relief in 14.8% in the elderly group, and 83.3% and 9.7%, respectively, in the non-elderly group ($p = 0.750$). Permanent neurological complication was not observed in the elderly group, whereas Vth nerve and VIIIth nerve complications were observed in the non-elderly group. Rates of preoperative multiple comorbidities and of cardiovascular comorbidity were significantly higher in the elderly group ($p < 0.01$). Worsening comorbidity and new pathology at discharge were mainly hypertension in both groups, but glaucoma attack and asthma attack were observed in the elderly group. All pathologies were successfully managed.
Conclusions: MVD for elderly patients with TN can be achieved safely with careful perioperative management. Information of comorbidity should be shared with all staff involved in the treatment, who should work as a team to avoid worsening comorbidity. The possibility of unpredictable events in the elderly patients should always be considered.

1. Introduction

Microvascular decompression (MVD) is often described as the most effective treatment to achieve initial and long-term pain control for trigeminal neuralgia (TN). However, percutaneous procedures have also showed good results [1,2], and both percutaneous procedures and MVD provide acceptable outcomes [3]. TN occurs more frequently with higher age [4], but older patients are thought to have higher risks for surgery and anesthesia compared to younger patients. Consequently, some surgeons are reluctant to operate on older patients, especially as other therapeutic options are available. No single large study of MVD in the elderly has been possible due to the small sample size. A meta-analysis and a report based on the National Inpatient Sample in the United States published in 2011 provides a representative large series of the elderly [5,6]. The conclusions were that MVD in the elderly deserved consideration, but we believe that more clinical data is desirable.

The present study evaluated the safety as well as efficacy of MVD in a group of elderly patients compared with the non-elderly patients, including detailed perioperative and management data.

2. Materials and methods

2.1. Patients

The clinical records were retrospectively reviewed of 106 consecutive patients with TN who underwent surgical treatment at

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Mitsui Memorial Hospital between May 2012 and June 2015. This study was intended to evaluate pure MVD for TN, so four patients with tumor origin, two patients who underwent MVD as reoperation, and one patient with painful tic convulsif that required decompression of both Vth and VIIth nerves were excluded. Consequently, this study included 99 patients divided into 2 groups: the elderly group consisting of patients aged 70 years or older, and the non-elderly group consisting of patients aged 69 years or younger.

The diagnosis of TN was based on a history of typical paroxysmal lancinating facial pain associated with trigger points and the absence of neurological deficits. Surgical treatment was offered after failure of medical management or percutaneous procedures. It was our policy that MVD should be offered if a patient condition was fit for general anesthesia regardless of age.

2.2. Preoperative management

All patients had undergone magnetic resonance imaging. Preoperative routine examinations included cardiac ultrasonography and master electrical cardiography, and patients with abnormal findings were referred to a cardiologist for preoperative evaluation. Besides the preoperative routine standard studies, a history of comorbidity was obtained and patients were referred to appropriate physicians for preoperative consultation if necessary. Patients were admitted to the hospital a day before surgery and a final check-up as well as preoperative evaluation were performed by the anesthesiologist.

2.3. Operative technique

After the induction of general anesthesia, the patient was placed in the lateral park bench position with three-point fixation, and retrosigmoid craniotomy was performed. The rostral edge of the craniotomy was extended until the caudal edge of transverse sinus was visible, and the junction of the transverse and posterior edges of the sigmoid sinus was adequately exposed. After opening the dura mater, the cerebellar horizontal fissure was carefully dissected to minimize retraction of the acoustic nerve [7]. With maximum protection of the petrosal veins, the trigeminal nerve was observed. Offending vessels were transposed using Teflon slings, usually toward the tentorial direction if the superior cerebellar artery was the responsible artery, and fixed with fibrin glue. Other offending arteries such as the anterior inferior cerebellar artery, posterior inferior cerebellar artery, and trigeminocerebellar artery [8] were similarly transposed in the optimum direction. Offending veins not considered as a major returning vessel route were sacrificed, but if the diameter was reasonably wide, the vein was partially coagulated and separated from the nerve. If the vertebrobasilar artery was the offending artery, the craniotomy was extended to the caudal side and dissection of arachnoid membrane near the lower cranial nerves was completed to obtain mobility of the artery. Transposition of the artery toward the caudal direction with Teflon slings enabled further observation of the trigeminal nerve, and both caudal and rostral decompression with transposition was completed. Intraoperative brainstem auditory evoked response was monitored only in cases involving the offending vertebrobasilar artery because exposure of the VIIth and VIIIth nerve complex and manipulation over the complex were necessary. Use of the brain retractor was minimized in all cases, and interposition was not performed in any case.

