PATIENT REPORTS OF SATISFACTION AFTER MICROVASCULAR DECOMPRESSION AND PARTIAL SENSORY RHIZOTOMY FOR TRIGEMINAL NEURALGIA

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OBJECTIVE: There are no reports of patient satisfaction surveys after either a microvascular decompression (MVD) or a partial sensory rhizotomy (PSR) for trigeminal neuralgia. This study compares patient satisfaction after these two types of posterior fossa surgery for trigeminal neuralgia, because it is postulated that recurrences, complications, and previous surgical experience reduce satisfaction.

METHODS: All patients who had undergone their first posterior fossa surgery at one center were sent a self-complete questionnaire by an independent physician. Among the 44 questions on four standardized questionnaires were 5 questions that related to patient satisfaction and experience of obtaining care. Patients were divided into those having their first surgical procedure (primary) and those who had had previous ablative surgery (nonprimary).

RESULTS: Response rates were 90% (220 of 245) of MVD and 88% (53 of 60) of PSR patients. Groups were comparable with respect to age, sex, duration of symptoms, mean duration of follow-up, and recurrence rates. Overall satisfaction with their current situation was 89% in MVD and 72% in PSR patients. Unsatisfied with the outcome were 4% of MVD and 20% of PSR patients, and this is a significant difference ($P < 0.01$). Satisfaction with outcome was higher in those undergoing this as a primary procedure. In the primary group, satisfaction was dependent on recurrence and complication/side effects status (each $P < 0.01$), but this was not the case in the nonprimary group. Patients expressed a desire for earlier posterior fossa surgery in 73% of MVD and 58% of PSR patients, and this was highest in the primary group. The final outcome was considered to be better than expected in 80% of MVD and 54% of PSR patients, but 22% of the PSR group ($P < 0.01$) thought they were worse off.

CONCLUSION: Patients undergoing posterior fossa surgery as a primary procedure are most satisfied and PSR patients are least satisfied, partly because of a higher rate of side effects.

KEY WORDS: Microvascular decompression, Partial sensory rhizotomy, Patient satisfaction, Trigeminal neuralgia

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The severe unilateral facial electric shock-like pains often provoked by light touch, such as eating, shaving, and talking, make trigeminal neuralgia one of the most severe neuropathic pains and result in significant social disability. Drug therapy is the initial form of management, but in the long term, the majority will fail to have their pain controlled by drugs or will develop debilitating side effects as a result of the medications. Patients will then require some form of surgical treatment, which could include microvascular decompression (MVD) or partial sensory rhizotomy (PSR). The latter is performed only if the surgeon does not find convincing evidence of compression of the trigeminal nerve (11, 16). It inevitably leads to sensory loss and is considered to be a side effect of surgery rather than a complication; however, it can then lead to deafferentation pain and difficulties with eating. The timing of surgery remains controversial, with some neurosurgeons advocating early surgery to prevent the pain from developing into a more neuropathic type with a continuous dull, aching component (1, 2) and to yield longer pain relief periods (12, 16, 19). Zakrzewska and Patsalos (21) asked pa-

tients they had followed up for a mean of 16 years about the timing of surgery, and they suggested that it should have been earlier.

A systematic review of more than 200 published studies on outcomes after surgery for trigeminal neuralgia has shown that 32 reported the use of a questionnaire or interview (personal or telephone) to assess patient satisfaction, and of these, 8 were in patients who had had an MVD (20). Twenty-seven of the studies merely reported that patients considered their surgery to have provided either excellent or good results. One group has published its entire questionnaire as sent to patients (23), and five others have published some questions from or answers to questionnaires (7, 8, 10, 14, 15), but only one of these was in patients who had undergone an MVD (15). No details are provided of how patients were sampled, how the data were validated, how large the response rate was, and whether the data were collected by an independent observer to reduce bias. As far as can be ascertained, these nonstandardized questionnaires were not assessed for validity and reproducibility to ensure that they were really measuring what they intended to measure and that the results were always consistent. Other standardized questionnaires, such as the Medical Outcomes Study Short-Form 36, General Health Questionnaire, and Beck Depression Inventory, which have been used in patients with other neuropathic pains, have not been reported in patients after surgical procedures.

