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Retrospective study

Effectiveness of the multi-/interdisciplinary neurorehabilitation program in young patients with incomplete myeloradicualar injuries after spinal cord injury

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ABSTRACT: Nowadays young persons may be frequent victims of traumatic cervical spinal cord injury (CSCI). Material and methods A retrospective study (January 2019-March 2021) we conducted with the approval of the Ethics Commission of THEBA, to assess the results of the complex medical rehabilitation program during the subacute period. A selected group of 23 young tetraplegic patients with traumatic CSCI, were admitted to the THEBA Neuromuscular Rehabilitation Clinic with incomplete (AIS-B, -C, -D) myeloradicular injuries. All patients were males, aged between 19 and 57 years (with a mean of 44.35 years, SD 12.9). Patients came from urban areas 11 (48%) and the remaining 12 (52%) from rural areas. Results The spine lesion location was located at C2 vertebral level (4 men), C3 (4 men), C4 (3 men), C5 (6 men); C6 (in 2 patients); C7 (in 2 men); T6 and T7 in 1 patient each. The patients' neurological levels of injury were: C1 (in 2 patients), C2 (in 2 patients), C3 (in 4 patients), C5 (in 7 patients), C6 (in 4 patients) and C7 (in 2 patients). The AIS/ Frankel degree at admission was: incomplete lesion AIS-B 3 patients, AIS-C 11 patients, AIS-D 9 men. The average muscle strength at admission was 60.72 (SD 25.74). In the study group 20 patients were operated: anterior osteosynthesis was performed in 16 patients and posterior vertebral approach in 4 patients. The neurological evolution was favorable: at discharge there were only patients with incomplete AIS-C (8 men), respectively AIS-D (15 men) grade type of lesions, and their average muscle strength at discharge was 71.97 (SD 22.30). The following comorbidities were associated: arterial hypertension (in 2 patients), traumatic brain injury (in 14 patients), alcoholism (in 9 patients), pneumonia (in 6 patients), neoplastic disorders (in 1 patient), gastric ulcer (in 2 patients), depression (in 2 patients). Complications of the immobilization syndrome were: enterocolitis (in 3 men), bronchopneumonia (in 3 patients), urinary tract infections (in 13 patients) and bedsores (in 2 patients). Discussion Effectiveness of the final therapeutic approach was assessed (in percentage) by evaluating the progress of the muscle strength (quantified and compared at discharge vs. admission) reported to the number of days of treatment. The external-internal variations of the numeric scores of the quality of life, FIM, Ashworth and Penn were evaluated. Statistics was performed for small groups (Anova and Pearson) to establish the effectiveness of the rehabilitation program, evaluating the level of correlation between the scores quantified with the aforementioned the scales. An inversely proportional relationship was found between spasticity and efficacy of physical therapy (F 0.000, Pearson -0.35), between the scores of Penn scale and the effectiveness of physical therapy (F test 0.000, Pearson -0.18), respectively directly proportional relationship between the kinetic therapy and FIM (F test 0.000, Pearson 0.74), similar to the relationship between physical therapy and the scores assessing the quality of life (F test 0.01, Pearson 0.02). Conclusions These results underline the importance of a multi-interdisciplinary team approach in the management of the tetraplegic patients after CSCI during the subacute post-lesional/ post-operative stage.

Keywords: *neurorehabilitation program, incomplete myeloradicualar injuries, spinal cord injury*

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INTRODUCTION

In the contemporary world, scientific advances have changed the lifestyle, which influences medical problems (especially among young people) (1,3,5,9). Spinal cord injuries are a serious health problem in this population category, and the attempt to return to a normal life is made with the help of a multidisciplinary medical recovery team (4,7,13,15). Among the therapeutic-recovery modalities, medical gymnastics is an essential place, by stimulating neuroplasticity, neurogenesis and neurorecovery (2,6,8,10,11,12,14,16-20).

Material and methods

A retrospective study (January 2019-March 2021) we conducted with the approval of the Ethics Commission of THEBA, to assess the results of the complex medical rehabilitation program during the subacute period. A selected group of 23 young tetraplegic patients with traumatic CSCI, were admitted to the THEBA Neuromuscular Rehabilitation Clinic with incomplete (AIS-B, -C, -D) myeloradicular injuries. The statistical processing of the information was done using Office Windows 2013. Effectiveness of the final therapeutic approach was assessed by evaluating (in percentage) the progress of the muscle strength (quantified and compared at discharge vs. admission) reported to the number of days of treatment. The external-internal variations of the numeric scores of the Quality of Life (QOL), Functional Independence Measure (FIM), Modifiesd Ashworth Scale (MAS) and Penn were evaluated.