2.4. Postoperative care

All patients were returned to the regular nursing floor and not admitted to the intensive care unit. Liquid oral intake and ambulation were completed by the next morning if the clinical condition was stable. Patients were scheduled to be discharged from the hospital on postoperative day 8 after removing the surgical staplers. Therefore, the scheduled hospital stay was 10 days, but if a patient in good condition wished to be discharged earlier, this was allowed.

2.5. Data collection

The medical records of all patients were reviewed, and data were gathered on demographics, pain distribution and duration, preoperative comorbidity, preoperative physical status according to the American Society of Anesthesiologists Physical Status (ASA PS) classification system, compression vessel, duration of surgery, outcome of surgery, neurological complications, length of hospital stay, postoperative in-hospital worsening comorbidity, and non-neurological complications. Efficacy of the surgery was evaluated in July 2015. If a patient had discontinued hospital visits for any reason, a brief telephone interview was performed. The outcome was divided into 3 categories: complete (no pain), partial (some pain but improved), and absent (no change in pain). At the same time, permanent neurological complication was assessed if persistent symptoms were present. If a new postoperative symptom was not present at that time, this was recorded as transient.

Preoperative comorbidity was divided into five types; cardiovascular, pulmonary, cerebrovascular, abdominal, and others. Cardiovascular comorbidity included hypertension, angina, myocardial infarction, abnormal findings on master electrical cardiography, abnormal findings on cardiac ultrasonography, and other cardiovascular diseases. Pulmonary comorbidity included asthma, chronic obstructive pulmonary disease, current smoking, and others. Cerebrovascular comorbidity included transient ischemic attack, minor stroke, and others. Abdominal comorbidity included any chronic abdominal diseases that required regular medication. Others included diseases that required regular medication or occult diseases identified by preoperative studies, such as silent venous thrombosis diagnosed by ultrasonography due to elevation of D-Dimer. If comorbidity was present, the number was recorded as single or multiple.

Worsening comorbidity and non-neurological complication were evaluated as postoperative in-hospital status. If a patient suffered from worsening of comorbidity and received more medication at discharge, this was recorded as worsening. If a patient suffered onset of new pathology not directly related to the surgery during the postoperative hospital stay, this was recorded as a non-neurological complication.

2.6. Statistical analysis

All analyses compared the parameters between the two groups. Chi-square tests were used to analyze sex, affected side, number of preoperative comorbidities, preoperative cardiovascular comorbidity and others, and the ASA PS, *t*-tests for duration of surgery, Fisher's exact probability test for division of affected lesion, preoperative pulmonary, cerebrovascular, and abdominal comorbidities, and efficacy of the surgery, and Mann-Whitney test for age, period of pain before surgery, and length of hospital stay. IBM SPSS Statistics version 23.0 for Microsoft Windows was used for the analysis and *p*-values of less than 0.05 were interpreted as significant.

3. Results

Table 1 summarizes the clinical characteristics of the 99 patients. No statistical difference was found in any demographic characteristic except age. Table 2 demonstrates the preoperative status of the patients. Rate of multiple comorbidities in the elderly group was significantly higher than the rate in the non-elderly group ($p < 0.01$). The most common comorbidity in the elderly