Original Article

The biopsychosocial model and spinal cord injury

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Objective: To highlight the importance of taking the psychological, social and biological aspects into consideration when dealing with somatic complaints of spinal cord injured patients.

Setting: Supra-regional Spinal Injury Unit in the UK.

Study design: Case study series.

Material and methods: The somatic complaints of four patients with spinal cord injury were assessed and their relationship to psychological and social issues were correlated. Two patients suffered unexplained pain, another excessive spasm uncontrolled with intrathecal Baclofen pump and the fourth with several pressure sores, constipation and other physical problems. The impact of psychosocial issues on the somatic complaints were analysed.

Results: In all four patients the resolution of their psychosocial issues resulted in significant gains *vis-à-vis* their somatic complaints.

Conclusion: Psychological and social issues of spinal injury patients could have a serious impact on the resolution of somatic complaints. It is important to take these into consideration in their treatment.

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Introduction

In 1977, Engel¹ proposed that the dominant medical model was no longer an adequate model for medicine. He said that it was inadequate to assume that disease could be 'fully accounted for by deviations from the norm of measurable biological (somatic) variables'. Concentration on the biomedical problems, to the exclusion of the psychosocial, distorts perspectives and even interferes with patient care. He postulated that a model was needed which took into account 'social, psychological and behavioural dimensions of illness' – the Biopsychosocial model.

Since Engel wrote this paper, numerous authors have used the Biopsychosocial model to illuminate the impact of various disease processes upon individuals, and the consequent implications for treatment.^{2–5} However, within the area of spinal cord injury, and its attendant complications like spasticity, sphincteric incontinence and pressure sores, the dominant model is still biomedical. This largely ignores the social, psychological and behavioural dimensions which are so important. The literature is full of articles dedicated to the medical management of these

physical conditions.^{6–15} Rarely, if ever, are the social and psychological factors, and their importance in treatment explored. Contemporary medical practice similarly reflects this emphasis on the biomedical model.

Literature search indicates one exception to this model of management – in the area of pain management. In 1992, Manano¹⁶ suggested the importance of the biopsychosocial model in the management of pain in spinal cord injury. He postulated that this model should guide all interventions within this area. Since then, various authors have outlined the relationship between psychosocial variables and pain, and the role they play in attempts to manage it (eg^{17–23}). However, despite this awareness within the literature, the medical management of pain is still very much dominated by the biomedical model and evidence from published literature does not appear to have been translated to clinical practice. Therefore, patients with spinal cord injury who experience chronic pain often get treated pharmacologically, with little attention paid to the psychosocial components.

Perhaps one reason for this is that much of the literature outlined above is quantitative in nature and relies heavily upon the use of questionnaires

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and statistical analysis to explore this relationship. Such approaches are likely to provide insufficient clinical detail with which to help clinicians identify the general social and psychological factors that play a part in the individual's pain experience. Although it is acknowledged that individuals will vary considerably in the specifics of the factors underlying their pain perception and management, nevertheless clinicians do need more information than such studies provide. Equally, clinicians need to have some awareness of how these factors can be addressed once they have been identified, in order to develop alternative approaches to pain management.

A qualitative exploration of the nature of these factors therefore becomes essential. There is a need to expand this exploration beyond the issues of pain and its management. This paper is an attempt to illustrate, through the use of case studies, the value of the biopsychosocial model and the need to consider both the psychological and social factors within the treatment of physical problems such as pressure sores, spasticity and not merely pain.

Case 1

Mr J is a 36-year-old man who suffered a spinal cord injury in a road traffic accident when he was aged 18 as a result of a fracture subluxation of T12/L1 vertebra. He was the driver of a motorcycle that was involved in a collision resulting in an incomplete paraplegia below L1. At the time of his initial discharge he was able to walk using bilateral ankle/foot orthosis and a pair of crutches. Following the injury he returned to continue his studies at the university. He subsequently married a fellow student who became pregnant with their first child before he completed his university course. Mr J took on the role of a provider for his wife, financially and emotionally supporting his wife. He returned to full time employment and has continued to do so to this day.

Nine years following the injury he was involved in a second motor vehicle accident. By this time his wife had a second child and his family were facing financial constraints. His wife had elected to return to university so that she could complete her training and obtain a job in order to augment the family's income. Prior to the second road traffic accident Mr J had noted pain in his lower limbs below his knees but following this accident however the pain became worse. He developed 'a constant burning pain in his legs and an episodic severe vice-like pain in his legs, which occurred infrequently, usually every 3–4 weeks'. He reported that whilst he was able to cope with the burning pain, the 'vice-like pain' was too severe to cope. Following referrals to various pain clinics he was commenced on Morphine Sulphate, which was progressively increased to 60 mg. The medication did not alter his perception of pain.

