The Turkish Journal of Pediatrics 35: 171-175, 1993

ETIOLOGICAL AND FUNCTIONAL EVALUATION OF THE PEDIATRIC POPULATION WITH SPINAL CORD INJURIES*

*Fitnat Dinçer MD***, Reyhan Çeliker MD***, Seyhan Özker MD***
*Osman Başgöze MD**, Rıdvan Özker MD***

SUMMARY: Dinçer F, Çeliker R, Sözay S, Başgöze O, Özker R. (Department of Physical Medicine and Rehabilitation, Hacettepe University Faculty of Medicine, Ankara, Turkey). Etiological and functional evaluation of the pediatric population with spinal cord injuries. Turk J Pediatr 35: 171-175, 1993.

Spinal cord lesions are the result of many etiological factors and are associated with motor, sensorial and autonomic dysfunctions. The subjects evaluated were a total of 217 paraplegics and quadriplegics who had been enrolled in a rehabilitation program during the last five years conducted by the Department of Physical Medicine and Rehabilitation of the Hacettepe University Faculty of Medicine. Forty-three of these patients were in the pediatric age group. In this clinical trial, the patients with spinal cord injuries were examined according to their age, sex, etiological factors and functional status. Frankel's scale was used for functional assessment. The mean age of patients was 9.19 ± 4.19 years and varied between 1-16 years.

The results of our classification according to etiological factors were as follows: Nineteen patients with tumors (44.1%), nine patients with infections (20.93%), five patients with congenital abnormalities (11.63%), five patients with vascular lesions (11.63%), four patients with trauma (9.30%), and one patient with a degenerative central nervous system disorder (2.32%). The effect of the rehabilitation program on the functional status of the patients is discussed. *Key words: spinal cord injury, childhood, rehabilitation.*

Various etiological factors are involved in the development of spinal cord lesions which are associated with motor, sensorial and autonomic dysfunctions. Optimal management of spinal cord injured patients requires a multidisciplinary team. Physicians involved in the care of these patients deal not only with the physical disability, but also with socioeconomic and psychologic aspects of the problem[1]. Secondary complications such as diminished pulmonary function, immobility, osteoporosis and urinary and bowel dysfunction are common[2]. Trauma is now one of the most frequent causes of spinal cord injury, but tumour, infection, disc herniation, spinal stenosis, congenital abnormalities such as meningomyelocele, spina bifida, diastematomyelia and vascular lesions may also be an etiological factor. These factor not only effect adult patients but also patients in the pediatric age group[1-6].

* From the Departments of Physical Medicine and Rehabilitation, Hacettepe University Faculty of Medicine, Ankara.

** Professor of Physical Medicine and Rehabilitation, Hacettepe University Faculty of Medicine.

*** Resident in Physical Medicine and Rehabilitation, Hacettepe University Faculty of Medicine.

Rehabilitation together with medical and surgical treatment, has afforded the spinal cord injured patient the chance for a longer and better life. The most important therapeutic tool in rehabilitation is exercise. It plays a role in preventing complications, maintaining health and improving function. It is maximally effective when done at the right time, in the proper form and sufficiently[1,4]. The management of the disabled child is based on two fundamental factors: (1) the nature of the child's specific physical and functional impairment, (2) knowledge of normal development[3].

The aim of this study is to determine the distribution of paraplegic and quadriplegic patients in the pediatric age group according to age, sex and etiological factors and to evaluate the functional status before and after completion of the rehabilitation program by using Frankel's scale.

