

## Post-Traumatic Movement Disorders: Effect of the Legal System on Outcome

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**ABSTRACT:** Since patients with post-traumatic, neurologic, movement disorders often seek legal counsel and become involved in litigation, we used this group of disorders as a model for testing the hypothesis that an interaction with the legal system may influence its outcome. We reviewed 100 consecutive medical records of patients with post-traumatic movement disorders from the Movement Disorders Clinic at the Baylor College of Medicine. Additionally, 40 patients completed a detailed questionnaire and a health survey. Nineteen of the 40 respondents had obtained legal representation in regards to compensation for their medical problems. The group of patients with attorneys differed from those without legal representation in that they were significantly younger and a significantly higher percentage of these patients were disabled as compared to the group without attorneys. While most were dissatisfied with the legal system, 68% were satisfied with services provided by their attorneys. Although the patients with legal aspects of their movement disorders seemed to have more severe and persistent disability, we could not definitely conclude that the legal system had adversely affected the outcome of the post-traumatic movement disorders.

**KEYWORDS:** forensic science, legal medicine, post-traumatic neurologic movement disorders, litigation, legal system

Movement disorders is a group of neurologic symptoms, signs and diseases manifested by paucity or slowness of movement (hypokinesias) at one end of the spectrum and by abnormal excessive involuntary movements at the other end of the spectrum (hyperkinesias). Parkinson's disease is the best example of a hypokinetic movement disorder. Hyperkinetic movement disorders include tremors (oscillatory movement), dystonia (abnormal contractions of muscles producing twisting movements or abnormal postures such as writer's cramp and torticollis), and other involuntary movements (chorea, tics, myoclonus, stereotypies, etc). Several reports have drawn attention to the relationship between trauma to the central or peripheral nervous system and the subsequent development of movement disorders (1–11). Patients with post-traumatic movement disorders often become involved with the legal system either because of workers compensation, insurance, or tort law. Although much has been written in the medical, legal, and lay press regarding the interaction between medicine and the law, there is paucity of information about the effect of legal representation and litigation upon the outcome of a disease process.

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Whiplash injury involves the legal system probably more than any other condition (12–21). Schrader et al. (20) in a retrospective questionnaire-based cohort study, examined the development of late whiplash syndrome in Lithuania, a country where few automobile drivers and passengers are covered by insurance. They interviewed 202 individuals 1 to 3 years following a rear-end motor vehicle collision. No one in the study group reported disabling or persistent symptoms as a result of the automobile accident. The authors concluded that expectation of disability and/or attributing pre-existing symptoms to the motor vehicle accident (MVA) may be important factors in explaining the increased frequency of persistent symptoms in more affluent countries. Norris and Watt (15) found the rate of litigation to be almost twice as high in whiplash injured patients with persistent severe symptoms as in patients with mild symptoms. They found several factors that adversely affected prognosis; however, litigation per se had little influence on either the severity or longevity of symptoms. Mendelson (16) also concluded that the end of litigation or a verdict for the plaintiff did not herald an end to the patient's symptoms. Merskey (17), a psychiatrist, in an editorial in the *Canadian Medical Association Journal* entitled, *Psychiatry and the Cervical Sprain Syndrome*, states the following:

All specialists concerned have to be aware of the possibility of malingering and that, as will certainly be alleged by specialists acting for the defendant, the patient's symptoms might disappear as soon as the legal issues have been dealt with. Both sides can readily agree that patients are likely to feel somewhat better after the legal proceedings are over. The anticipation of a trial, the anxiety about a cross-examination—particularly for those who are not used to giving evidence or articulating their views in public and the sheer uncertainty of his or her financial situation weigh upon the patient before the trial. Some lightening of the patient's load can therefore be expected when the trial is over. However, the assertion that all patients recover when the legal proceedings are over is palpably false. This attitude is a gross oversimplification of the fact that men and women have some interest in money and may be inclined not to underestimate their symptoms if they are to be rewarded financially. But it blithely ignores a plethora of evidence and casts doubts on the veracity of many people who continue to suffer long after their involvement with the civil law is concluded.

The primary aim of our study is to examine the effect of legal representation and litigation on the medical outcome of patients with post-traumatic movement disorders.