Eighteen years following the onset of his spinal cord injury he sought help from the clinical psychologist attached to the Spinal Injuries Unit because of increasing difficulty in coping with his pain and a suicidal ideation. The clinical psychologist saw Mr J for an assessment and based upon the information gained during this process, developed a working hypothesis which then guided intervention.

Working hypothesis

From the information gleaned at assessment it was clear that Mr J's 'episodic pain' had a definite psychological component. It was evident that Mr J had never really adjusted to his physical disability and struggled to maintain his psychological well being. He had previously decided that he would only live for the same number of years as a disabled person as he had been an able-bodied person. He therefore felt helpless and frequently felt suicidal. This created a substantial strain within his marital relationship.

In addition his wife had now become financially independent and his children are well supported financially from the joint income. Mr J believed that the need for his wife's return to work arose as a result of his inability to earn adequate income for the family. This reinforced his feelings of inadequacy. He began to interpret his partner's professional aspirations as a reflection of his inability to provide for the family. Psychometric assessments indicated that Mr J generally struggled to feel in control of his life, and of his pain in particular and that he had a overwhelming feeling that it was unmanageable. This seemed to cause additional friction in their marriage. His wife felt that he did not try hard enough and he felt that she was not supportive enough. Finally Mr J worked extremely long hours and found it hard to allow himself the time to manage his pain. His belief was that to give in to the pain would have a detrimental effect on his work and so he worked harder to compensate. This merely created more tension and stress and further exacerbated his pain which contributed to his feeling that he had no control over his pain.

Intervention

In an attempt to address these issues, a multi-disciplinary approach was adopted involving not only psychology but also physiotherapy and pharmacology. In terms of the psychological intervention, alternative pain control strategies such as hypnosis, pacing, and stress management techniques were explored with Mr J. In addition to this individual work, work with Mr J and his wife was also undertaken, to explore his belief about his disability and to help them manage his suicidal ideation. The psychologist also explored the stresses within their relationship. A phased reduction of medication was advised.

Outcome

As a result of this intervention Mr J was able to reduce his medication quite substantially. Three months after the commencement of intervention he was asymptomatic and had returned to full time employment. One year after his last multidisciplinary meeting, he remained without clinically relevant pain. The family unit has survived the crisis of imminent divorce.

Case 2

Mr P, a 33 year old single man suffered a T6 complete paraplegia following an industrial accident at a construction site. He underwent his initial period of rehabilitation at the Spinal Injuries Unit. During his acute admission it was noted that his partner was a woman aged approximately 65 years. He was particularly conscious of the fact that his partner was older than his mother and hoped that she would provide the necessary support when he returned home following rehabilitation. However the relationship ended shortly after the onset of the paralysis. He became an angry and unhappy man who developed quite uncontrollable spasticity in his lower extremities. In spite of his youth and good upper extremity musculature, his spasticity precluded achieving satisfactory independence from a wheelchair. Various oral anti-spasmodics failed to control his spasticity. He was eventually discharged to a first floor flat that was located above a busy and noisy Public House. Even though the flat was adapted for the use of a wheelchair dependent individual his mother took on the role of cooking his meals and tidying his property. He rarely went away from this property because of severe spasticity.

One year after the onset of the paralysis, because of the severity of the spasticity and the resultant subluxation of one of his hip joints, an intrathecal drug delivery system was implanted. Although, this initially achieved satisfactory control of his spasm with 200 micrograms of Baclofen per day he rapidly developed 'tolerance'. The intrathecal Baclofen dose had to be gradually increased to over 1500 μg per day. In spite of this the spasticity remained uncontrolled. By this time he had also begun to report severe pain and violent headaches. The clinicians eventually persuaded Mr P to seek the advice and support from the clinical psychologist. As with Mr J, the clinical psychologist saw Mr P for an assessment and based upon the information gained during this process, developed a working hypothesis, which then guided intervention.

Working hypothesis

During the course of assessment, the Clinical Psychologist found that Mr P had a past history of underachievement at school combined with hyperactive behaviour. He described himself as a 'mad worker'. In employment he tended to work very hard and long hours. He admitted to having a volatile temperament

and generally coped with interpersonal problems with violence. He was encouraged to keep a diary of his spasticity. As a result of this it became apparent that his spasticity increased and went 'out of control' whenever his levels of anxiety increased or when he became angry and upset. He particularly noted that the level of noise from the Public House tended to increase his spasticity.

