

Rehabilitation outcome after traumatic brain injury

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Summary

Rehabilitation goals after traumatic brain injury are improving function, increasing the level of independence as high as possible, preventing complications and providing an acceptable environment to the patient. Several complications can be encountered during the rehabilitation period which lead to physical, cognitive and neurobehavioral impairments that cause major delay in functional improvement. This prospective study was designed in order to investigate the complications and their relations with functional recovery in patients that were included in the acute phase of a rehabilitation program.

Thirty traumatic brain injured patients admitted to the Intensive Care Units of Uludag University School of Medicine were included in the study. Rehabilitation program consisted in appropriate positioning, range of motion exercises, postural drainage and respiratory exercises. Complications that were encountered during intensive care rehabilitation program were recorded. All patients were evaluated by Functional Independence Measure, Disability Rating Scale and Ranchos Los Amigos Levels of Cognitive Function Scale at admission and discharge.

Improvement was observed in patients in terms of functional outcome and disability levels. Pneumonia, atelectasis, anemia and meningitis were the most frequent complications. Deterioration in functional outcome and disability levels was noted as the number of these complications increased.

In conclusion, rehabilitation has an important role in the management of traumatic brain injured patients. Reduction of frequency of complications and improvement in functional outcome and disability levels can be achieved through rehabilitation programs. Long-term controlled studies with large number of patients are needed in order to obtain accurate data on factors associated with rehabilitation outcomes.

KEY WORDS: Traumatic brain injury. Rehabilitation. Complication.

Resultados de la rehabilitación después de sufrir un traumatismo craneoencefálico

Resumen

Entre los objetivos de la rehabilitación después de un traumatismo craneoencefálico está la mejoría de la función cerebral el aumento del grado de independencia la prevención de complicaciones y la obtención de un ambiente aceptable para el paciente. Durante el período de la rehabilitación pueden producirse varias complicaciones que conducen a discapacidades físicas, cognitivas y otras neurológicas que causan un importante retraso en la mejoría funcional. Este estudio ha sido diseñado para investigar las complicaciones observadas en los pacientes que se incluyeron en un programa de rehabilitación en fase aguda, sus relaciones con el estado funcional y los factores que tienen impacto en los resultados de la rehabilitación.

Se incluyen en el estudio treinta pacientes con traumatismo craneoencefálico admitidos en la Unidad de Cuidados Intensivos de la Escuela de Medicina de la Universidad de Uludag. El programa de rehabilitación consistió en rehabilitación postural, una serie de ejercicios de movimiento, y ejercicios respiratorios. Se registraron las complicaciones que se encontraron durante el programa de rehabilitación de cuidados intensivos. Todos los pacientes fueron evaluados por una Medida de Independencia Funcional, por el grado de invalidez y mediante los niveles de función cognitiva de la Escala Rancho Los Amigos tras la admisión, y en el momento del alta.

Abreviaturas. CT: computerized tomography. DRS: Disability Rating Scale. DVT: deep venous thrombosis. FIM: Functional Independence Measurement. GCS: Glasgow Coma Scale. HO: heterotopic ossification. ICU: intensive care unit. LOS: length of stay. RLA: Rancho Los Amigos. ROM: range of motion. TBI: traumatic brain injury.

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La mejoría se observó en los pacientes en términos de resultados funcionales y niveles de invalidez. Las complicaciones más frecuentes fueron la neumonía, atelectasia, anemia y meningitis. Se observó una disminución en los niveles de los resultados funcionales y de invalidez a medida que aumentó el número de complicaciones.

En conclusión, la rehabilitación tiene un papel principal en la recuperación de pacientes con traumatismo craneoencefálico. La reducción de la incidencia de complicaciones y la mejora de los niveles de los resultados funcionales y de invalidez se pueden lograr con programas de rehabilitación. Estudios controlados a largo plazo con un gran número de pacientes son necesarios para obtener datos exactos sobre los factores asociados a los resultados de la rehabilitación.

PALABRAS CLAVE: Traumatismo craneoencefálico. Rehabilitación. Complicación.

Introduction

Traumatic brain injury (TBI) is a condition occurring as a result of the application of an external force to the brain and it is associated to consciousness changes that can cause cognitive, physical and psychosocial functional disorders³. It is the most common cause of death and disability among all neurological diseases in early decades of life^{3,32}.

The frequency of TBI is 95-102/100000⁶. Motor vehicle accidents, falls, fired weapon injuries, occupational accidents and sports injuries are the most common causes of TBI³. TBI is most frequent under the age of 45 and two fold more usual in males. The frequency reaches a peak level between 15-30 yr. Low socioeconomic status, previous TBI history, alcohol and substance abuse are other risk factors³.

Several clinical situations can occur following TBI depending on the degree and type of brain injury. In order to evaluate the severity of the trauma, anticipate the outcomes and choose the most appropriate treatments, prognostic factors such as Glasgow Coma Scale (GCS), age, posttraumatic amnesia duration, coma duration, pupillary light reflex, computerized tomography (CT) findings were defined³. Improvement is faster in children and young adults compared to adults over 45 yr. and functional improvement is slower and worse with increasing age³.

In these patients, the aims of rehabilitation are improving their neurological function, providing patient independence as much as possible, preventing complications and to provide an acceptable environment to the patient. Although treatment is obviously important in order to decrease injury severity, concentrated rehabilitation interventions aimed at improving patients' cognitive and functional

status may have a significant impact⁵. Rehabilitation starts during the intensive care period and can last for lifetime in some cases³. During the acute period the aim is to prevent complications that may cause later disability. Appropriate positioning, passive range of motion (ROM) exercises can prevent complications like contracture development, pressure wounds or deep venous thrombosis (DVT)^{3,42}. Significant functional improvements in many patients can be achieved by acute rehabilitation programs. Environmental arrangements, family education, facilitation of neurological reorganization are also important during this period and prevention of complications depends mostly on spontaneous neurological recovery⁸.

Early rehabilitation after TBI has become a worldwide accepted interface. It is a part of intensive care with enhanced approaches to preserve the rehabilitation potential of the brain²¹. In most studies evaluating the effectiveness of rehabilitation it has been reported that patients included in rehabilitation programs show improvements in their neurological status^{36,40}. Investigators agree that early rehabilitation intervention for the traumatically brain-injured patient has a generally positive outcome, although well controlled studies are difficult to perform¹².

During the acute rehabilitation period, there can be various complications, which delay functional recovery and lead to physical, cognitive and neurobehavioral disorders. These complications may be life-threatening and also may interfere with the participation of the patient to active rehabilitation, prolong the rehabilitation period and increase the cost¹³. Most complications are apparent within the first days or months following injury³⁴. There is a complex relationship among the type of underlying medical impairment, severity of functional limitation, comorbidity, and unanticipated medical or surgical complications that interrupt rehabilitation. Ranka et al studied 36 patients with severe TBI and observed mainly respiratory disorders, pressure sores, DVT and contractures. They stated that these complications developed in the first four weeks and their main objective for the early rehabilitation is to prevent these complications³⁷. Lew found low Functional Independence Measurement (FIM) scores in patients with acute medical complications²⁹. Early rehabilitation decreases the frequency of the complications and facilitates to take these complications under control easier²¹. Development of complications may also prolong length of stay (LOS) in the intensive care unit (ICU)¹¹.

As seen in the literature, in the TBI patients it is very important to diagnose complications, take preventive measures early and rehabilitation in this period has positive effect both on decreasing complication occurrence and patients functional outcome.

This study was planned in order to determine the complications that are seen in adult patients included in reha-

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