Material and Methods

In this retrospective study, patients referred to the Department of Physical Medicine and Rehabilitation of the Hacettepe University Faculty of Medicine between 1985-1990 were investigated. A total of 217 patients were admitted to the rehabilitation program during this period and 43 of them were in the pediatric age group. Of these 43 patients, there were 41 (48.8%) females and 22 (51.2%) males. The ages ranged between one and 16 years, with a mean age of 9.19 ± 4.19 years. The patients were evaluated according to age, sex, etiology, lesion location and functional status. Frankel's scale was used to determine the functional status of the patients before and after completion of the rehabilitation program[1,7,8]. According to this scale Grade A consists of injuries in which no motor or sensory function is present below the level of the lesion. Grade B consists of injuries in which there is complete motor paralysis below the level of the lesion with some preservation of sensory function including sacral sparing. Grade C consists of injuries in which there is some motor power present below the level of the lesion, but of no practical use. Grade D consists of injuries in which there is useful motor power below the level of the lesion allowing the patient to move the lower limbs and walk with or without aid. Grade E consists of injuries in which there are no neurological symptoms such as weakness, sensory loss or sphincter disturbance. This classification system is based on the presence of sensation or motor function below the level of the lesion.

Results

The distribution of patients according to age and sex is presented in Fig. 1. The breakdown of spinal cord injuries according to etiology shows that 19 patients (44.29%) had tumors, nine (20.93%) had infections, five (11.63%) had vascular lesions, five (11.63%) had congenital abnormalities (three cases meningomyelo-

cele and two cases with syringomyelia), four (9.30%) had traumas, and one (2.32%) had a degenerative central nervous system disorder.

Evaluation according to clinical status shows that 24 patients (55.82%) had incomplete paraplegia, nine (20.93%) had complete paraplegia, nine (20.93%) had incomplete quadriplegia and one (2.32%) had complete quadriplegia. Lesions were at the thoracal level in 55.93 percent of the patients.

The functional status of the patients was evaluated using Frankel's scale before and after entry into the rehabilitation program. Before treatment ten of the patient (23.25%) were classed in Grade A, five (11.3%) in Grade B, 23 (53.49%) in Grade C and five (11.63%) in Grade D. After completion of the rehabilitation program, neurological improvement of at least one degree according to Frankel's scale was noted in 40 percent of Grade A patients, in 80 percent of Grade B patients and in, 82.6 percent of Grade C patients (Table I).

