Int J Clin Exp Med 2016;9(11):22369-22374
www.ijcem.com /ISSN:1940-5901/IJCEM0033938

Original Article

Factors predicting patient dissatisfaction 2 years after anterior cervical discectomy with fusion for cervical spondylotic radiculopathy

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Received June 18, 2016; Accepted August 22, 2016; Epub November 15, 2016; Published November 30, 2016

Abstract: Objective: To explore factors predicting patient dissatisfaction 2 years after anterior cervical discectomy with fusion (ACDF) for Cervical Spondylotic Radiculopathy (CSR) in a Chinese cohort. Methods: Pre-operation and 2-year follow-up data for 360 patients were analyzed. After 2 years of ACDF, patients expressed their satisfaction by Patient Satisfaction Index (PSI), and we explored association between patients' personality, perioperative variables and dissatisfied degree. Results: 269 patients had a PSI of 1 or 2 were considered as satisfied group, 91 had a PSI of 3 or 4 and were considered as dissatisfied group. By analyzing, according to BECK anxiety inventory (BAI) scale, people with Type B Personality (TBP) usually got a satisfied result, however, people with Type A personality (TAP) got a dissatisfied result. Patients from rural and had complications after surgery easier to complain dissatisfied results. Other data, including, age, gender, Body Mass Index (BMI), and Oswestry Disability Index (ODI), Visual Analog Scale (VAS)-neck, VAS-upper limb at time of pre-operation and 2 years follow-up were not significant difference between 2 groups. Conclusions: Approximately 75% patients expressed satisfaction with ACDF for CSR. Three factors, registered permanent residence, type A personality, complications after operation, could predict patients' dissatisfaction.

Keywords: Factors, dissatisfaction, anterior cervical discectomy with fusion, cervical spondylotic radiculopathy

Introduction

Cervical Spondylotic Radiculopathy (CSR) is the most common spinal reason for upper limb radiative pain [1]. More importantly, CSR can also lead to nerve root dysfunction or even paralysis if do not get valid treatment [2, 3]. Nowadays, in China, CSR occurs increasingly in young people, because of severe life and work pressure, leading to keep one posture and less rest, which accelerate cervical disc degeneration. ACDF is a regular method to treat CSR for people unresponsive to conservative therapy [3-5].

Many previous studies have shown satisfactory outcomes of the ACDF procedure for treatment of CSR, of course, there were still some dissatisfied cases. It is well known that the satisfied and dissatisfied patients behave differently. Satisfied patients prefer to cooperate with their doctors by disclosing important medical information and continue using medical care services. On the contrary, the dissatisfied patients may make treatment less effective, either by neglecting to seek care when needed or refusing to comply with the prescribed course of treatment [4, 6]. Since the therapeutic effects are significantly influenced by patient satisfaction, it is reasonable to believe that spinal surgeons should strive to satisfy their patients as well as to provide the right and effective treatment [1-4].

To authors' knowledge, few studies reported on the association between perioperative factors, type of personality and patient satisfaction after ACDF. Therefore, the primary aim of this study was to identify factors predicting patient dissatisfaction after ACDF for CSR in a Chinese cohort.

Material and methods

Subjects

We conducted a prospective study of 360 patients underwent ACDF from January 2010 to

Table 1. Patient Satisfaction Index (PSI)

PSI	PSI Patient Responses
1	Surgery met my expectations
2	Surgery improved my condition enough so that I would go through it again for the same outcome
3	Surgery helped me but I would not go through it again for the same outcome
4	I am the same or worse compared to before surgery

PSI = patient satisfaction index.

Table 2. BECK anxiety inventory (BAI) scale for patients

Range of Scores	Anxiety Level
0-7	Minimal Level of Anxiety
8-15	Mild Anxiety
16-25	Moderate Anxiety
26-63	Severe Anxiety

October 2013. The study was approved by Ethics Committee of The Third Hospital of Hebei Medical University. The primary inclusion criteria were the following: 1. Presence of mechanical neck and upper limb radiated pain due to CSR; 2. The radiated pain unresponsive to conservative treatment; 3. Magnetic resonance imaging (MRI) showed one level cervical disc herniation. 4. All patients were performed ACDF with plate. The exclusion criteria were the following: 1. Spinal mechanical instability, an extra-spinal cause of neck pain and upper limb pain; 2. The presence of infection, trauma; 3. Unwillingness to participate in the study. All patients were provided written informed consent to participate in this study before the enrollment.