**Methods**

The patient database, which contains demographic and diagnostic data on more than 10,000 patients with movement disorders studied at the Baylor College of Medicine Movement Disorders Clinic, was used to generate a list of all consecutive patients with the diagnosis of post-traumatic movement disorders. There were 231 such cases in the database, of which 150 were active. All 150 records were reviewed. Fifty cases were rejected because the relationship between the traumatic event and the subsequent movement disorder was not well established. The remaining 100 patients fulfilled the diagnostic criteria for post-traumatic movement disorders (10). In addition, a questionnaire which included a health survey was mailed to all 100 patients (available from the authors upon request). A second mailing was sent to those patients, who failed to respond within 30 days. Patients who did not respond after an additional 30 days, were contacted by telephone.

**Results**

Of the 100 patients who met the inclusion criteria: 40 returned the completed questionnaire, 19 letters were returned by the post-office as undeliverable, 36 did not respond either to our letters or telephone calls, and 5, upon being contacted, refused to participate. Of the 40 patients who responded to the questionnaire, 19 had legal representation.

Tables 1–3 compare demographic and clinical data from all 100 patient records with the 40 patients who responded to the questionnaire. The similarity of the two data sets suggests that the 40 respondents are representative of the entire population of 100 patients with post-traumatic movement disorders. Except for essential tremor in 3 patients and tardive dyskinesia in 1, there were no other pre-existing movement disorders. Two-thirds of the subsequent post-traumatic movement disorders developed within 30 days of the initial injury. The upper body (head, neck, and upper

TABLE 1—*Demographics.*

	Total Number of Patients: 100	Number of Responders: 40
Female/Male	49/51	23/17
Trauma/Injury Type:	Peripheral = 94 (94%) (13/94 with associated central injury) Central Injury = 19 (19%) (13/19 with associated peripheral injury)	Peripheral = 36 (90%) (8/36 with associated central injury) Central Injury = 12 (30%) (8/12 with associated peripheral injury)
Latency Between Injury and 1st Visit with a Physician:		
Mean ± S.D. (Range) days	8.32 ± 31.25 (0–240)	6.37 ± 24.48 (0–145)
0–1 days	76 (76%)	29 (72.5%)
2–7 days	11 (11%)	7 (17.5%)
8–30 days	7 (7%)	2 (5%)
>30 days	6 (6%)	2 (5%)
Age when 1st Injured:		
Mean ± S.D. (Range) years	38.71 ± 15.76 (8–77)	41.30 ± 17.94 (8–77)
0–10	1 (1%)	1 (2.5%)
11–20	11 (11%)	5 (12.5%)
21–30	17 (17%)	4 (10%)
31–40	26 (26%)	8 (20%)
41–50	19 (19%)	9 (22.5%)
51–60	18 (18%)	8 (20%)
61–70	4 (4%)	3 (7.5%)
71–80	4 (4%)	2 (5%)
Age when 1st Seen in Movement Disorder Clinic:		
Mean ± S.D. (Range) days	41.66 ± 14.45 (14–73)	45.15 ± 15.66 (15–73)
0–10	0	0
11–20	5 (5%)	2 (5%)
21–30	14 (14%)	2 (5%)
31–40	28 (28%)	9 (22.5%)
41–50	23 (23%)	11 (27.5%)
51–60	21 (21%)	11 (27.5%)
61–70	4 (4%)	2 (5%)
71–80	5 (5%)	3 (7.5%)
Average Latency Between Injury and 1st Visit to the Movement Disorder Clinic:		
Mean ± S.D. (Range) days	44.21 ± 71.25 (0–365) (5 outliers > 365 days omitted)	39.42 ± 63.51 (0–270) (5 outliers > 365 days omitted)
0–3 months	0	0
3–6 months	5 (5%)	1 (2.5%)
6–12 months	25 (25%)	12 (30%)
1–2 years	22 (22%)	8 (20%)
2–3 years	17 (17%)	6 (15%)
3–5 years	10 (10%)	3 (7.5%)
> 5 years	21 (21%)	10 (25%)

TABLE 2—Injury data.