Statistics was performed for small groups (Anova and Pearson) to establish the effectiveness of the rehabilitation program, evaluating the level of correlation between the scores quantified with the aforementioned the scales.

All patients were males, aged between 19 and 57 years (with a mean of 44.35 years, SD 12.9).

Patients came from urban areas 11 (48%) and the remaining 12 (52%) from rural areas.

The spine lesion location was located at C2 vertebral level (4 men), C3 (4 men), C4 (3 men), C5 (6 men), C6 (2 patients), C7 (2 men), T6 and T7 in 1 patient each.

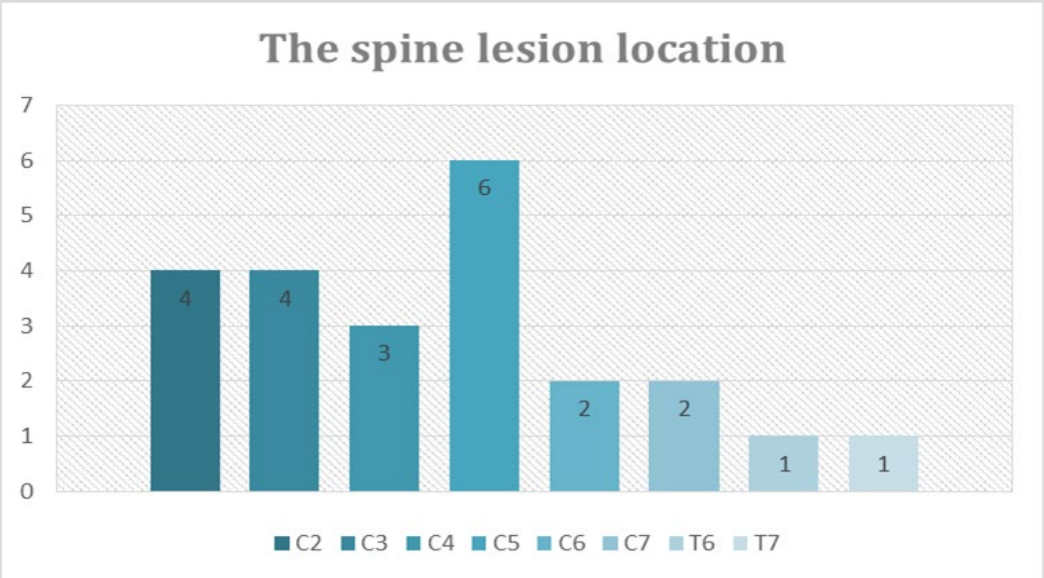

Fig no1. The spine lesion location

The patients' neurological levels of injury were: C1 (2 patients), C2 (2 patients), C3 (4 patients), C5 (7 patients), C6 (4 patients) and C7 (2 patients).