The nonstandardized questionnaires that have been used to ascertain satisfaction with results do not define what is meant by satisfaction and have not attempted to correlate it with recurrence rates, complications, or other factors. Patient satisfaction is a complex issue, and it has been proposed that it should be divided into outcome-related or process-related (17). When looking at outcome-related satisfaction, it is clear that relief of pain is only one of several factors that affect patients' satisfaction with treatment and include factors such as depression and healthcare providers' attitude and support, including effective communication skills (4). The Hospital Anxiety and Depression Scale, a well-validated questionnaire (24), has been used in patients with trigeminal neuralgia and has shown that patients after surgery no longer have depression if they are pain-free (22, 23) and that this could provide another reason for improved satisfaction. Response rates to postoperative questionnaires have varied from 64% (18) to 91% (8), and it is therefore surprising that more patient-centered surveys have not been performed to determine patients' views on outcome.

Several hypotheses were generated for an in-depth study to evaluate patients' experience of posterior fossa surgery. It was hypothesized that patients would have preferred to have surgery earlier but that many were not referred directly from the primary care sector to a neurosurgeon. It was also postulated that postoperative satisfaction (outcome of care) was related not only to recurrence rates but also to factors such as previous ablative surgery, need for further surgery, complications, and depression. In view of the fact that PSR is likely to result in sensory loss, it may result in decreased satisfaction in this group of patients.

PATIENTS AND METHODS

A specially designed self-complete questionnaire was used that contained 44 questions related primarily to postoperative complications and patients' experiences. It also included the Hospital Anxiety and Depression Scale, the Brief Pain Inventory, the Medical Outcomes Study Short-Form 36, and the McGill pain questionnaire. Its development and validation have been reported previously (20a). Five of the questions related to overall satisfaction with process and outcome after surgery, and one related to the range of healthcare professionals that had been consulted before the consultation with the neurosurgeon who performed the operation. The wording of the questions and the choices patients were asked to make are shown below (see *Table 3*). The questionnaires were returned to the independent observers (JMZ and BCL), and the resulting data were entered on a spreadsheet with the help of a patient who acted as an arbitrator.

Patients

One neurosurgeon's (HBC) entire trigeminal neuralgia posterior fossa surgery practice from 1982 to 2002 (the Bristol data) was available for the survey, which was conducted late in 2002. Comprehensive details on the methodology, including inclusion and exclusion criteria, have been published separately (20a), but in brief, patients meeting the following criteria were included: patients with primary idiopathic trigeminal neuralgia; in the MVD-only group, a vessel with significant compression, and in the PSR group, either some vessel contact but no deformity or no vessel contact at all; this was the first posterior fossa procedure; and the patient had an operation 6 months before the survey was performed. Patients were excluded if they had a secondary cause of trigeminal neuralgia, e.g., tumor; clinical evidence of multiple sclerosis; or concurrent cranial nerve disorder, e.g., hemifacial spasm.

From the total number of 413 patients in the database, it was possible to send a questionnaire with a cover letter to 305 patients. Twenty-five patients had died of conditions completely unrelated to trigeminal neuralgia surgery before this follow-up study took place. Twenty-two were lost to follow-up, and 56 did not meet the inclusion criteria: 21 because of multiple sclerosis; 10, follow-up of less than 6 months; 8, insufficient data; 8, previous posterior fossa surgery; 6, atypical trigeminal neuralgia or other diagnosis; and 3, secondary trigeminal neuralgia. One patient had a bilateral PSR. All patients gave informed consent for PSR to be performed if no neurovascular compression was detected.