	Total Number of Patients: 100		Number of Responders: 40	
Injury Site				
Neck	48	(15 associated with head injuries; 15 associated with upper extremity trauma)	17	(10 associated with other injuries: 7 head, 3 upper extremity, 1 face) (7 associated with a neck injury)
Head	22	(15 associated with neck injuries)	14	(3 associated with neck injury and with multiple injuries)
Upper Extremity	41	(13 hand injuries either alone or associated with upper extremity injuries)	3	
Lower Extremity	15		3	
Dental	5		1	
Face	1		0	
Back	2		2	
Eye	2			
Cause of Injury				
MVA	17		6	
Extension/Flexion injury	14		5	
Fall	20	(often assoc. with a stretch/twist injury)	9	(3 assoc. with fall, twist, blow)
Stretch/Twist injury	16	(often assoc. with a fall or blow)	10	(5 assoc. with other injuries)
Blow	24	(14 assoc. with a fall, MVA or Ext./Flx)	5	(all assoc. with other injuries)
Pull	7	(always assoc. with a twist)	3	(all assoc. with other injuries)
Surgery	17	(dental surgery 5)	7	(dental surgery 3)
Laceration	1		1	

extremities) was the site of most injuries and the subsequent movement disorder (Tables 2 and 3). Dystonia was by far the most common movement disorder; it accounted for 72% of the entire group and 80% of the respondents. Eighty percent of the movement disorders were either focal or segmental, and the movement disorder spread beyond the original site of injury in over one third of the patients and in one quarter the movement disorder crossed to the contralateral side. Reflex sympathetic dystrophy (RSD) was associated with the movement disorder in 22% of the entire group and in 15% of the respondents (5 of the 19 with attorneys, or 26%; and 1 of the 21 without attorneys or 5%). Nearly half of the patients were depressed; 5–15% had evidence of “major” depression seventy percent of the CT studies were negative, and 50% to 60% of the MRI studies were negative. Seventy of the 100 patients were receiving some medication for their movement disorder at the time of their last evaluation: 52 were receiving botulinum toxin (BTX) injections (22), 13 were taking levodopa/carbidopa, 9 trihexypenidyl, and 7 had surgical treatments, such as sympathectomy, dorsal column stimulator, thalamotomy, and laminectomy. Overall, 65% categorized their response to the treatment as “much better” or “better.”

Of the 40 patients who responded to the questionnaire, 21 did not have an attorney and 19 did. Females represented 62% of the patients in the first group and 58% in the second group. Approximately 80% of each group noted that the movement disorder was more disabling than the original injury. A law suit was filed in 10 of the 19 with attorneys; in 9 of the 10 the legal action was completed at the time this study was initiated. Eight of the 9 were not satisfied with the outcome of the law suit. Though 13 of 19 (68%) were overall satisfied with the services of their attorneys, only 2 were satisfied with the legal system. Thirteen of the 19 (68%) patients required legal assistance and representation in disability insurance, workers compensation, and social security disability claims. Ten of the 13 (77%) were satisfied with their attorney's

services. All 19 indicated that their involvement with the legal system did not in any way affect their movement disorder.

Patients with attorneys were clearly younger than those without attorneys: 42% of the patients with attorneys and 19% of those without were between the ages of 20 to 40; whereas, none of those with attorneys and 24% of the patients without attorneys were between the ages of 61 to 80. Patients with attorneys were first seen by a physician on the average  $0.32 \pm 0.67$  (range: 0–4) days after their initial injury, whereas patients without attorneys were first seen by a physician on the average  $5.65 \pm 13.36$  (range: 0–71) days following their initial injury. All patients with attorneys were either working full or part time and one was a full time student prior to their initial injury, in contrast to 11 (52%) of patients without attorneys. After developing the movement disorder only 7 (37%) of the patients with attorneys and 9 (43%) of those without attorneys were still working. In regards to financial assistance, 13 of the 19 (68%) patients with attorneys had filed claims under a disability insurance policy, workers compensation, or social security disability; whereas only 3 of the 21 (14%) patients without attorneys filed a claim under workers compensation. Eleven of the 21 (52%) patients without attorneys rated their overall health score as either excellent or good, as compared to only 4 of the 19 (21%) patients with attorneys (Table 4). Compared to one year ago, 18 (95%) of patients with attorneys rated their condition as same or worse, whereas 17 (81%) of those without attorneys had worsening or no improvement in their condition. In the 4 weeks prior to completing the questionnaire 14 (74%) of patients with attorneys and 13 (62%) of those without attorneys stated that their physical health or emotional problems interfered with their normal social activities. Furthermore, 16 (84%) of those with attorneys and only 11 (52%) of those without attorneys experienced bodily pain within the past 4 weeks, and the pain was described moderately to extremely disabling in 15 (79%) of the first group and in 12 (57%) of the second group.