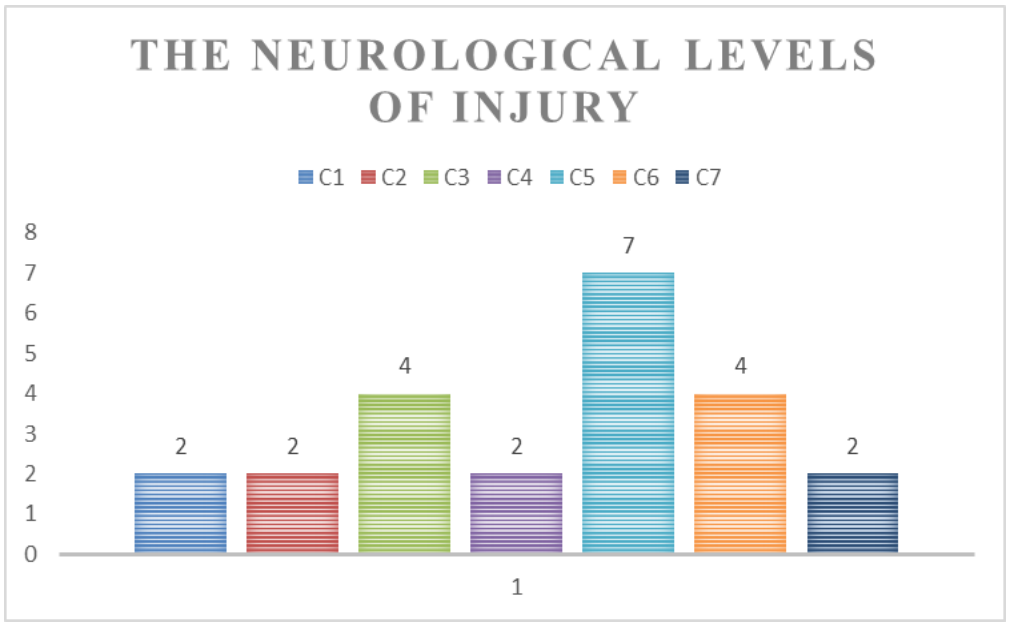

Fig no2. The neurological levels of injury

In the study group 20 patients were operated: anterior osteosynthesis was performed in 16 patients and posterior vertebral approach in 4 patients.

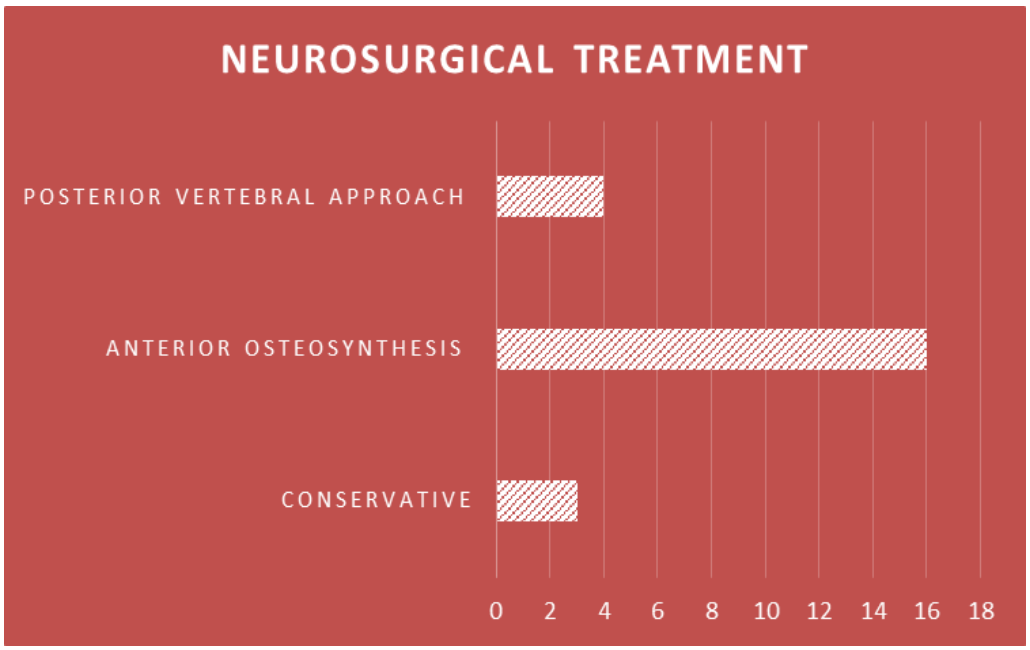

Fig no3. The neurosurgical treatment

The following comorbidities were associated: arterial hypertension (2 patients), traumatic brain injury (14 patients), alcoholism (9 patients), pneumonia (6 patients), neoplastic disorders (1 patient), gastric ulcer (2 patients), depression (2 patients).â

