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The effects of Kinesio taping on sitting posture and functional independence in children with myelomeningocele: report of four cases

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Summary

Myelomeningocele is a defect of neural arch which causes body structure and function disorders, participation restrictions and activity limitation in children. Protecting body structure and functions and gaining functional independence are the most important goals in rehabilitation of children with myelomeningocele. In this study, we analysed the effects of Kinesio taping on sitting posture and functional independence in 4 cases with a diagnosis of myelomeningocele. *(Turk Arch Ped 2011; 46: 170-3)*

Key words: Myelomeningocele, Kinesio tape, sitting assessment, sitting posture

Introduction

Myelomeningocele (MM) is a defect of neural arch which causes body structure and function disorders, participation restrictions and activity limitation in children (1,2). In addition to spinal involvement muscle weakness and sensory loss in the lower extremities, upper extremity dysfunction, bladder and intestinal incontinence, hyrocephalus leading to cognitive dysfunction and Arnold Chiari II malformation may affect many patients (3,4). In myelomeningocele, not only spinal involvement, but also central nervous system involvement characterized by neurologic defects is significant (5, 6). Multi-center approaches are needed for physical and physiologic problems occuring during childhood and adolescence in patients with myelomeningocele.

Physiotherapic approaches are widely applied in myelomeningocele and rehabilitation approaches aim to increase muscle power and tonus and protect growth and function of the child by preventing contractures (6,7). To develop sitting and walking functions in children with myelomeningocele different approaches may be applied in addition to physiotherapy exercises (various sitting apparatus, surgical methods, electro-mechanical devices etc.) (8,9). In this study, the effect of Kinesio Taping (KT) method which was described in 1996 by Dr. Kenzo Kase and which can be used to strengthen weak muscles, control joint “instability”, increase sensory stimulation, increase functional motor skills, help with postural straightness and support functionality in pediatric rehabilitation clinics in addition to physiotherapy programs on sitting posture and functional independence in four cases were analysed (10, 11). Dr. Kenzo reported that using KT method in addition to exercise could lead to better outcomes (10, 11). Similarly, KT method was used in children who received a regular physiotherapy and rehabilitation program in this study.

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Case reports

Four cases diagnosed with myelomeningocele were included in the study. At the beginning of the study, both the children and the families were informed about the study and informed consent was received from them for the study. Only children of the families who volunteered to participate in the study were included. Inclusion criteria were as follows: a diagnosis of myelomeningocele, receiving physiotherapy and rehabilitation program, having weak abdominal and back muscles and being cooperated. Children with hip dislocation, perceptional disorder which interferes with carrying out given orders and spinal surgery during the last year were excluded from the study.

Desriptive data about the subjects included in the study are shown in Table 1. The subjects included in the study had been receiving a physiotherapy and rehabilitation program for a period of 3-4 years (Table 1).

Evaluation criteria

Sitting Assessment Scale (SAS) was used to evaluate balance and posture during sitting. This is a scale composed of five parts (head, trunk, foot, hand and arm) which evaluate sitting straightness and balance. Head, trunk and foot control is evaluated while the subject is sitting on an appropriate stool. To evaluate arm and hand functions the patient is asked to grasp an object. Each section is graded form 1 (weak) to 4 (well) (12).

SCPM (Seated Postural Control Measure) has been used to evaluate sitting posture. SCPM evaluates not only postural disorder but also the effect of sitting on postural control. It is composed of three parts including one part which includes personal data (diagnosis, age, birth date, etc.), a second part which evaluates straightness on sitting and a third part which evaluates upper extremity function. Deviations from the basic posture are graded from 1 (severe disorder) to 4 (normal). The highest score in the part of straightness on sitting is 84 and in the part evaluating upper extremity function is 48 (13).

To evaluate the level of functional independence of the subjects WeeFIM (Functional Independence Measure for children) was used. WeeFIM includes six subsections and 18 items: self-care (6 items), sphincter control (2 items), transfer (3 items), locomotion (2 items), communication (2 items) and social state (3 items). Each item is graded between 1 and 7. A score of 1 means that the child is completely dependent and a score of 7 means that the child is completeley independent. The lowest score is 18 and the highest score is 126 in WeeFIM (14).

Application

Kinesio taping was applied on the erector spinae from spinal level of sacral 1 to spinal level of cervical 7 in the way Dr. Kase recommended (from origo to insertio) (11). Kinesio tape of 5 cm (Kinesio Tex, Gold) was used as "fan technique" to provide predominantly sensory stimulus on the erector spinae and application was performed bilaterally (Figure 1). The band was kept for three days on children who were applied Kinesio tape. After 3 days the band was removed and the region was was kept free for 24 hours. Then KT was applied again by the physiotherapist.