Study variables

The following data were collected before the ACDF: type of personality, age, gender, body mass index (BMI), registered permanent residence, Oswestry Disability Index (ODI), Visual Analog Scale (VAS)-neck, and VAS-upper limb. Two years after ACDF, the patients were contacted for a clinical evaluation, and the following were collected: surgical complications, 2 years follow-up ODI, 2 years follow-up VAS-leg, 2 years follow-up VAS-back. We chose a 2-year follow-up interval because we wished to study satisfaction at a time were expected to be optimal.

Evaluate the study variables

In each patient, to avoid biased response, the study variables were collected by a study personnel, not the surgeon. The 2-year follow-up evaluation started with the administration by the personnel by telephone, all the patients were asked to complete a telephone questionnaire to obtain an assessment of patient satisfaction, functioning and BECK anxiety inventory (BAI) scale.

A Patient Satisfaction Index (PSI) response of 1 or 2 was considered to indicate a satisfied outcome and a PSI response of 3 or 4 to indicate a dissatisfied outcome (**Table 1**). The BECK anxiety inventory (BAI) questionnaire [8] is a self-administered survey to quantify type of personality of the patients, which was widely used to assess personal characteristic in psychology area. Data was collected on BECK anxiety inventory (BAI) questionnaire [9]. According to the criteria laid down by BECK scale [10], patients were scaled as follows: Then Type A and Type B were diagnosed according to the operational definitions. Score of 26 and above were defined as Type A personality while score of 25 and below were diagnosed Type B personality. After answering the questionnaire from the patients, they were diagnosed as having either type A or B personality (**Table 2**). The Visual Analog Scale (VAS) consists of a horizontal line 100 mm in length, with the end points "No pain" and "Worst imaginable pain" placed at each end of the line. Participants were asked to make a mark on the line that best represents the level of pain intensity that they were experiencing 1 day before ACDF. The 2-year follow-up evaluation of neck/upper limb pain was completed in the same way with the help of the study personnel. The BMI was calculated by dividing weight (kg) by the square of height (m). Patients were the urban or the rural according the seat of registered permanent residence.

Statistical analysis

Data were presented as mean ± standard deviation (SD) for continuous variables and as percentages for incidence rates. The normality test and homogeneity test were performed on

Table 3. The Main Features in the Satisfied and Dissatisfied Patients at Baseline, Before the Surgery

	Satisfied (n = 269)	Dissatisfied (n = 91)	*P*-Value
Age (years)	50.5±10.0	49.6±9.7	0.442
Gender (Male/Female)	140/129	49/42	0.766
BMI (kg/cm^2)	25.2±3.1	25.8±3.0	0.393
Hometown (Urban/Rural)	102/167	18/73	0.002
Pre-op ODI	71.7±5.5	72.5±5.0	0.331
Pre-op VAS-neck	77.1±10.5	76.1±10.0	0.442
Pre-op VAS-upper limb	76.2±10.2	74.9±9.8	0.280
2 years follow-up Type of personality (A/B)	52/214	77/14	<0.001
2 years follow-up ODI	14.8±2.9	14.8±2.5	0.832
2 years follow-up VAS-neck	14.7±3.0	14.9±2.4	0.959
2 years follow-up VAS-upper limb	14.7±3.0	14.7±2.5	0.714
Complications (Yes/No)	16/239 (5.9%)	14/77 (15.4%)	0.005

ODI = Oswestry Disability Index, VAS = Visual Analog Scale, BMI = body mass index.

Table 4. Surgical Complications in Satisfied and Dissatisfied Group After ACDF

Complications	Satisfied (n = 16)	Dissatisfied (n = 14)
Not bone graft fusion	0	1
Voice hoarse	5	4
Dysphagia	2	2
C5 nerve root palsy	6	5
leakage of cerebrospinal fluid	2	1
Incision infection	1	1

measured data (The level of significance was set at 0.10). The characteristics and clinical data were compared between the groups using the t-test for normally distributed continuous variables and the Chi-square test for categorical variables. Continuous variables with non-normal distribution were analyzed with the Mann-Whitney U test. Due to numerous valuables selected to assess dissatisfied degree after ACDF, we performed a multivariate logistic regression model and for each variable, we computed the odds ratio (OR) with its 95% CI. All statistical analyses were performed using the software of SPSS (version 21.0, SPSS Inc, Chicago, IL).