TABLE 3—Injury related movement disorders.

	Total Number of Patients: 100	Number of Responders: 40
Type of Movement Disorder (MD):		
Dystonia	72	32
Associated with Myoclonus	4	1
Associated with RSD	5	1
Associated with Tremor	5	5
Associated with Tic	1	1
Associated with Parkinsonism	1	1
Tremor	20 (5 assoc. with Parkinsonism)	9 (2 assoc. with Parkinsonism)
Parkinsonism	13 (7 following head injury)	6
Akathisia	1	
Painful arm, moving hand	1	
RSD	6 (5 assoc. with either tremor or dystonia)	1
Site where MD 1st noticed:		
Upper Extremity	54 (30 with associated hand injury)	21
Hand	30 (18 hand only)	13 (9 hand alone)
Neck	29	9
Face, eye, jaw	11	5
Lower Extremity	12	6
Distribution of MD:		
Focal	44 (44%)	19 (47.5%)
Segmental	37 (37%)	14 (35%)
Unilateral	12 (12%)	3 (7.5%)
General	7 (7%)	4 (10%)
Spread of Movement Disorder:		
Yes	35 (35%)	15 (37.5%)
No	65 (65%)	25 (62.5%)
Spread Scale (0–4):		
0 (no spread)	65	25
1 (to body area immediately contiguous with original site of involvement)	7 (20%)	4 (27%)
2 (beyond the immediate contiguous area but remaining confined to the same limb or body area)	7 (20%)	4 (26%)
3 (to body region ipsilateral to but not contiguous with the original site of involvement)	12 (34%)	4 (27%)
4 (to a body region contralateral to the original site)	9 (26%)	3 (20%)

**Discussion**

In this study we attempted to examine the effects of the legal system on the outcome of patients with post-traumatic movement disorders. The group of 40 patients who responded to a detailed questionnaire was thought to be representative of a larger group of patients (N = 100) followed in the Movement Disorders Clinic and those described in the literature (1–11). Before drawing any conclusions from this study, however, it is important to point out its limitations. This was not a prospective study in which patients would be randomly assigned to a group that would be involved with the legal system and another group without legal representation. Such a study would be difficult to design and impossible to conduct. We did not systematically perform psychological or personality assessments to determine the potential contribution of conversion, somatization, factitious, or malingering disorders (23). Furthermore, our division of patients into the two groups according to the presence or absence of attorney representation may be viewed as arbitrary. We felt, however, that this was a reasonable method of testing the hypothesis whether involvement with the legal system affected the outcome of post-traumatic movement disorder.

The two groups of patients, those with and those without attorneys, were comparable except those with attorneys were younger

and were more likely to work prior to the initial injury. This is not surprising since young workers would be expected to be particularly affected by their post-traumatic movement disorder and would be more prone to seek legal assistance to obtain maximum medical compensation. In addition, the group with attorneys were seen by a physician following their initial injury sooner than the group without attorneys and were more likely to develop RSD. While only 2 of the 19 (10%) patients were satisfied with the legal system and 1 of 9 (11%) were satisfied with the outcome of their law suit, 10 of the 13 (77%) patients with disability insurance, workers compensation, or social security disability claims were satisfied with the service provided them by their attorneys.

Although 100% of patients represented by attorneys was working prior to the injury, only 37% were still working at the time of the study (Fig. 1). This is in contrast to the group without attorneys in which there was only a minimal reduction in the number of patients still working; from 52% to 43%. Furthermore, 11 of the 21 (52%) patients without attorneys considered their overall health to be excellent or good at the time of the survey, as compared to 4 of the 19 (21%) patients with attorneys. There were other indications that those patients who retained an attorney were more functionally affected by their movement disorders than those without attorneys. For example, 18 (95%) of patients with attorneys and

TABLE 4—Health survey.