Patients with idiopathic trigeminal neuralgia not resulting from multiple sclerosis or tumors were explored by keyhole retrosigmoid craniotomy by one surgeon or his supervised trainee. If no convincing neurovascular compression was found, then a PSR was performed (1, 11). The patient details of

those responding to the questionnaire and the response rate are shown in *Table 1*. The Kaplan-Meier curve of recurrence-free rate, stratified by type of surgery, is shown in *Figure 1*, which includes all patients lost to follow-up, those who died, and those who had a minimum follow-up of 2 years. The results of the Kaplan-Meier test are based on the single result of the posterior fossa surgery, complete pain relief with no medication for a mean follow-up of 5 years. *Figure 1A* shows the primary patients and *Figure 1B* all those who had previous surgery (nonprimary). The study had the approval of the local ethics committees. The data were made anonymous before being analyzed by a statistician (SEK) using S-Plus, a statistical software. The first 238 patients have been reported in a textbook chapter (3).

TABLE 1. Demographics (including complications) of patient population who underwent their first microvascular decompression or partial sensory rhizotomy and replied to the questionnaire[a]

	Microvascular decompression	Partial sensory rhizotomy
Response rate	90% (220/245)	88% (53/60)
Sex (F/M)	131/89	37/16
Mean age (yr) at operation	59	57
Mean duration (yr) of symptoms	6.7	7.0
Mean follow-up (yr)	5.3	5.7
Patients with a previous ablative procedure or unknown	19 peripheral surgery	3 peripheral surgery
	20 gasserian ganglion	15 gasserian ganglion
	37 do not know	3 do not know
Patients with repeat surgery after their first posterior fossa surgery	28; of these, 18 currently pain-free	4; of these, 2 currently pain-free
Patients with both previous surgery and repeat surgery after posterior fossa surgery	9; of these, 6 currently pain-free	0
Patients reporting any form of facial pain at time of survey	40	16
Mean recurrence at 5 years from Kaplan-Meier test		
All respondents	21%	28%
Primary group	16%	30%
Nonprimary group	30%	25%
Numbness	9 (5%)	23 (48%)
Headaches	25 (13%)	7 (14%)
Burning sensation	10 (5%)	12 (24%)
Hearing problems	24 (13%)	8 (16%)
Unsteadiness	20 (11%)	9 (18%)
Dizziness	15 (8%)	10 (20%)
Eating problems	5 (3%)	14 (27%)
Eye problems	10 (5%)	11 (22%)
Any complication	57 (26%)	32 (62%)
Presence of depression on HADS at the time of the survey (primary)	3.2% (2/62)[b]	17% (3/18)[b]

[a] HAD, hospital depression and anxiety scale; primary group, no previous surgery; nonprimary group, previous ablative surgery.
[b] Excluded patients who stated that they had other health problems that could account for depression.

Definitions

The *primary group* was defined as patients who had not undergone any previous surgery and the *nonprimary group* as patients who had had a previous ablative procedure.

A *failure* was defined as no relief or a repeat operation or percutaneous procedure within 3 months, and a *partial pain relief* outcome was a patient using medication to achieve complete relief, but in the Kaplan-Meier data, this was classified as failure.

A *recurrence* was defined as any return of pain, minor or major. A *major recurrence* was defined as return of severe pain, uncontrolled or controlled either with drugs or with repeat surgery. A *minor* or *transient recurrence* was defined as pain well controlled by drugs or lasting for only 1 to 2 months and then cleared.

Pain was defined as classic trigeminal neuralgia if it fulfilled the International Headache Society criteria. If there was also an element of a dull, aching quality, as seen on the McGill pain questionnaire, it was called *atypical trigeminal neuralgia*, and any other pain was defined as *chronic idiopathic pain*, a constant pain defined by use of a variety of non-trigeminal neuralgia words on the McGill Pain Questionnaire.

Deafferentation pain, or anesthesia dolorosa, was defined as constant pain described as burning and associated with numbness. It was defined as severe, moderate, or mild depending on its effect on quality of life.

All reported complications and side effects were based on the patients' answers to the questionnaire and in some cases extended commentary, but no patients were examined to validate the findings.