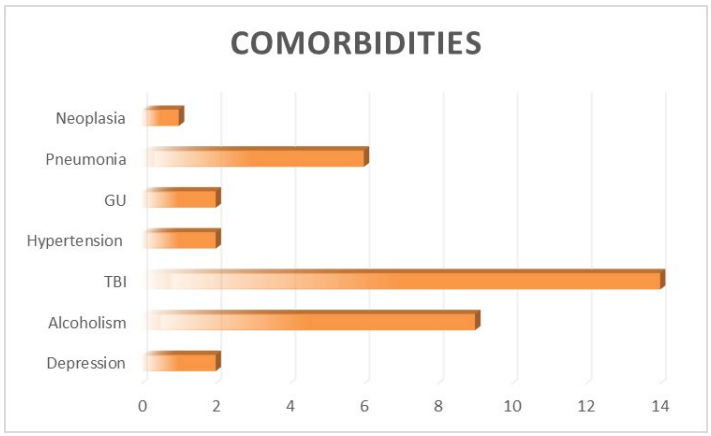

Fig no4. The comorbidities asscociated

Complications of the immobilization syndrome were: enterocolitis (3 men), bronchopneumonia (3 patients), urinary tract infections (13 patients) and bedsores (2 patients).

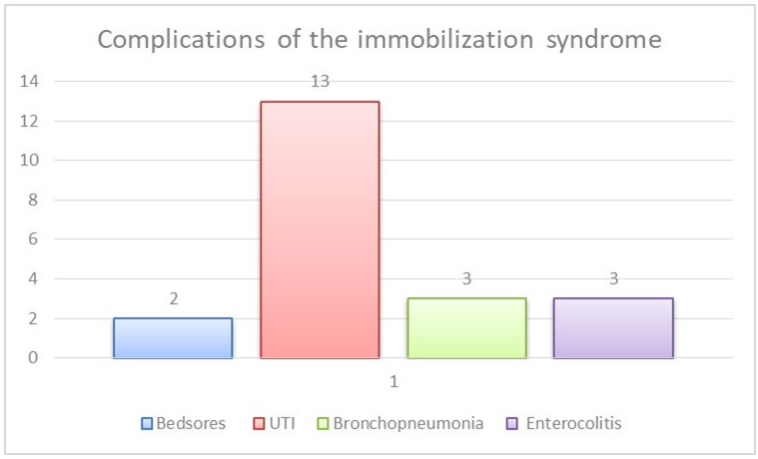

Fig no5. Complications of the immobilization syndrome

The AIS/ Frankel degree at admission was: incomplete lesion AIS-B 3 patients, AIS-C 11 patients, AIS-D 9 men. The neurological evolution was favorable: at discharge there were only patients with incomplete AIS-C (8 men), respectively AIS-D (15 men) grade lesions.

