



## Improvement of quality of life and mental health in patients with spasmodic torticollis after microvascular decompression

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### ABSTRACT

**Objective:** Although not life threatening, spasmodic torticollis (ST) impairs patients' daily activity, socialization and work. The aim of this study was to evaluate the quality of life (QOL) and mental health in patients with ST after microvascular decompression (MVD).

**Patients and methods:** From June 2014 to June 2017, patients with ST who underwent MVD in our department were included in this study. Toronto Western Sparse Torticollis Rating Scale (TWSTRS) were used to evaluate the ST symptoms. Quality of life was assessed by the craniocervical dystonia questionnaire (CDQ-24). Beck Depression Inventory (BDI-II) and Beck Anxiety Inventory (BAI) were used to evaluate the mental health. Intraoperative findings and follow-up results were analyzed.

**Results:** A total of 104 consecutive patients were enrolled in this study. At the 12 months follow-up, the total effective rate was 81.73%. After MVD surgery, 88(84.62%) ST patients experienced QOL improvement. The severity of ST symptoms was positively correlated with the CDQ-24 score( $r = 0.31$ ,  $P = 0.02$ ). Forty-eight patients (46.16%) with ST have moderate to severe depression and nine (8.65%) have depression preoperatively. Pain and disability domains of TWSTRS were found have high relation with BDI-II score( $r = 0.27$ ,  $P = 0.02$ ;  $r = 0.33$ ,  $P = 0.03$ ). There was a positive correlation of educational levels with the BDI-II scores( $r = 0.45$ ,  $P = 0.02$ ).

**Conclusion:** ST affects patients' QOL both physically and mentally. MVD for ST not only provides high spasm-relief rate but also leads to significantly higher QOL after surgery. Not only ST symptoms, but also psychiatric status of patients should be routinely followed. Psychological care and psychopharmaceuticals should also be considered for these patients.

### 1. Introduction

Spasmodic torticollis (ST), also known as cervical dystonia (CD), is the most common form of focal dystonia with involuntary neck muscle contraction, which leads to abnormal head and neck movements and postures. Although ST is a chronic and non-life threatening disease, it troubles ST patients both physically and psychologically [1,2].

MVD is an effective and safe treatment for ST [3–6]. However, consideration of only cure rate and side effects after treatment in patients with ST is not enough. Successful functional improvement post-operatively does not mean that patients have improved QOL. Few studies have exclusively evaluated QOL and psychological conditions in patients

with ST. In present study, we used Toronto Western Sparse Torticollis Rating Scale (TWSTRS) to evaluate the ST symptoms [7]. The craniocervical dystonia questionnaire (CDQ-24) was used to assess the quality of life [1]. Beck Depression Inventory (BDI-II) and Beck Anxiety Inventory (BAI) were used to evaluate the psychiatric symptoms [8,9].

### 2. Patients and methods

#### 2.1. Study design

From Jun 2014 to June 2017, a cohort of 104 consecutive patients with primary ST who underwent MVD surgery in the department of

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Neurosurgery, Tongren Hospital Affiliated to Shanghai Jiao Tong University School of Medicine were included in this study. At the early stage of the disease, all the patients had been treated with multiple therapies. It had been proved that these therapies had no significant benefit.

The inclusion criteria including: (1) No congenital ST, primary adult onset ST; (2) absence of systemic dystonia diseases; (3) abnormal head posture that has lasted for at least six months; (4) preoperative magnetic resonance imaging(MRI) of brain and cervical CT/MRI to rule out intracranial and cervical lesions; (5) general good health. In addition to general MRI, three dimensional-time of flight-magnetic resonance angiography (3D-TOF-MRA) was performed preoperatively to confirm the relationship between the spinal accessory nerves (SAN) and offending vessels. EMG examination of the neck muscles was also performed to identify the main responsible muscles.

## 2.2. Evaluation

The Toronto Western Spasmodic Torticollis Rating Scale (TWSTRS) was used to evaluate the symptoms of dystonia. TWSTRS is a standardized assessment scale commonly used in clinical trials to assess any change in the severity of ST. It comprised of three sections: severity, disability and pain.

Cranio-cervical Dystonia Questionnaire (CDQ-24) is a 29-item inventory that measures the perceptions and concerns of ST patients (stigma, emotional state, pain, daily activity and social life). Higher results represent worse QOL [1].

Beck Depression Inventory II (BDI-II) and Beck Anxiety Inventory (BAI) were used for evaluation of depression and anxiety. The BDI-II contains 21 questions, each answer being scored on a scale value of 0–3 [9,10]. BAI is a 21-question multiple-choice self-report inventory that is used for measuring the severity of anxiety in children and adults [8]. Higher results on both scales represent higher stage of depression and anxiety [11].