RESULTS

The response rate was greater than 90%. The demographic data for the two groups of patients are similar, and both have been followed for the same mean time of 5 years, as shown in *Table 1*. Of those who responded (220 MVD and 53 PSR patients), there were 144 MVD and 32 PSR patients who had not undergone any other surgical procedure (even a peripheral procedure such as cryotherapy). There is no information on previous procedure for 37 MVD and 3 PSR patients, and these have not been included in the Kaplan-Meier analysis. There is also a group of patients who were primary cases but who later underwent repeat surgical procedures because of return of pain: 19 MVD, 4 PSR. A summary of complications is included in *Table 1*. There were no deaths and no serious permanent neurological complications, e.g., hemiplegia,

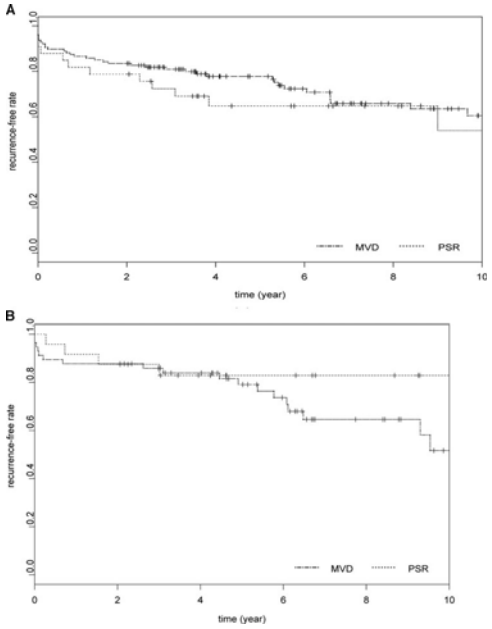

FIGURE 1. *Kaplan-Meier curves of recurrence-free rate, stratified by type of surgery, in primary (A) and nonprimary (B) patients.*

TABLE 2. Relationship between satisfaction, recurrence, and complications/side effects for primary group and nonprimary group

	Satisfaction			Total
	Satisfied	Slightly unsatisfied	Unsatisfied	
Primary group				
Recurrence				
Yes	17 (74%)	2	4	23
No	123 (95%)	3	3	129
Total	140 (92%)	5	7	152
Complications				
Yes	36 (78%)	4	6	46
No	104 (98%)	1	1	106
Total	140 (92%)	5	7	152
Nonprimary group				
Recurrence				
Yes	26 (65%)	7	7	40
No	32 (82%)	4	3	39
Total	58 (73%)	11	10	79
Complications				
Yes	20 (69%)	4	5	29
No	20 (91%)	2	0	22
Total	40 (78%)	6	5	51

TABLE 3. Patients' views on their surgical outcomes after microvascular decompression or partial sensory rhizotomy[a]

	Primary group		Nonprimary group	
	MVD	PSR	MVD	PSR
Looking back now, how would you consider the timing of your surgery?[b]				
Should have been earlier	97 (78%)	17 (65%)	39 (71%)	11 (52%)
About right	28 (22%)	8 (31%)	16 (29%)	10 (48%)
Could have been delayed	0 (0%)	1 (4%)	0 (0%)	0 (0%)
How long did it take you to completely get over the operation?				
Mean (SD) (wk)	10.7 (12.5)	14.5 (16.5)	11.1 (12.3)	7.5 (8.2)
Median (wk)	6	6	7	4
Range (wk)	0–78	2–52	0–52	0–26
How well did this operation meet your expectation?[b]				
Better than expected	102 (82%)	15 (60%)	34 (59%)	12 (52%)
Just as expected	18 (14%)	4 (16%)	13 (22%)	7 (30%)
Worse than expected	5 (4%)	6 (24%)	11 (19%)	4 (18%)
Overall, how satisfied are you with your current situation?[b]				
Satisfied	119 (96%)	21 (75%)	44 (76%)	14 (64%)
Slightly unsatisfied	4 (3%)	1 (4%)	8 (14%)	3 (14%)
Unsatisfied	1 (1%)	6 (21%)	6 (10%)	4 (18%)
If you needed treatment again, what treatment would you choose?[b]				
The same surgery	100 (80%)	16 (59%)	37 (66%)	11 (52%)
Other form of surgery	1 (1%)	3 (11%)	0 (0%)	1 (5%)
Drug therapy	2 (2%)	2 (8%)	1 (2%)	1 (5%)
Other	2 (2%)	0 (0%)	0 (0%)	0 (0%)
Unsure	19 (5%)	6 (22%)	18 (32%)	8 (38%)