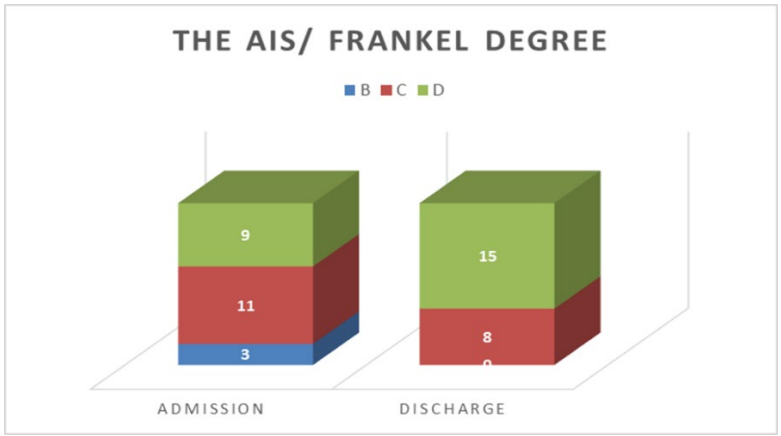

Fig no6. The neurological evolution of the patients

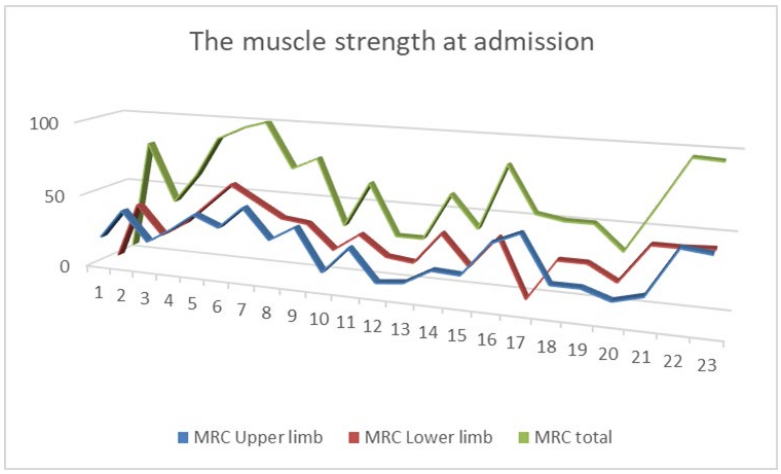

Fig no7. The muscle strenght at admission

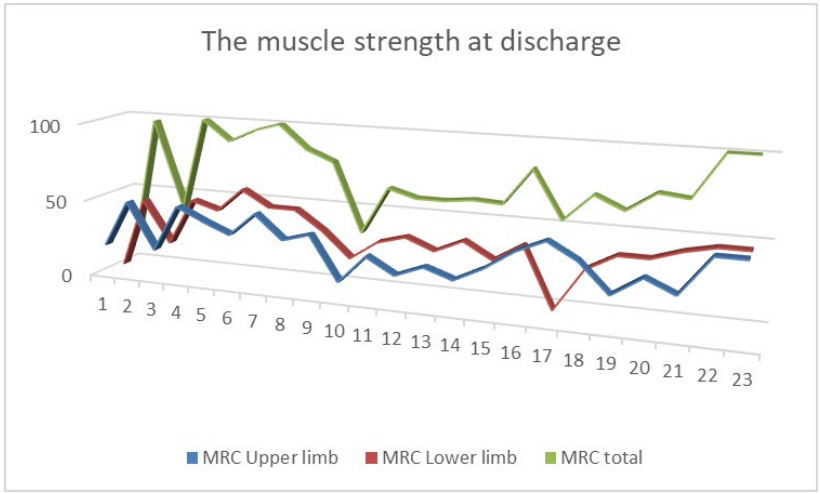

Fig no8. The muscle strenght at discharge

The average muscle strength at admission was 60.72 (SD 25.74). The average muscle strength at discharge was 71.97 (SD 22.30).

