Suicide in patients with motor neuron disease¹

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The aim of the present study was to assess, through an epidemiological study, whether suicide risk is increased in patients with motor neuron disease (MND). The study involved 116 patients with MND. In the study period 92 patients died, 47 males and 45 females. No patients committed suicide. The number of expected suicides was 0.27 for males and 0.12 for females, a total of 0.38. The difference between observed and expected suicides was not statistically significant for males and females.

Keywords: Motor neuron disease – Prognosis – Suicide

INTRODUCTION

Motor neuron disease (MND) is a progressive degenerative disease of the motor neuron system in adults. The major symptoms are muscle weakness, dysarthria, dysphagia, muscle wasting and fasciculations. Respiratory muscles are usually affected late in the disease. Depending on clinical signs three subtypes are recognized: amyotrophic lateral sclerosis (ALS), progressive bulbar palsy (PBP) and progressive muscular atrophy (PMA; Rowland, 1980; Tandan and Bradley, 1985; Li *et al.*, 1990).

Previous Danish population surveys have shown average annual incidence rates of 0.8–1.4/100 000/year and prevalence rates of 2.5–3.1/100 000 (Kristensen and Melgaard, 1977; Højer-Pedersen *et al.*, 1989). This is in accordance with results from other countries (Tandan and Bradley, 1985; Tysnes *et al.*, 1991; Swash and Schwartz, 1992). The mean age of onset is approximately 60 years of age (Kristensen and Melgaard, 1977; Rowland, 1980; Christensen *et al.*, 1990). Men are affected more frequently than females with a male:female ratio of 1.2:1 to 1.9:1 (Kristensen and Melgaard, 1977; Højer-Pedersen *et al.*, 1989; Li *et al.*, 1990; Tysnes *et al.*, 1991; The Scottish Motor Neuron Disease Research Group, 1992). Old age or early bulbar symptoms indicate poor prognosis and the overall median survival time is 23 months from

onset (Christensen *et al.*, 1990). The most common cause of death is probably ventilatory failure (Rowland, 1980; Leone *et al.*, 1987; Christensen *et al.*, 1990).

The risk of suicide in patients with neurological diseases has been assessed in several investigations (Stenager and Stenager, 1992). Generally somatic diseases and depression constitute the greatest risk factors for suicide (Nielsen *et al.*, 1990). The lifetime risk of suicide in persons who have suffered from depression is 15% (Sainsbury, 1986).

Among patients with multiple sclerosis (MS) depression and suicide are more frequent compared with the background population. During the course of the disease 40–50% of MS patients experience depression (E. Stenager *et al.*, 1991; Stenager *et al.*, 1992) and the cumulative lifetime risk of committing suicide is 1.95% (Stenager *et al.*, 1992). Suicide is also a frequent cause of death in patients with spinal cord injury, particularly in young patients and patients with paraplegia (DeVivo *et al.*, 1991; Carlifue and Gerhart, 1991). Increased suicide risk is described in patients with epilepsy (White *et al.*, 1979; Barraclough, 1987) and Huntington's disease (Schoenfeld *et al.*, 1984) but these investigations are encumbered with methodological problems (Stenager and Stenager, 1992). Cancer patients are also at increased risk of suicide, particularly patients with depression (Louhivuori and Hakama, 1979; Stensman and Sundqvist-Stensman, 1988; E.N. Stenager *et al.*, 1991).

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The course of MND is often characterized by rapid deterioration and severe disablement. Sense of hopelessness, depression and increased risk of suicide could be a comprehensible reaction to this serious disease. However, no studies concerning the suicide risk in MND exist. The aim of the present study was to assess, through an epidemiologic study, whether patients with MND are at an increased suicide risk.

METHODS

The study involved all patients with MND who were treated in the Neurological Department at Odense University Hospital in the period 1 April 1973 to 31 October 1991. The diagnosis of MND is assigned to patients with progressive muscular weakness, progressive muscular atrophy and muscle fasciculations in the spinal area (PMA) or bulbar area (PBP) and additional presence of pyramidal tract involvement (ALS). Finally, absence of sensory involvement and sphincter abnormalities is required. The classic electrophysiological diagnostic criterion is evidence of active denervation, normal sensory nerve conduction studies, normal motor conduction studies (unless compound muscle action potential amplitudes are very reduced) and evidence of reinnervation (Behnia and Kelly, 1991). Usually examination of three limbs or two limbs and bulbar muscles are required. We accepted examination of fewer muscles if quantitative examination was carried out. In 96 patients (83%) electrophysiological examination was performed. Twenty-three patients fulfilled the classic electrodiagnostic criteria. Electrophysiological findings compatible with MND were found in 54 patients but they failed to fulfill the classic criteria mainly because the examination was incomplete. Ten patients had electrophysiological findings compatible with other neurologic diseases, most commonly polyneuropathy. In nine cases the electrophysiological examination was normal. The final diagnosis was based on a combination of clinical and electrophysiological signs. Patients with normal electrophysiological findings or signs suggestive of other diseases were included if the clinical course was compatible with MND.