Results

When these patients were in hospital, we evaluated totally 387 patients. After 2 years, 20 patients were lost to follow-up, 5 refused the second evaluation and 2 had died. Therefore, there were 360 patients finally included and were divided into 2 groups according to PSI. Satisfied group included 269 patients (74.7%) showing 1 or 2 stage in PSI and 91 patients (25.3%) in dissatisfied group showing 3 or 4 stage in PSI.

There were no significant difference between 2 groups in age, gender, BMI, pre-op ODI, pre-op VAS-neck, pre-op VAS-upper limb, 2 years follow-up ODI, 2 years follow-up VAS-neck, 2 years follow-up VAS-upper limb. Two groups had a statistic difference in type of personality of patient, patients' registered permanent residence and surgery complications, showing that Type A personality (TAP), rural patients and surgery complications tended to be dissatisfied with ACDF (**Table 3**).

The following variables were entered into the multivariate model: age, sex, weight, height, seat of registered permanent residence, type of personality, BMI, pre-operation ODI, pre-operation VAS-neck, pre-operation VAS-limb, post-operation ODI, post-operation VAS-neck, post-operation VAS-limb, complication after operation (**Table 4**). When included in a multivariate logistic regression model, seat of registered permanent residence, type A personality, complications after operation were independently associated with patient dissatisfaction 2 years after ACDF (**Table 5**).

Discussion

In our study, 2 years after ACDF, 269 patients, accounting for about 74.7% of all included patients, were satisfied with the results of ACDF, however, 91 patients (25.3%) were complaint about the efficacy of the surgical procedure, believing ACDF did not meet what they expected. Our results showed that patients with Type A personality, the patients from rural area and complications after surgery were more inclined to dissatisfied with outcome of ACDF. Other variables, like age, gender, BMI,

Table 5. Factors Predicting Dissatisfaction After Discectomy, Identified by Multivariate Analysis

	Odds Ratio [95% CI]	*P*-Value
X1 (Age)	0.92 [0.87-0.98]	0.433
X2 (Weight)	1.47 [0.77-2.80]	0.721
X3 (Height)	0.70 [0.40-1.22]	0.489
X4 (BMI)	0.39 [0.07-2.12]	0.392
X5 (Pre-op ODI)	1.12 [1.03-1.23]	0.213
X6 (Pre-op VAS-Neck)	0.94 [0.90-0.99]	0.393
X7 (Pre-op VAS-Limb)	0.94 [0.89-0.99]	0.261
X8 (2 year follow-up ODI)	1.00 [0.83-1.19]	0.885
X9 (2 year follow-up VAS-Neck)	1.00 [0.85-1.19]	0.675
X10 (2 year follow-up VAS-Limb)	1.00 [0.85-1.18]	0.967
X11 (2 year follow-up Type of personality A/B)	0.37 [0.19-0.71]	<0.001
X12 (Hometown Urban/Rural)	0.19 [0.05-0.79]	0.002
X13 (Gender Male/Female)	0.93 [0.50-1.72]	0.766
X14 (Complications)	0.11 [0.04-0.32]	0.005

pre-op ODI, pre-op VAS-neck, pre-op VAS-upper limb, 2 years follow-up ODI, 2 years follow-up VAS-neck, 2 years follow-up VAS-upper limb, were not interfere dissatisfied degree of patients to ACDF.

The type A personality (TAP) was described in the 1950s by cardiologists Meyer Friedman and Ray Rosenman [11], TAP-typically characterized by individuals who are anxiety, highly competitive, ambitious, work-driven, time-conscious and aggressive. On the other hand, Type B personality (TBP) includes people who live at a lower stress level and typically work steadily, enjoying achievements but not becoming stressed when they are not achieved, furthermore, have a poor sense of time schedule and can be predominately right brained thinkers [6]. Meyer Friedman and Ray Rosenman, who argued that TAP was a risk factor for coronary heart disease (CHD), notably among White middle-class men [11]. This theory appeared to be supported by findings from the Western Collaborative Group Study in 1970 [12], 1974 [13], 1976 [14], and the Framingham Study in 1980 [15]. Many subsequent reports explored that negative effects of depression on postoperative satisfied degree of patients. Linn et al [16] reported that the psychological status strongly influenced the patient reported satisfaction ratings in internal medicine practices. Bui et al [17] reported that depressive symptoms were associated with patient dissatisfaction 12 months after a breast cancer diagnosis. As same to previous views, this study believed that patients with TPA were more likely to be dissatisfied with the result of ACDF. There are three possible reasons for this result. First, patients with TAP characterized by time urgency, impatience, hostility and perfectionism. Thus, they expected and seek to the most perfect outcomes, let alone efficacy of ACDF. So, just a little comfort post-operation may cause their anger, because they excessively focus on the little unwell, leading to dissatisfaction of the operative therapy. On the contrary, patients with TBP characterized by live at a lower stress level and more enjoy life, even though they had a little discomfort, they prefer to ignore or not care about it. Second, in China, the cost of one segment of ACDF to a ordinary family is equal to income of one years, so, operative treatment is a big burden for a common family. Patients with TAP live a high pressure life, suddenly they must pay so much money for surgery, they may be anxious about this and pay more attention to the outcome of ACDF. Cost so much, if have not a perfect result, which may mainly effect their satisfactory degree. But, patients with TBP do not consider like this, they live a lower pressure life and enjoy life. Although surgery cost much of their savings, they do not lose their temple easily on these. Their motto was everything is OK, don't worry about everything.