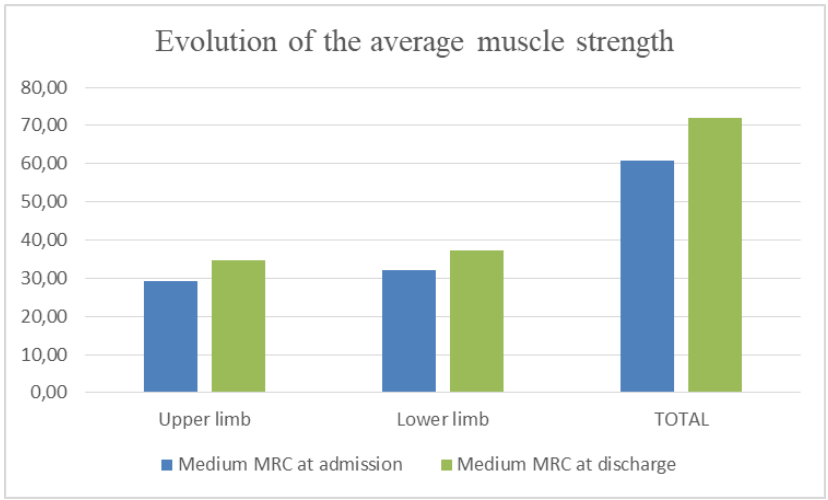

Fig no9. Evolution of the average muscle strength

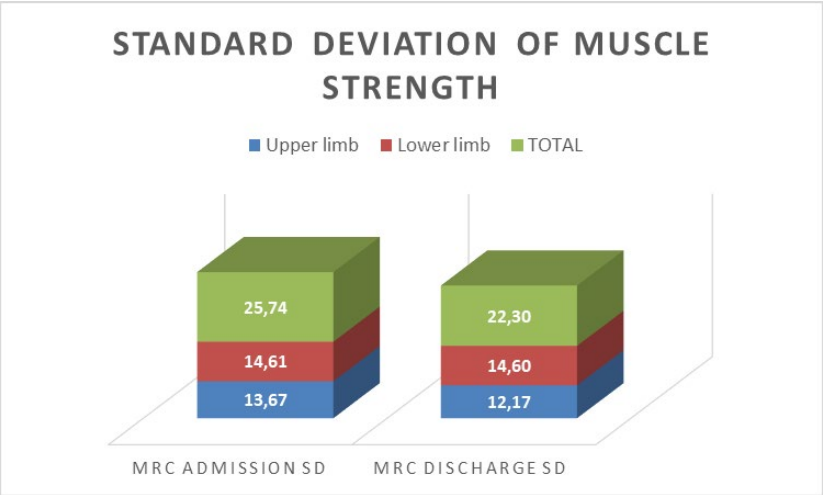

Fig no10. Standard deviation of muscle strength

An inversely proportional relationship was found between spasticity and efficacy of physical therapy (F 0.000, Pearson -0.35) and between the scores of Penn scale and the effectiveness of physical therapy (F test 0.000, Pearson -0.18).