[a] MVD, microvascular decompression; PSR, partial sensory rhizotomy; SD, standard deviation.
[b] Outcomes significantly depend on combinations of surgical type and primary group at 0.01 significance level.

ataxia, or bulbar palsy, in any patients in the whole database. Two patients reported having a stroke, but they recovered fully from this; however, up to 11% of patients reported a cerebrospinal fluid leak. Long-term side effects and complications in the MVD patients and PSR patients who had only this one procedure and who said it had some effect on their quality of life occurred in 24% (30 of 125) in the MVD and 57% (16 of 28) in the PSR group. In the MVD group, the most common complication/side effect was a nonspecific headache, whereas in the PSR group, it was sensory loss.

Figure 1A shows that for the primary group, although statistically nonsignificant, recurrence-free rates for the MVD group are consistently higher than those for PSR group. At 5 years, the mean recurrence-free rates were 84% for the MVD and 70% for the PSR group. *Figure 1B* shows that for the nonprimary group, recurrence-free rates for the two surgical groups were similar by 5 years. The different rates shown after 5 years are not stable because of the small sample size; thus, we do not attempt to interpret the differences.

Depression was significantly lower in the MVD group than in the PSR group (3.2% MVD, 17% PSR) (Fisher's exact test, $P = 0.036$) and correlates with increased satisfaction in the MVD group. *Table 2* shows that for the primary group, satisfaction is highly dependent on both recurrence status (Fisher's test, $P < 0.01$) and complications (Fisher's test, $P < 0.01$). Ninety-five percent (123 of 129) of patients without a recurrence are satisfied, whereas only 74% (17 of 23) of patients with recurrence are satisfied. Ninety-eight percent (104 of 106) of patients without complications are satisfied, whereas 78% (36 of 46) with complications are satisfied. For the nonprimary group, satisfaction is not dependent on either recurrence status (Fisher's test, $P = 0.22$) or complications (Fisher's test, $P = 0.11$). Of the patients who reported being in pain at the time of the survey, one-half said they were satisfied with their outcome (MVD, 21, and PSR, 7), and of those who were unsatisfied, complications and side effects were also present.

A higher percentage of patients who had an MVD as a primary procedure are likely to be prepared to have a repeat procedure, and it is these patients who express better than expected results of surgery and highest satisfaction rates (*Table 3*). Up to 24% of patients who had a PSR thought that the results were worse than they anticipated. Some patients take a long time to recover after surgery, but 50% of patients will think that they have recovered within 2 months (*Table 3*). The MVD patients are more likely to say that they should have had surgery earlier than the PSR group.

As *Table 4* shows, more than two-thirds of the patients will have seen both their primary care doctor and their dentist, but then nearly one-half are referred to neurologists for a second opinion rather than a neurosurgeon. There was no correlation with the type of previous surgery and the type of healthcare professional the patient had seen. Up to one-third of patients may visit a complementary or alternative healthcare professional, but very few see a psychologist. Patients who have had trigeminal neuralgia for a longer period do not seem to consult more healthcare professionals. The mean duration of symptoms was approximately 7 years, and even then, the majority of patients think that surgery should have been performed earlier.