## 2.3. Surgical procedure and follow-up

Patients underwent MVD surgery under general anesthesia via suboccipital retro-sigmoid approach or suboccipital paramedian approach. After the dura mater and the arachnoid being opened, the neurovascular relationship was carefully studied. The offending vessel that compressed the root exit zone of spinal accessory nerves, C1-2 nerve roots and cervical spinal cord was moved away and soft shredded Teflon was put between them.

All the patients were evaluated by either an interview in the clinic or telephone interview. A comprehensive analysis of clinical outcomes was performed at 1 day, 6 months and 12 months after surgery. The Toronto Western Sparse Torticollis Rating Scale (TWSTRS) was used. The efficiency of the surgery was evaluated by the reduction in the TWSTRS total scores pre and postoperatively. The efficacy of MVD was categorized as either excellent (Reduction of 75%–100% of the TWSTRS score), good (Reduction of 50%–75%), fair (Reduction of 25%–50%), or poor (Reduction of < 25%). Postoperative complications were also recorded after surgery and at follow-up.

## 3. Results

A total of 104 patients were involved in this study. The patients in this group were followed up for 12–27 months, with an average of 18.7 months. Of these, 43 patients were male and 61 were female. Median age was 56.61 years (range, 32–75 years). Median duration of symptoms was 7.32 years (range, 0.5–20.0 years). Of these patients, 54 had torticollis, 41 had laterocollis, 5 had retrocollis and 4 had anterocollis. Demographic data are shown in Table 1.

The offending vessels were found in all 104 cases. The most common offending vessels were vertebral artery(VA) in 84 patients

**Table 1**  
Summary of patient characteristics.

Demographics	
<b>Number</b>	104
<b>Gender(Male/Female)</b>	43/61
<b>Mean age(years)</b>	56.61 ± 9.23
<b>Mean disease duration(years)</b>	7.32 ± 3.45
Education n(%)	
Primary school	7(6.73)
high school	62(59.62)
university	30(28.85%)
postgraduate	5(4.81%)
Employment status n(%)	
Unemployed	34(32.69)
Employed	47(45.19)
Retired	23(22.12)
Type of cervical dystonia n(%)	
Torticollis	54(51.92)
Laterocollis	41(39.42)
Anterocollis	4(3.85)
Retrocollis	5(4.81)

(80.77%), posterior inferior cerebellar artery(PICA) in 18 patients (17.31%) and arteriole in 2 patients (1.92%).

Five patients (4.81%) got an immediate “excellent” spasm relief after the operation (Table 2). For most of the patients, the symptoms improved gradually from weeks to months after surgery. At the 12 months follow-up, the total effective rate was 81.73% (85/104). The mean (SD) score of all three domains of TWSTRS including severity, disability and pain were significantly improved ( $P < 0.05$ ) (Table 3). Complication rates were 6.73% (7/104) immediately after the operation, including shoulder numbness in 4 and hoarseness in 3. The complications were reversible, and no patients experienced complication at the last follow-up.

In this study, 88(84.62%) ST patients experienced QOL improvement after MVD surgery. Before MVD surgery, the domains of stigma, emotional state and daily activity had the highest values of 19.59, 12.21 and 15.43, respectively. At the 12 months follow-up, the mean values of results of all five domains of CDQ-24 were significantly improved (Table 3). In addition, the analysis showed that the severity of ST symptoms was positively correlated with the CDQ-24 score ( $r = 0.31$ ,  $P = 0.02$ ).

Before MVD, 48 patients (46.16%) with ST have moderate to severe depression and 9 (8.65%) have anxiety preoperatively (Table 4). Even five patients confessed that they wanted to commit suicide. Pain and disability domains of TWSTRS were found have high relation with BDI-II score ( $r = 0.27$ ,  $P = 0.02$ ;  $r = 0.33$ ,  $P = 0.03$ ). The analysis also showed that there was a positive correlation of educational levels with the BDI-II scores( $r = 0.45$ ,  $P = 0.02$ ). Patients who are employed are more likely to be depressed than those who are retired or unemployed ( $P < 0.05$ ). However, other factors, such as age, gender, disease duration and type of cervical dystonia, did not correlate with the scores of BDI-II or BAI ( $P > 0.05$ ). After 12 months follow-up, the mean values of results of BDI-II and BAI were significantly improved ( $P < 0.05$ ) (Table 3).

**Table 2**  
Time course of postoperative outcomes at 1 day, 6 months and 12 months follow up after MVD surgery for spasmodic torticollis.

	Excellent	Good	Fair	Poor
1 Day	5(4.81%)	19(18.27%)	27(25.96%)	53(50.96%)
6 Months	29(27.88%)	26(25.00%)	21(20.19%)	28(26.92%)
12 Months	31(29.80%)	32(30.77%)	22(21.15%)	19(18.27%)

**Table 3**  
Comparison of TWSTRS, BDI-II, BAI and CDQ-24 in patients with spasmodic torticollis preoperatively and postoperatively.