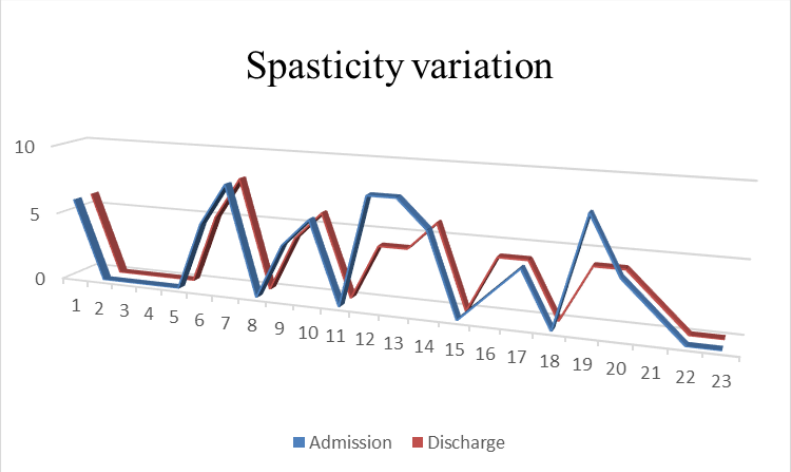

Fig no11. Spasticity variation

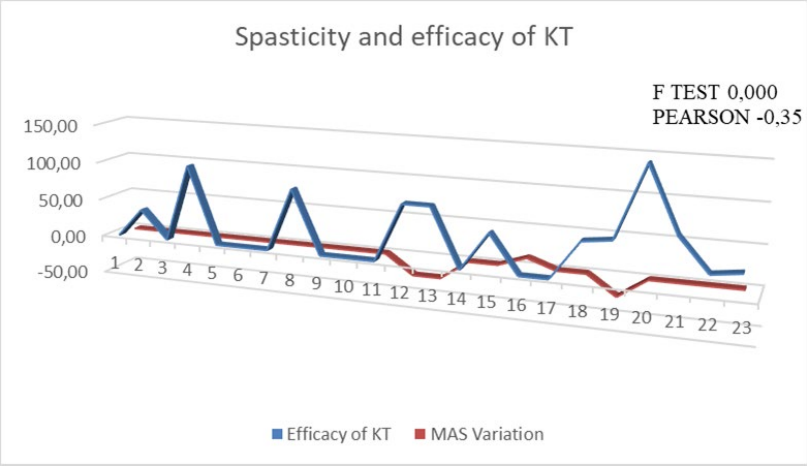

Fig no12. Spasticity and affecacy of KT

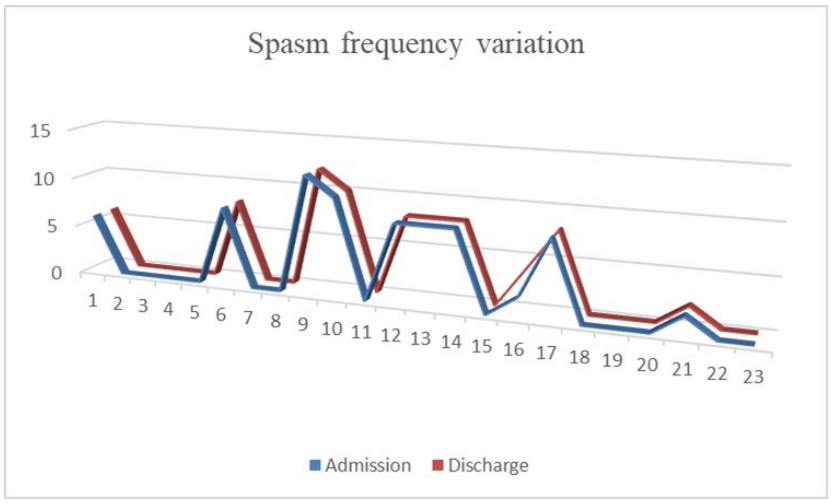

Fig no 13. Spasm frequency variation

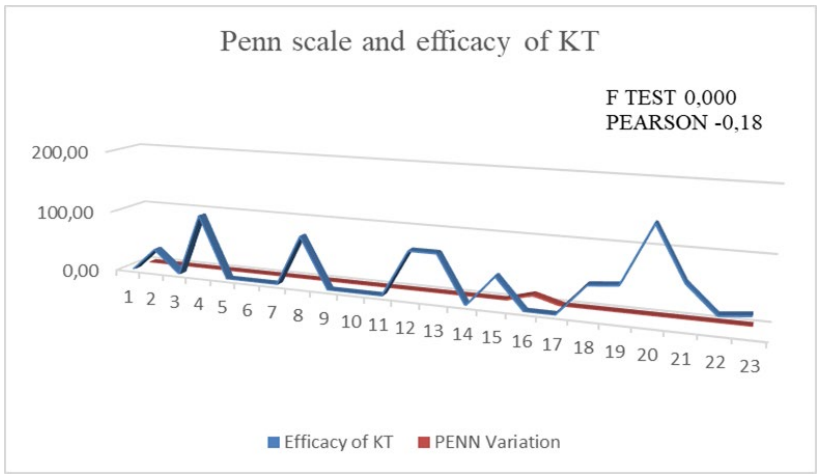

Fig no14. Penn scale and efficacy of KT

An directly proportional relationship was found between the kinetic therapy and FIM (F test 0.000, Pearson 0.74), similar to the relationship between physical therapy and the scores assessing the quality of life (F test 0.01, Pearson 0.02).