TABLE 4. Range of healthcare professionals consulted before the neurosurgeon who performed the first posterior fossa surgery[a]

	Microvascular decompression	Partial sensory rhizotomy
Mean no. (SD)	3.7 (1.9)	2.9 (1.5)
Range	1–14	1–7
Primary care specialists		
Dentist	80% (175/219)	71% (37/52)
Medical practitioner	85% (187/219)	77% (40/52)
Secondary care specialists		
Neurologist	45% (98)	42% (22)
Oral surgeon	33% (72)	29% (15)
Pain specialist	26% (56)	12% (6)
General physician	16% (34)	10% (5)
Ear, nose, and throat surgeon	12% (27)	4% (2)
Other neurosurgeon	11% (23)	8% (4)
Oral physician	8% (18)	2% (1)
Psychiatrist	2% (4)	0% (0)
Clinical psychologist	2% (4)	0% (0)
Complementary and alternative medical specialists		
Acupuncturist	34% (75)	17% (9)
Chiropractor	10% (21)	4% (2)
Counsellor	2% (5)	0% (0)
Osteopath	2% (5)	2% (1)
Others	5% (12)	6% (3)

[a] SD, standard deviation.

DISCUSSION

Patients undergoing primary surgery with no recurrence and no complications show no evidence of depression and are very satisfied with posterior fossa surgery and express a wish for it to have been performed earlier. Both recurrence rates and complications/side effects reduce satisfaction. Sensory loss is an inevitable side effect after PSR, and it can lead to addition complications, such as keratitis and eating difficulties; these patients are less satisfied with outcome than MVD patients. Patients who have had previous surgery are less likely to be satisfied than those undergoing their first procedure. Patients are not referred directly from the primary care sector to neurosurgeons and hence experience what the majority of patients consider to be delays in having surgery.

This is the first study of trigeminal neuralgia that has attempted to examine posttreatment satisfaction from the patient's perspective, because patients helped to design the questionnaire and then to analyze it. It also used independent observers who were from a different hospital and from two different specialties. The results from this study are generalizable to patients in the United Kingdom, because this study represents the largest report from the United Kingdom, and the 90% response rate is probably because of the center's yearly survey of all its patients, which could also have contributed to improved satisfaction rates. The data, however, are cross sectional, and patients' memory of events cannot always be reliable, especially surrounding immediate postoperative events (12). For example, the incidence of cerebrospinal fluid leak reported by patients was 11%, compared with 3.6% in the surgeons' database. The groups are not of equal size, and so bias is introduced. However, to date, there are no studies that have attempted to compare these two procedures using the same instruments. The questionnaire has primarily indicated satisfaction in relation to outcome, but it still needs to be validated and would benefit from input from clinical psychologists to improve, among other things, its measurement of satisfaction. Future surveys should include more baseline data on patients, including psychological ones, as proposed by Zakrzewska and Lopez (20).

The recurrence rates reported are similar to those in previous studies, but the complication rate is higher (19). This is probably because of the very comprehensive list of complications/side effects that were provided in the questionnaire and the fact that patients are also more likely to report complications in a self-complete questionnaire than when facing the surgeon who performed their operation (13). In common with other studies, high satisfaction rates are reported, and even in patients who are less satisfied, the residual pain and side effects/complications are less bothersome than the original pain. However, there is more depression in the patients who have sensory loss and recurrences of their pain. Zakrzewska et al. (23) found that 85% of patients (a United Kingdom sample) before a radiofrequency thermocoagulation had evidence of depression on the Hospital Anxiety and Depression Scale, whereas after treatment, this decreased to 28%; and yet, 90% of the whole sample had sensory loss. No comparable data are available for posterior fossa surgery patients. Although pain relief is of paramount importance, side effects and complications will affect the quality of life. Patients need to be made fully aware of the potential implications of a negative exploration and subsequent PSR and how this compares with other ablative surgical techniques (6). It is hoped the improving resolution of the

magnetic resonance imaging scans will enable more accurate prediction of compression. Magnetic resonance imaging/magnetic resonance angiography now seem to demonstrate neurovascular compression with 100% specificity and 95% sensitivity (9). Patients may express a wish not to have a PSR in the event of a negative magnetic resonance imaging scan and may opt for another type of ablative procedure that carries lower risks for mortality and morbidity, although no deaths related to surgery occurred in this series. Patients' views on expectations and possible future surgery in the event of recurrence may reflect their views on the process of care, with which they seem to be very satisfied. Data on immediate complications of surgery need to be collected within 6 months of surgery by an independent group. Patients currently do not have high-quality evidence on the risks of developing complications/side effects in both the short and the long term.