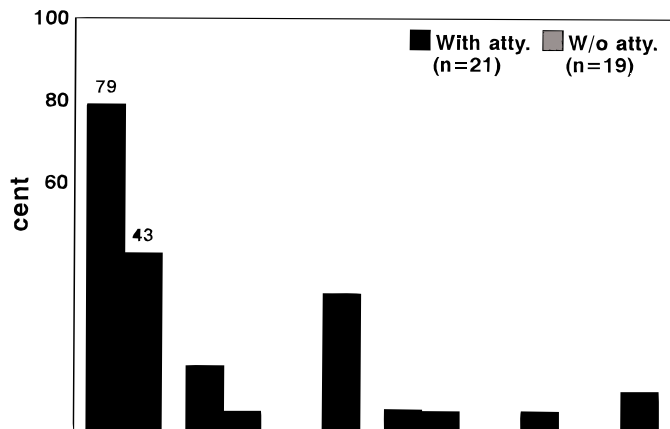
Fourty respondents	19 with attorneys	21 without attorneys
How would you describe your health at the present time?		
Excellent	1 (5.25%)	3 (14.25%)
Very Good	2 (10.50%)	4 (19.00%)
Good	7 (37.00%)	6 (28.50%)
Fair	5 (26.25%)	7 (33.50%)
Poor	4 (21.00%)	1 (4.75%)
Compared to 1 year ago, rate your health now?		
Much better now than 1 year ago	0	2 (9.50%)
Somewhat better now than 1 year ago	1 (5.25%)	2 (9.50%)
About the same as 1 year ago	13 (68.5%)	9 (43.00%)
Somewhat worse than 1 year ago	4 (21.00%)	6 (28.50%)
Much worse than 1 year ago	1 (5.25%)	2 (9.50%)
In the past 4 weeks, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbors or groups?		
Not at all	2 (10.50%)	4 (19%)
Slightly	3 (15.25%)	4 (19%)
Moderately	4 (21.00%)	8 (38%)
Quite a Bit	9 (48.00%)	4 (19%)
Extremely	1 (5.25%)	1 (5%)
In the past 4 weeks, how much bodily pain have you had?		
None	2 (10.50%)	5 (23.75%)
Very Mild	1 (5.25%)	5 (23.75%)
Moderate	8 (42.00%)	6 (28.75%)
Severe	6 (31.75%)	5 (23.75%)
Very Severe	2 (10.50%)	0
In the past 4 weeks, how much did pain interfere with work or other routine activities?		
Not at all	3 (15.25%)	5 (23.75%)
Slightly	1 (5.25%)	4 (19.00%)
Moderately	4 (21.00%)	6 (28.75%)
Quite a Bit	9 (48.00%)	5 (23.75%)
Extremely	2 (10.50%)	1 (4.75%)
In the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities (visiting family or friends)?		
None of the time	1 (5.25%)	5 (23.75%)
A Little of the Time	1 (5.25%)	3 (14.00%)
Some of the Time	8 (42.12%)	6 (28.75%)
Most of the Time	8 (42.12%)	6 (28.75%)
All of the Time	1 (5.26%)	1 (4.75%)
Overall Health Score?		
Excellent	2 (10.50%)	4 (19.00%)
Good	2 (10.50%)	7 (33.25%)
So-So	4 (21.00%)	6 (28.75%)
Fair	10 (52.75%)	3 (14.25%)
Poor	1 (5.25%)	1 (4.75%)

17 (81%) of those without attorneys had worsening or no improvement in their condition as compared to a year ago; and in the past month, 14 (74%) of patients with attorneys and 13 (62%) of those without attorneys stated that their physical health or emotional problems interfered with their normal social activities. Furthermore, more patients with attorneys than those without attorneys experienced bodily pain within the past 4 weeks (84% vs 62%), and the pain was described as moderately to extremely disabling more frequently in the former than in the latter group (79% vs 57%).