The subjects who participated in the study received physiotherapy and rehanbilitation for one hour 3 days a week for 12 weeks. The physiotherapy and rehabilitation

Picture: Kinesio Tape application in the subjects

Table 1: Descriptive data about the subjects

	Gender	Age (years)	Height (cm)	Weight (kg)	Assistive device used, if present	Period of physiotherapy -rehabilitation (years)	Level
Subject I	Female	9	112	34	HFAO*	3	Lumbosacral
Subject II	Male	5	85	21	HFAO	4	Lumbosacral
Subject III	Female	8	105	28	-	3	Thoracolumbal
Subject IV	Female	9	110	30	-	2	Lumbosacral

*HFAO: Hip-foot-ankle orthesis

Table 2: SCPM, SAS, WeeFIM values of the subjects before and after KT

	Before KT*				After KT			
	SCPM* Straightness	SCPM Function	SAS**	WeeFIM***	SCPM Straightness	SCPM Function	SAS	WeeFIM
Subject I	51	36	17	93	55	47	17	98
Subject II	58	43	16	75	60	44	18	77
Subject III	53	44	17	76	54	44	17	89
Subject IV	61	37	16	81	64	39	17	84

KT*: Kinesio Tape

**SCPM: Seated Postural Control Measure

***SAS: Sitting Assessment Scale

****WeeFIM: Functional Independence Measure

program included activities of upper extremity including grasping, letting go and extending, exercises directed to increase sitting and trunk balance and activities for taking the sitting position.

WeeFIM, SCPM and SAS values of the subjects before and after KT application are shown in Table 2.

Discussion

In patients with MM who develop postural disorder because of muscle weakness and spinal deformities, providing straight sitting and posture is important in terms of preventing spinal deformities, hip and lower extremity deformities and compression wounds and developing hand function (15, 16). This study investigated the effect of KT application on sitting posture and functional independence in four subjects with a diagnosis of MM and consequently, an increase in SCPM, SAS and WeeFIM values was found in all subjects. Lumbosacral involvement was present in three of our subjects and thoracolumbar level was affected in one subject. The best improvement was observed in the subjects with lumbosacral involvement.

As the application of Kinesio tape becomes widespread, it is noted that the number of studies investigating the effect of KT in the literature increases. There is no study in the literature investigating the use of KT application which is used in patients with neurologic involvement for different objectives in patients with MM. This study is the first study conducted on this subject.

Some studies have reported that KT is beneficial in improving trunk flexion normal joint range of motion (ROM) in patients with acute wiplash injury (sudden movement of head and neck anteriorly or posteriorly during motor vehicle accidents as a result anterior or posterior trauma) and in treatment of patellofemoral pain syndrome (17-19). In the study performed by Jaraczewska and Long (20), it was found that KT applied in association with other treatment methods was effective in improving muscle function in hemiplegic patients, in decreasing pain, in increasing "proprioseptive feed-back" mechanism and in providing body straightness. In a study performed by Yasukawa et al.(10), it was reported that KT application in acute pediatric rehabilitation clinics improved upper extremity control and function and was beneficial in addition to occupational therapy programs during hospitalization (10). In the study performed by Cepeda et al.(21), in children with a diagnosis of hypotonia, KT applied on abdominal muscles was reported to be a therapeutical method which increased transition from supine position to sitting position. We also observed that KT application in addition to physiotherapy aiming to increase body balance, to provide body straightness by increasing proprioseptive perception and to support weak muscles had a positive effect on funcional levels and sitting postures of children. Specifically in our first subject, upper extremity functions improved better compared to the other three subjects. Improvement of upper extremity function in children with myelomeningocele is an important factor providing independence in daily life activities (self-care activities). Thus, a marked improvement was observed in all of our subjects. Similarly, improvement in body straightness and control was observed in our subjects. Consequently, we found that KT application was beneficial in patients with a diagnosis of MM. We believe that Knesio taping can be used clinically in children with poor sitting balance, weak body muscles and balance problems in body muscles in addition to physiotherapy and rehabilitation programs.

This study is the first study performed to investigate this subject and we think that it is important in terms of lighting the way for future studies about KT application. More studies with control groups and increased number of subjects are needed.

Conflict of interest: None declared

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