Neurologists need to be made aware of these results so that after confirmation of diagnosis, patients are given the opportunity to undergo surgery rather than seeking care from acupuncturists or other nonsurgeons. Duration of symptoms did not seem to lead to increased use of healthcare professionals, and so increased healthcare use could be linked more to severity of pain and quality of life. There is a need to educate dentists on the diagnosis and management of trigeminal neuralgia, given the large number of patients who consult dentists. It is of interest that few of these patients consult psychologists or psychiatrists, who treat patients with many other types of facial pain. To reduce referrals to numerous specialists, it is proposed that multidisciplinary clinics be set up in centers that have high numbers of referrals to enable patients to be offered a range of treatments early in their disease process. The personal experience of the authors confirms that patients are prepared to travel long distances to be treated in centers of excellence that, because of higher throughput, have improved results (5). All patients who undergo neurosurgery should be carefully assessed preoperatively, should be given a thorough explanation of all treatment options, and should be educated to improve understanding of the procedures, and clinicians must ensure that all their fears are addressed. The results should then be audited on a regular basis, ideally by a national center, to ensure that high levels of satisfaction are achieved. Patients are extremely willing to cooperate and should be involved at the start of any projects.

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the data on a spreadsheet and provided very useful interpretations of the answers.

COMMENTS

In a comparison of perceived patient outcomes after either microvascular decompression (MVD) for trigeminal neuralgia versus partial sensory rhizotomy (PSR) (in patients without observed vascular compression), the authors suggest that 1) patients are more satisfied after MVD, 2) patients would prefer to have definitive management earlier rather than relying for long periods on medical management, and 3) patients can still report satisfaction with the procedure even in the face of a high rate of perceived complications and even pain recurrence. The study was retrospective, and the questionnaire methodology is hard to validate. It is fortunate that patients seem to share our enthusiasm for surgical management of trigeminal neuralgia. Provided that we can continue to demonstrate a low morbidity rate, provide a reasonable pain control rate, and maintain long-term patient satisfaction, it would seem that neurosurgeons will continue to have a significant role in the management of this pain problem. Perhaps we should be in the picture sooner, before medical side effects build up or medical pain control fails.

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The article by Zakrzewska et al. discusses reports by patients of satisfaction after posterior fossa surgery for trigeminal neuralgia. Retromastoid craniectomy with MVD was performed when vascular compression was found in the operating room, whereas PSR was performed when such compression was not found. Satisfaction with outcome was higher in those undergoing this surgery as their primary operation (without previous surgery). The PSR group showed a lower level of patient satisfaction than those with MVD, probably because of more complications from trigeminal denervation.

Patients undergoing posterior fossa surgery for trigeminal neuralgia need to recognize that significant vascular compression is not always found in the operating room. When this occurs, patients must be prepared for either a PSR with its associated numbness, possible dysesthesias and eye problems, or no treatment, with the need for a subsequent percutaneous or radiosurgical denervation.

High-resolution, thin-section magnetic resonance images are a helpful, but not perfect, guide to intraoperative anatomy. When vascular contact is not seen on such a magnetic resonance image, approximately 50% of patients will be found in the operating room to have no contact. When vascular contact is detected on these magnetic resonance images, vascular contact will almost always be found in the operating room. Intraoperative compression will not necessarily be seen, as noted in the present series, in which some vessels were noted to be in contact with the trigeminal nerve but not compressing it and a PSR was performed rather than an MVD.