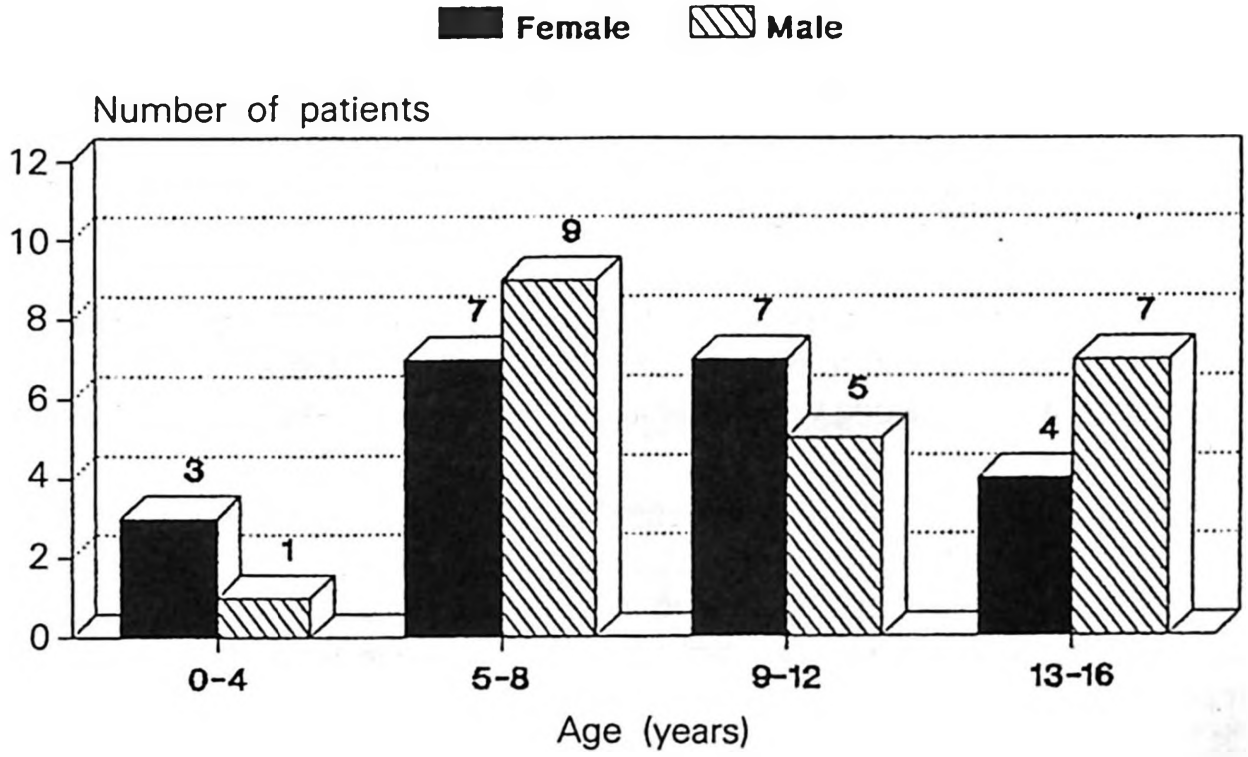

Fig. 1: Distribution of patients according to age and sex.

Table I: Functional Status of Patients Before and After Completion of the Rehabilitation Program According to Frankel's Scale

After	A	B	Before	C	D	Total	Improvement	%
A	6	–		3	1	10	4	40
B	–	1		1	3	5	4	80
C	–	–		4	19	23	19	82.6
D	–	–		–	5	5	–	–

Discussion

Despite significant advances in medical technology, traumatic spinal cord injuries continue to be incurable, costly and catastrophic. The treatment of choice, therefore, is the proverbial "ounce of prevention". Teenagers, therefore, are an ideal target population for a spinal cord injury prevention program since they can be reached through the school system[9]. Spinal cord injury is one of the leading causes of disability in children and young adults[10].

In our study we observed that female and male children are equally exposed to spinal cord injury (Fig. 1). In the pediatric population, the 5-8-year-old age group is at high risk of spinal cord injury (16 patients), followed by the 9-12-year old age group (12 patients) and the 13-16-year-old age group (11 patients). Reports in the literature indicate that trauma is the most frequent cause of paraplegia and quadriplegia[1,8,10-12].

However, in our clinical trial we found tumors to be the most frequent cause. The Hacettepe University Hospital is a referral center for many complicated cases. The second most frequent cause of spinal cord injury in our patient series was infection. Spinal cord infections are generally secondary to trauma and pulmonary and urinary tract infections. These primary causes mostly occur in the first and second decades[5].

Since the thoracal region is the longest segment of the spinal cord, there are a great many locations where lesions can occur, and therefore, this region has attracted our attention along with other investigators. Our results parallel those in the literature[13,14].

Rehabilitation of a patient is a function of the following: age, quadriplegia, complete lesions, immobilization and such complications as pulmonary embolism, deep vein thrombosis, spasticity and decubitus ulcers[8,15,16]. Paraplegic and quadriplegic patients classed as Frankel's Grade A are in the high risk group for complications[16].

According to Frankel's scale, neurological improvement was more significant in Grade C patients following completion of the rehabilitation program. Eighty-two percent of Grade C patients were classed as Grade D after completion of rehabilitation. Forty percent neurological improvement was noted in Grade A patients and 80 percent in Grade B patients. The five patients in Grade D remained in the same category after treatment. Since Grade D includes a wide variety of neurological signs, it is not always possible for a patient to proceed to Grade E a category where there is no motor or sensory dysfunction. Most patients in Grade D are discharged when they gain adequate function even though they might not have proceeded to Grade E. The improvement rate was lower in Grade A patients when compared with those in Grades B and C, which

may be because complete lesions and complications are more frequent in Group A.

Spinal cord injuries account for more deaths and disabilities in the 1 to 44-year-old age group than all communicable diseases and other conditions. We must stress that rehabilitation for paraplegic and quadriplegic patients is one of the most important subjects for physicians of Physical Medicine and Rehabilitation.

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