Relation between patient satisfaction and patients' registered permanent residence have never been confirmed in previous reports according to authors' knowledge. For patients undergoing ACDF for treatment of CSR, our result also confirmed the widely held impression that the patients from rural are a risk factor for poor postoperative satisfaction. Why? There are 3 hypotheses. First, in China, people from rural area know a little about medicine, they place all hope and expectation on surgery, they believe operation can solve their all pain and don't bring any complications post-operation, yet, urban patients know more about the

evolution and limitation of contemporary medicine. When doctor tell the complications after operation to patients from urban, they could get better understanding than rural patients. Second, in China, most of rural patients just live on farming. They have a lower income and lead a rather poor life. Compared to urban patients, cost of surgery is a larger burden for rural patients. The urban are not anxiety about the payment as same as the rural. Third, a large proportion of the rural patients are manual workers, instead of resting as much as possible within 3 months after surgery, they have to manual work and lack enough rest. The urban patients mostly do as doctors said. Because of above reasons, the satisfactory degree of rural patients worse than that of urban patients.

Another disadvantage factor on patient dissatisfaction was complications post-operation, which brought the physical and mental impairments to the patients. Even though 16 of 269 patients had complication after operation (**Table 4**), they also were satisfied with outcomes of ACDF. There are 2 possible reasons. First, one thing that they had in common was the urban people, they might have a good education or they might have a relation with doctors, resulting in having a full understanding of the natural course of CSR and the possible complications of ACDF. Second, another thing that they had in common was the patients with type B personality; they were more likely to cooperate with us by disclosing their discomfort and continue using medical care services. Just opposite, in dissatisfied group, the patients with complications were all type A personality and from the rural.

There are some limitations to this study. First, satisfaction is a subjective response to value judgments that patients make about their clinical experience and is associated with many variables, such as patient symptom characteristics, symptom-related expectations, functional status, mental disorders, unmet expectations, doctor-patient communication, and so on. In this study, only a small portion of variances were chosen in predicting dissatisfaction and selection bias may exist. Second, the satisfaction is evaluated by PSI and type of personality for patients are evaluated by BAI, which are easy to use, but are quite simple. Third, this is just a study of single institution, we need a multi-centre study, this results just showed condition of Asia, but it may not fit westerners, so we want to cooperate with westerners in further study. However, we report the first retrospective study to evaluate outcomes of ACDF in a large Chinese cohort of patients with CSR. We identify 3 factors that predict patient dissatisfaction and can be assessed: Type A personality, the patients from rural area and complications after surgery.

In summary, Type A personality generally is considered to have a close relation with medicine, especially coronary heart disease. In our study, Type A personality (TAP) was association with the dissatisfaction degree of patients after ACDF, as well as registered permanent residence, complications after operation. Our results indicated that these factors should be considered regarding the selection of the operative treatment method and may assist spinal surgeons in customizing patient-specific evaluation of the likelihood of successful surgery.

Disclosure of conflict of interest

None.

Authors' contribution

Conceived and designed the study: W.Y.D. and T.W. Collected data: H.W. and L.M. Analyzed the data: T.W. and H.W. Wrote the paper: T.W., D.Z. and X.M.T.

Abbreviations

BMI, body mass index; LDH, lumbar discherniation; ODI, Oswestry Disability Index; PSI, Patient Satisfaction Index; VAS, Visual Analog Scale; BAI, BECK anxiety inventory; CSR, Cervical Spondylotic Radiculopathy; ACDF, anterior cervical discectomy with fusion; TAP, Type A personality; TBP, Type B Personality.

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