	Preoperation (mean ± SD)	12 months follow-up (mean ± SD)	P-value
TWSTRS	40.43 ± 6.25	18.82 ± 5.39	P < 0.05
severity	18.87 ± 4.63	9.02 ± 3.24	P < 0.05
disability	15.19 ± 3.35	10.19 ± 3.35	P < 0.05
pain	6.38 ± 3.17	1.60 ± 1.67	P < 0.05
BDI-II	19.80 ± 5.13	14.49 ± 6.89	P < 0.05
BAI	10.93 ± 6.27	8.92 ± 5.14	P < 0.05
CDQ-24	57.18 ± 12.33	21.81 ± 5.21	P < 0.05
stigma	19.59 ± 6.17	6.32 ± 2.9	P < 0.05
emotional state	12.21 ± 7.96	4.84 ± 2.2	P < 0.05
pain	9.12 ± 5.37	2.12 ± 1.9	P < 0.05
daily activity	15.43 ± 7.64	7.33 ± 3.2	P < 0.05
social life	8.68 ± 2.43	3.65 ± 1.3	P < 0.05

**Table 4**  
Distribution of depression and anxiety in patients with spasmodic torticollis before MVD surgery according to BDI-II and BDA scores.

Depression	Patient n(%)	Anxiety	Patient n(%)
None	8(7.69)	None	82(78.85)
Mild	48(46.15)	Mild	13(12.50)
moderate	43(41.35)	Moderate	9(8.65)
severe	5(4.81)	Severe	0

#### 4. Discussion

MVD for ST is a procedure with high probability of cure or significant improvement [4,12–14]. However, the postoperative recover progress can be variable. Some patients got an immediate spasm relief after the operation, whereas most of them may improve gradually from months to even years postoperatively [4,12,15]. In this study, 5 patients (4.81%) were spasm free immediately. At one year follow-up, the symptoms of 85 patients (81.73%) were improved. Thus, we chose 1 year follow-up to assess patients' response.

It was showed that 88(84.62%) of ST patients experienced QOL improvement 1 year after MVD surgery. Both physical and mental health was significantly improved after operation. This study also found that the severity of ST symptoms have a great influence on all aspects of CDQ-24 (including stigma, physical, social, mental and emotional aspects). The more severe the ST symptoms, the greater the influence it had on the patients' QOL. This result was similar to the findings of several previous studies [2,16,17]. Werle RW reported that physical, emotional state and social life are the most affected parts of QOL in ST patients [17]. Some scholars suggested that stigma should be considered as a parameter relevant for clinical management of ST patients [18]. Cause stigma affect the patients' social, private and professional life seriously [18].

Compared with patients receiving botulinum toxin A (BTX A) treatment, patients undergoing MVD for ST in this study had similar improvement in TWSTRS scores, but greater improvement in term of QOL [19]. Most previous literature focused on QOL of ST patients after BTX are short term studies [19,20]. This situation might be explained by either the potential side effects of BTX injection, such as partial paralysis of the muscles, or the resistance after repeated injections. In addition, BTX treatment showed a little bit insufficient in pain relieving [1].

Patients with cervical dystonia are often accompanied by depression and anxiety. In this study, almost half of the patients with ST had depression or anxiety preoperatively. The similar results have been reported by literature: around 40–47% of patients have anxiety and 37.5–57.3 % have major depression [1,21]. According to this study, pain and disability domains of TWSTRS were found have high relation

with BDI-II score. In fact, pain is reported to be a limiting factor in QOL [22]. It might be induced by involuntary twitching and contraction of neck muscles. Another common pain for ST patients is postural changes such as elevation of one shoulder caused by orthopedic and neurological complications [23,24]. Our results also showed that educational levels are positively related to the severity of depression. Patients who are employed are more likely to be depressed than those who are retired or unemployed. This result was consistent with previous studies [25]. People with a higher educational level or employed tend to engage in more social activities, thus they have higher expectations. Both symptoms relief and mental health status are susceptible to these people.

Even mild symptoms of ST can decrease QOL and result in patient's depression or anxiety. Not only ST symptoms, but also psychiatric status of patients should be routinely followed after treatment. Besides surgical treatment and BTX injection, psychological care and psychopharmaceuticals should be the considered for these patients [2,17].

Our study has limitations. It might be limited by a small patient sample analyzed. There might also be a selection bias for ST patients, because only patients who treated with MVD were collected in study. Thus the QOL of ST patients from the general population might not be reflected.

#### Disclosure of conflict of interest

All authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest (such as honoraria; educational grants; participation in speakers' bureaus; membership, employment, consultancies, stock ownership, or other equity interest; and expert testimony or patent-licensing arrangements), or non-financial interest (such as personal or professional relationships, affiliations, knowledge or beliefs) in the subject matter or materials discussed in this manuscript.

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