Prior to the injury, he coped with stressful situations by behaving violently. Since he could not employ these pre-injury responses to situations that upset him he ended up raising his levels of anxiety and as a consequence his spasticity. This insight made him realise that his spasticity was not, after all entirely out of his control.

Intervention

In response to this working hypothesis, the clinical psychologist saw Mr P regularly for several weeks. Using a primarily cognitive behavioural approach, this work was aimed at shifting Mr P from an external locus of control (as in his dependence on the high dose of Baclofen) to an internal locus of control, in order to enable him to feel more in control of his spasticity.

Outcome

In doing the above, Mr P learnt to take control of times of high anxiety in his life, thus reducing his spasticity and resulting in a reduction in the dose of intrathecal medication. He currently uses less than 600 μg of intrathecal Baclofen with satisfactory control of spasticity and better social interaction. He is able to leave his home and visit his parents and friends in his own car, which he felt unable to do before the psychological interventions were instituted. His visits to the spinal injuries centre with repeated requests to increase the dose of intrathecal Baclofen dramatically reduced.

Case 3

Mr G, a 69 year old man suffered paraparesis at the age of 39 as a consequence of an inter-vertebral disc protrusion. Mr G did not receive any structured rehabilitative input from a Spinal Injuries Unit until 12 years after the onset of his paralysis when he presented with multiple pressure sores and urinary tract complications. At that time it was noted that he had extensive dysaesthetic pain in his buttocks, sacral area and the back of his thigh. These were described as spasmodic in nature. Following treatment of pressure sores he attended the outpatient department infrequently. He constructed parallel bars at home and learned to walk in the parallel bars at home. This unsupervised walking resulted in two pathological fractures to his lower extremity which required initially and external fixation and subsequently internal stabilization. On each of these admissions to the local

hospital he described worsening of pain. He was prescribed increasingly large doses of anxiolytics and analgesics including Opioids. In April 1996 he was transferred to the Spinal Injuries Unit at the request of a consultant in pain management. His medication on admission to the Spinal Injuries Unit included twice the pharmacological maximum dose of Temgesic (Buprenorphine), Morphine, Lofepramine and Paracetamol.

The multidisciplinary team consisting of a clinical psychologist, occupational therapist, physiotherapist and pharmacist assessed him in a multidisciplinary meeting.

Working hypothesis

Psychological assessment revealed several factors influencing his ability to cope with his pain. First, discussions with his family revealed that he had never accepted and adjusted to his disability and that he coped by staying indoors and avoided going out. His children who were aged 1 and 3 years old at the time when he initially developed paraplegia had never seen their father at their schools or colleges. They reported that they had never seen their father smile. They also reported that they had seldom known their mother to leave their father for longer than 1–2 h.

His inability to walk, together with subsequent fractures to the extremities reinforced his perception of pain in his lower extremities. He responded to the pain by increasing the doses of his analgesics. This in turn compromised his social functioning and his ability to carry out normal day to day activities. Such limitations on his personal care further challenged his self-esteem and confidence. His impoverished self-esteem and confidence made him feel increasingly unable to manage his pain. He continued to hope that with the right combination of medication his pain would cease so that he could reintegrate himself with his family.

His perceived and real disability, not unrelated to his perception of pain caused substantial distress within his family but they compensated by offering him a higher level of support and care. Unwittingly this only served to increase his dependence on others and a lack of control over his own environment. In fact such increasing levels of care further facilitated his emotional withdrawal from the family.

Psychological intervention was aimed at improving his self-esteem and sense of efficacy, developing more effective coping strategies and addressing his adjustment difficulties thereby reducing his medication. This was achieved both through psychological therapy and through involvement of physiotherapy and occupational therapy to develop his independence skills, which could help him feel more in control of his environment. The occupational therapists frequently engaged him in physical activities such as woodwork etc. He also received physical therapy to enable him to transfer from his wheel chair to bed – an act that

he and his wife had previously assumed that he was incapable of. Mr G remained as an inpatient in the hospital.

Outcome

Over a period of 7 weeks there was a substantial reduction in his analgesic medication and a significant improvement in his self-help skills. However his wife found his new independence threatening to her role as a carer and she needed considerable psychological support as well in order to allow this improvement to continue. Towards the end of his hospital stay there was significant improvement in his coping strategies. His medication had been reduced substantially. For the first time in 25 years, he was able to spend a day out with his family.