The MVD results from this study cannot be generalized to all patients undergoing retromastoid craniectomy for trigeminal neuralgia. Some patients (although a minority) who undergo retromastoid craniectomy for trigeminal neuralgia end up with a PSR and not an MVD, and they often do not know in advance which operation it will be. Not only are these two operations different, with varying complication profiles, but the lesion responsible for the trigeminal neuralgia is not the same. Those without vascular compression are more likely to have a brainstem lesion, such as demyelination, even without clinically apparent multiple sclerosis. Trigeminal neuralgia from a brainstem lesion is more difficult to treat and may require more denervation than trigeminal neuralgia caused by the more common vascular compression of the trigeminal nerve near the dorsal root entry zone.

As documented in this article, many patients with trigeminal neuralgia wait too long before they have a neurosurgical procedure. However, I would not agree with the author's recommendation that patients be given the opportunity to have surgery after confirmation of the diagnosis. Medicines such as carbamazepine and oxcarbazepine are so effective for trigeminal neuralgia that they should be offered before neurosurgical intervention. Those with minimal or no pain either without medicine or with small and nonbothersome doses do not need a neurosurgical procedure.

Although MVD relieves the pain of trigeminal neuralgia in many patients and these patients are often satisfied, there are some drawbacks. Some patients with trigeminal neuralgia who undergo the MVD operation for trigeminal neuralgia (19%, as demonstrated in this study) will not have vascular compression as a cause of their trigeminal neuralgia. After a single procedure, complications that have some long-term effects on the quality of life were present in 24% of the MVD and 57% of the PSR patients and thus could be expected in more than 24% of patients who undergo posterior fossa, or MVD, surgery for trigeminal neuralgia, because some will have a PSR. Pain recurs in some patients after posterior fossa surgery, and patients continue to be at risk for such recurrence. There are less invasive procedures, such as percutaneous rhizotomies and even less invasive gamma knife radiosurgery, which have fewer extratrigeminal complications than MVD and can be effective whether or not there is vascular compression. These procedures should also be discussed with patients in addition to MVD.

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This is a well designed and ambitiously conducted study, and it may serve as an example of how such retrospective case studies should be performed. The report is apparently based on questions selected from extensive questionnaires and inventories contained in a large data base. A major advantage of the study is that the follow-up has been conducted by a third disinterested party. The analysis of the complex issue of patient satisfaction, and the different approaches to its mea-

surement, are most valuable, but I do not agree with the authors' claim that their study is the first that have tried to evaluate satisfaction with the outcome from the patient's perspective.

Although this study is attractive from a methodological aspect, the reported results seem to be of limited interest. First, the comparison between the two types of surgery appears artificial because they are not alternative, but rather supplementary; no patient is offered the opportunity to undergo partial trigeminal rhizotomy as an alternative to MVD. Therefore, it also seems meaningless to examine the demographic composition of the two groups, unless one hypothesizes that, for example, elderly patients are more likely to present with a neurovascular conflict than the younger patients. One may ask why this study was not performed as a comparison between to optional treatments, say MVD versus a percutaneous intervention, instead. Secondly, and even more disturbing, is that the essence of the results appear rather trivial because a general relationship between side effects and pain recurrence with lack of satisfaction is hardly unexpected. The same applies to the statements that patients who had no recurrence and no complications were very satisfied and wished that surgery should have been offered earlier.

An example of the complexity of the term "satisfaction" is the paradox that even patients who experienced pain recurrence may report that they were satisfied with their outcome. Also, dissatisfaction related to side effects may be difficult to analyze and assess, and the severity of these effects should be taken into account. The authors refer to one of their previous studies in which they found that sensory loss after trigeminal thermocoagulation was present in no less than 90% of the patients, and yet depression incidence dropped dramatically. After that procedure, the sensory abnormalities are, as a rule, very modest, whereas selective rhizotomy is associated with profound and extensive hypesthesia and anesthesia, which may be quite incapacitating and even lead to severe deafferentation pain. Therefore, in order to analyze and evaluate the relationship between satisfaction and side effects in more depth, the form and extent of sensory abnormality should have been objectively assessed and not only asked for in a questionnaire.

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Cluster of neural cells derived from human embryonic stem cells. (Courtesy of Su-Chung Zang.)