The majority of MND patients in Funen County are admitted to the Neurological Department at Odense University Hospital first of all to establish the diagnosis. Funen County, which is representative of Denmark, has a population of 435 000. Probably 3-11% of Danish patients with MND, mainly old patients with bulbar symptoms, are diagnosed and treated at local hospitals (Kristensen and Melgaard, 1977; Christensen *et al.*, 1990).

Since 1952 all deaths in Denmark are registered at

a central registry and the cause of death recorded. All deaths not due to natural causes (i.e. accidents, crimes, suicide) are reported to the police and the County Medical Officer and following their examination, the cause of death is registered. A previous study has assessed a high reliability of Danish suicide statistics (Kolmos and Bach, 1987).

To assess the suicide risk in MND, the standard mortality ratio for suicide (the ratio of observed to expected numbers of suicide) was calculated with regard to age and sex. The ratio was adjusted to the patient series for the calendar year at the start of observation, i.e. point of diagnosis. The two-sided exact test was calculated for statistically significant differences using Poisson distribution probabilities. The 5% level was considered significant.

The study was approved by the local ethical committee for the counties of Funen and Vejle.

RESULTS

In the investigation period 116 patients with MND were treated in the Neurological Department at Odense University Hospital. During this period 92 patients died, 47 males and 45 females. None of the patients committed suicide. The number of expected suicides was 0.27 for males and 0.12 for females, a total of 0.38. The difference between observed and expected suicides was not statistically significant.

DISCUSSION

The study is based on a selected hospital sample which has the advantage that the diagnoses were reached by a neurologist and usually confirmed by electrophysiological examination. Because of the severity of the symptoms, practically all patients were referred to a neurologist, generally at the Neurological Department of Odense University Hospital, but some patients may have been treated at private neurological clinics or in local hospitals with a consultant neurologist.

Our study shows a similar suicide risk for patients with MND to that in the background population. Part of the explanation may be that depression is relatively infrequent in MND ranging from a few per cent (Peters *et al.*, 1978; Schiffer and Babigian, 1984; Newrick and Langton-Hewes, 1984; David and Gillham, 1986) to 22% of the patients (Haupt and Gould, 1977; Gould, 1980). This is in contrast to the occurrence of depression in multiple sclerosis (E. Stenager *et al.*, 1991; Stenager *et al.*, 1992), spinal cord injury (DeVivo *et al.*, 1991; Carlifue and Gerhart, 1991) and cancer (Breitbart, 1990; E.N. Stenager

et al., 1991). Pain is often a prominent feature in cancer. Cancer patients with pain are particularly exposed to depression and therefore at increased risk of suicide (Breitbart, 1990).

The major symptoms in MND are limb weakness, dysphagia and dysarthria. Some patients experience cramps and diffuse pain in the neck, back and limbs but severe pain is uncommon (Rowland, 1980; Newrick and Langton-Hewer, 1984). This may partly explain the rare occurrence of depression and suicide in MND patients.

The patient's knowledge and ideas of the disease influence the psychological reaction to the diagnosis. In the general public cancer is usually regarded as a terminal illness and is often associated with intense pain and suffering (Breitbart, 1990). This point of view can lead the cancer patient towards hopelessness, depression and perhaps suicide. In the same way patients with Huntington's disease are well aware of the prognosis of the disease and may also be at higher risk of suicide (Schoenfeld *et al.*, 1984; Stenager and Stenager, 1992). MND is a disease which is unknown to the general public. Usually the newly diagnosed MND patient is ignorant of the prognosis of the disease which may give rise to hope of treatment and cure (Gould, 1980).

Finally, cognitive dysfunction seems to be present in MND, although it is often slight. Frontal lobe dysfunction as well as global cognitive impairment has been described (Gallassi *et al.*, 1985; David and Gillham, 1986; Poloni *et al.*, 1986; Iwasaki *et al.*, 1990; Ludolph *et al.*, 1992) and may affect emotional reactions to the disease, towards less dysphoria and depression (David and Gillham, 1986). Whether patients with frontal lobe dysfunction are less likely to commit suicide is however not yet clarified.

In conclusion, suicide is rare in MND and we suggest that rare occurrence of depression, absence of severe pain, poor knowledge of the prognosis, and cognitive dysfunction lessen the risk of suicide in MND.

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