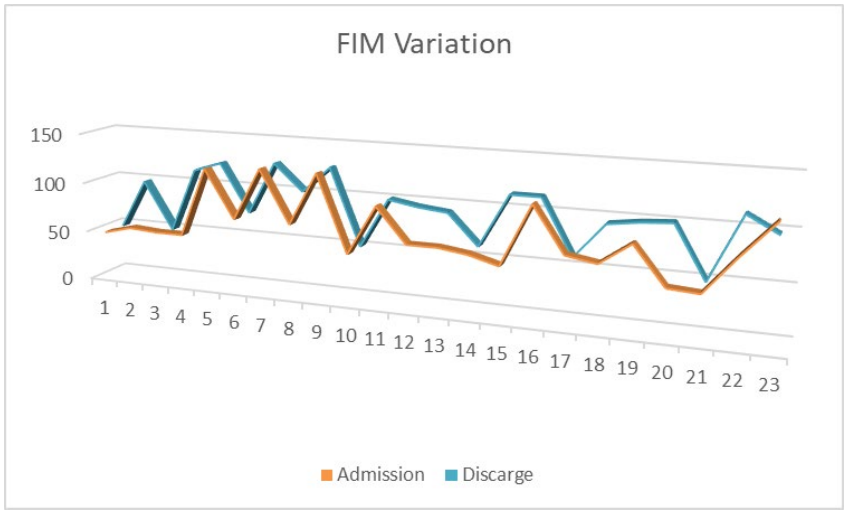

Fig no15. FIM variation

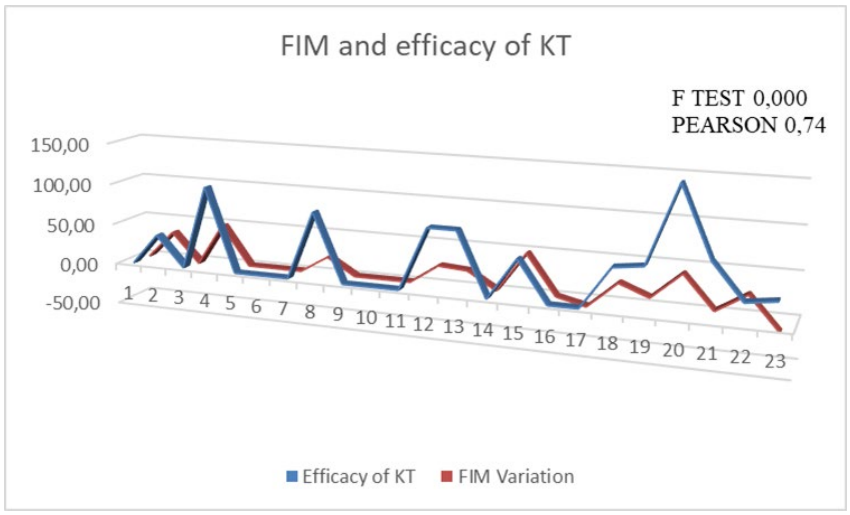

Fig no16. FIM and efficacy of KT

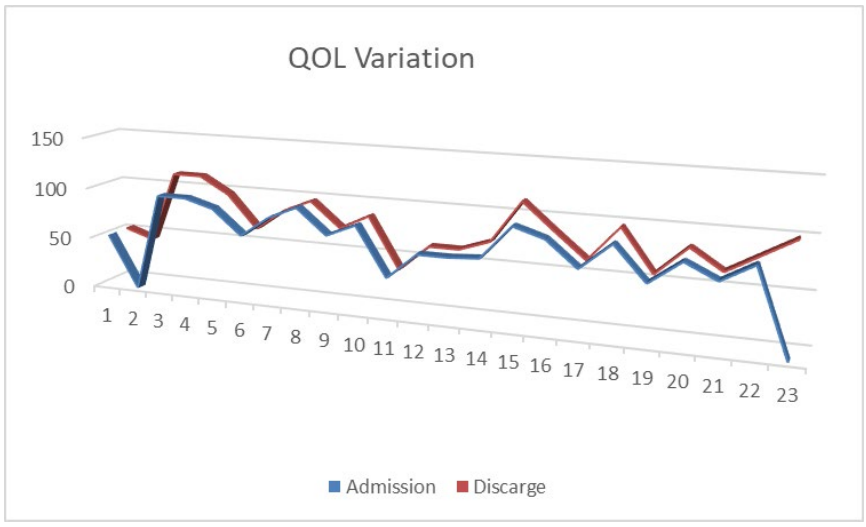

Fig no17. QOL variation

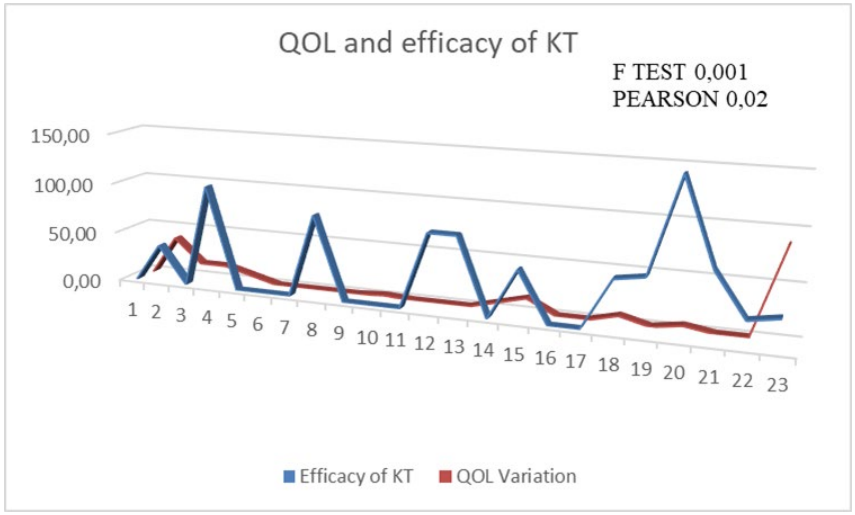

Fig no18. QOL and efficacy of KT

Discussion

An inversely proportional relationship was found between spasticity and efficacy of physical therapy (F 0.000, Pearson -0.35), between the scores of Penn scale and the effectiveness of physical therapy (F test 0.000, Pearson -0.18), respectively directly proportional relationship between the kinetic therapy and FIM (F test 0.000, Pearson 0.74), similar to the relationship between physical therapy and the scores assessing the quality of life (F test 0.01, Pearson 0.02).

Conclusions

These results underline the importance of a multi-interdisciplinary team approach in the management of young tetraplegic patients after CSCI during the subacute post-lesional/ post-operative stage.

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