Unfortunately it was difficult to maintain this improvement post discharge. His wife found it extremely difficult to give up her caring role and he found it difficult to maintain his newly learned coping strategies and remain independent. Again his pain was perceived to increase, his activities reduced and his intake of analgesic medication increased. Unfortunately Mr G died a year later of an unrelated cardiac condition. His children returned to the Spinal Injuries Unit following his death to donate a substantial amount of money to the unit and acknowledge their extreme gratitude for the brief spell when their father was happy.

Case 4

A woman now aged 34 suffered a D4 complete paraplegia in a motorcycle accident when she was aged 17. Four years after her injury she developed quite significant spasticity, which precluded erect ambulation using appropriate reciprocating gait orthosis. The spasm could not be contained with large doses of multiple anti-spasmodics. As a result she was treated successfully with an intrathecal drug delivery system using Baclofen. A year later she gave up walking using the reciprocating gait orthosis, now reporting chronic constipation. She reported that it took between 4–6 h to evacuate her bowels every day and that she spent a significant part of her life at home because of 'constipation'. Further protracted evaluation of her bowel motility followed and eventually a sacral anterior root stimulator was implanted to improve her bowel function. Although this produced a demonstrable increase in her bowel motility her bowel evacuation was still 'far from satisfactory'. During the subsequent 4 years she developed five separate episodes of major pressure sores in the weight bearing part of her perineum, usually over the ischia. Each time she required hospitalization and surgical closure. During the last 4 years she has been admitted several times complaining of pain around the perineum, over the pressure sores and a subjective increase in spasticity.

Working hypothesis and intervention

Miss C was assessed by a clinical psychologist who confirmed that she had a tendency to confabulate a variety of symptoms. After several long discussions she was encouraged to keep a diary of life events that preceded any physical symptoms. Initially the diary contained many suicidal thoughts. However during subsequent months the diary not only contained anxious thoughts and concerns but she was able to work towards their resolution. Psychological therapy revealed significant family and relationship difficulties that also appeared to contribute to her physical difficulties.

Outcome

She remained in our review by the psychologist for the subsequent 3 years during which period she developed no pressure sores, no bladder or bowel problems or pain due to spasticity. She had also entered into a meaningful relationship with a female partner.

Discussion

Barsky *et al*²⁴ discussed symptom amplification due to psychological factors. They identified four factors; a belief that one has a serious illness, an expectation of deterioration of the condition, underlying litigation/compensation and portrayal of the condition by the caregivers as catastrophic. The existence of functional somatic syndromes is well known but rarely appreciated in a clinical setting.

Spinal cord injury is a life-changing event. Most patients affected with this experience suffer complications on account of their sensory-motor paralysis. The traditional biomedical approach often treats these symptoms or complications in isolation. However it is clear that many of these are modulated by psychological or social pressures. It is therefore necessary to take these aspects into consideration in the treatment of relatively straightforward complications like pain, spasticity, constipation or pressure sores. All of the people described above had obvious physical complications arising from their spinal injury. In all cases their initial treatment was aimed at managing and treating the physical complaint, with little attention to the psychological or social issues. Treatment was very much guided by the biomedical model, but with little long-term effect. As a result we questioned the validity of treating these complications with a purely biologically based approach. Psychological evaluation revealed the complex interactions of physical and psychosocial issues. Once these needs were addressed and dealt with through therapeutic strategies, there was substantial improvement in their physical problems. This in turn translated into less dependence on drugs and better inter-personal relationships.

Two patients in our study suffered exacerbation of pain several years after they completed their initial

rehabilitation. In their review article Siddall and Loeser²¹ acknowledge that any pain syndrome can be modified by cognitive and affective factors as well as environmental influences acting on the patient. By empowering the patient to cope with their perceived pain in an environment where the patients felt supported, both our patients managed to return home with significant reduction of their symptoms. Other authors^{22,23} have suggested that quality of life and well being is dependent on many factors including psychosocial issues. The role of biopsychosocial model was addressed by Ferrari²⁵ and Vendrig²⁶ in patients who had chronic whiplash syndrome.

In this small series two patients exhibited several unusual behavioural features during their acute rehabilitation. The only woman in our study narrated several confabulated stories including her assertion of hanging a child and causing the death of the child. 'The mad worker' in case 2 had several verbal arguments with the therapy and nursing team during his acute rehabilitation in the spinal injuries unit, apparently for no specific reason. The authors retrospectively wondered whether it is possible to anticipate patients who are likely to suffer psychosocial maladjustment in the future; by appropriate evaluation during their acute rehabilitation.

We therefore, propose that persisting physical symptoms presenting to the clinician in a spinal injury population merit a thorough evaluation of their psychosocial components. This is likely to be more rewarding in terms of resolution of their physical symptoms and restoration of psychosocial well being.

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