Although none of the 19 patients with attorneys believed that involvement with the legal system had any effect on their post-traumatic movement disorder, the findings from our study may be interpreted as evidence that involvement with the legal system is associated with persistent disability. It is possible, however, that other factors could account for the apparent difference in the outcome between the two groups. For example, the patients represented by attorneys may have had more severe disability that impacted more significantly on their current and future occupational status than those without attorneys.

A recent study (24) of malpractice suits to identify factors that predict payment to plaintiffs indicated that adverse events, whether due to medical negligence or not, were not predictive. The study found that the severity of the patient's disability was the sole predictive factor in the amount of payment to the plaintiff. In our study, we noted that the latency between the initial injury and the patient's first visit to a physician was significantly shorter in the 19 patients with attorneys (mean 0.32 days) as compared to the 21 patients without attorneys (mean 5.6 days). This suggests that the patients with attorneys had a more serious injury. Other possible indicators of severity of illness are the development of RSD and depression. Of those patients with attorneys 26% developed RSD and 63% developed depression; in contrast only 5% and 33% without attorneys developed RSD and depression, respectively. This raises the possibility that the patients in the group with attorneys had more severe injuries which caused more severe and more persistent movement disorders. There is, however, poor correlation between the severity of initial injury and the long-term prognosis (10). Controlled, prospective, longitudinal studies are needed to answer the question whether involvement with the

**Work Status Prior to Injury/Movement Disorder References**



1. Goetz CD, Pappert EJ. Trauma and movement disorders. *Neurol Clin* 1992;4:907-10.
2. Koller WC, Wong GF, Lang A. Post-traumatic movement disorders: a review. *Mov Disord* 1989;4:20-36.
3. Lee MS, Rinne JO, Ceballos-Baumann A, Thompson PD, Marsden CD. Dystonia after head trauma. *Neurology* 1994;44:1374-8.
4. Schott GD. Induction of involuntary movements by peripheral trauma. An analogy with causalgia. *Lancet* 1986;2:712-6.
5. Jankovic J, Van der Linden C. Dystonia and tremor induced by peripheral trauma: predisposing factors. *J Neurol Neurosurg Psychiatry* 1988;51:1512-9.
6. Fletcher NA, Harding AE, Marsden CD. The relationship between trauma and idiopathic torsion dystonia. *J Neurol Neurosurg Psychiatry* 1991;54:713-7.
7. Bhatia KP, Bhatt MH, Marsden CD. The causalgia-dystonia syndrome. *Brain* 1993;116:843-51.
8. Krauss JK, Mahadjer M, Braus DF, Wakhloo AK, Nobbe F, Munding F. Dystonia following head trauma: a report of nine patients and review of the literature. *Mov Disord* 1992;7:263-72.
9. Goldman A, Ahlskog JE. Post-traumatic cervical dystonia. *Mayo Clin Proc* 1993;68:443-8.
10. Jankovic J. Post-traumatic movement disorders: central and peripheral mechanisms. *Neurology* 1994;44:2006-14.
11. Cardoso F, Jankovic J. Peripherally induced tremor and parkinsonism. *Arch Neurol* 1995;52:263-70.
12. Evans RW. Some observations on whiplash injury. *Neurologic Clinics* 1992;10:975-97.
13. Hohl M. Soft tissue injuries of the neck in automobile accidents: Factors influencing prognosis. *J Bone Joint Surg* 1974;56A:1675-82.
14. MacNab I. Acceleration injuries of the cervical spine. *J Bone Joint Surg* 1964;46A:1797-1799.
15. Norris SH, Watts I. The prognosis of neck injuries resulting from rear end vehicle collision. *J Bone Joint Surg* 1983;65B:608-11.
16. Mendelson G. Not "cured by a verdict." Effect of legal settlement on compensation claimants. *Med J Aust* 1982;2:132-4.
17. Merskey H. Psychiatry and the cervical sprain syndrome. *Can Med Assoc J* 1984;130:1119-21.
18. Nygren A. Injuries to car occupants: Some aspects of the interior safety of cars. *Acta Otolaryngol (Stockholm)* 1984;395(suppl):1-164.