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POST- STROKE EXECUTIVE DYSFUNCTIONS

Neurology

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ABSTRACT

Stroke is an acute condition,with compromise of the blood perfusion to the brain.Majority of the strokes are ischemic , while minority are hemorrhagic.

Around more than 140,000 people die of stroke every year in United States , that is every 1 in 20 deaths are because of stroke.And stroke is a leading cause of serious long term disabilities as well.

Stroke recovery often puts long term and intense rehabilitation.Even if the physical recovery is achieved psychological and social recoveries can persist reducing the quality of life in stroke survivors.

Executive dysfunction is one of the many consequences a post stroke patient can face,making it important for the physician to screen stroke patients.

Because there are many promising interventions ,early recognition and cognition rehabilitation can help the patients gain more independence with activities of daily living.

KEYWORDS

Stroke , Executive Functions

What are Executive Functions?

Executive functions are the skills that we use to control and coordinate our behaviors and our cognition.Executive function is a broad term that include various abilities like:

- Planning/Decision making
- Ability to think flexibly
- Organisational skills
- Problem solving strategy
- Performance management
- Multitasking
- Learning and showing appropriate behaviors
- Emotions
- Self awareness
- Motivation

All these activities enable us to perform 'Goal oriented behavior'.We often use these skills in our day to day activities like cooking,driving,going to work,self care etc.All these simple and complex activities require EF.

Brain injury and Executive Functions

- Impairments in executive functions are very common after a brain injury e.g. stroke,TIA .
- Brain damage to frontal lobes can impair these functions, Frontal lobes predominantly control all the cognition skills and is an important parts of our personalities and our social behaviors.
- These lobes can be damaged by any form of injury to the brain like stroke,traumatic injury,tumours, infections. About 75% people are thought to have executive dysfunctions after stroke.
- Broadly , causes for executive dysfunction can be categorised as follows
- Neurodegenerative conditions like Alzheimer's and Parkinson's disease
- Other Neurological conditions like Stroke,tumour,trauma
- Primary Psychiatric conditions like depression,anxiety, OCD, schizophrenia
- Primary medical and toxic conditions
- Infectious conditions like meningitis,encephalitis,HIV/AIDS
- Developmental conditions like ADHD,Autism,Learning disabilities

- Lesions to frontal lobes often lead to executive dysfunction because of the damage to the connections of the prefrontal cortex. Executive functions mainly lie in prefrontal and subcortical areas.But lesions to other areas of the brain can also lead to impairment of these functions because that can often lead to network disconnections
- It can be very hard to diagnose people post stroke if their executive functions are impaired because its mainly misunderstood as depression,lack of motivation, aggression.
- Patients often have feelings of frustration, exhaustion, embarrassment and isolation. Anti social behavior is common among patients and most of the times patients are unaware of these behavior changes. It can make hard for the patients to go back to their work and follow a normal routine day to day living.

Executive Function disorder

When a person's executive functions are impaired ,they will experience problems in initiating,planning,organising,monitoring of the activities.Emotional and social skills are impaired.Changes in the personality and behaviours can be seen. Few common signs and symptoms of patients having executive dysfunction are :

- Unable to initiate activities/tasks.
- Loss of thinking ahead of time and carrying out the important steps to complete the task.
- Unable to organise the order and address the timelines.
- Unable to multitask , Unable to divide attention
- Finding it hard to make accurate solutions/judgements/decisions.
- Impulsive behavior, can't think of consequences.
- Loss of emotional control,outburst of emotions.
- Difficulty interacting socially, doing and saying inappropriate things
- Difficulty memorising current and past events.
- Decreased concentration with difficulty in learning new concepts.
- Constantly misplacing personal items.
- Unable to remember names.
- Loosing train of thoughts.
- Loss of self motivation/self awareness

Clinical Approach for Executive Dysfunction

- A good history and a neurological exam.
- Patients most of the times don't present with the chief complaint of executive dysfunction, they present as 'loss of memory' to the physician.
- Physician should ask all the questions regarding executive dysfunctions like difficulty in planning and organization,behavior and personality changes,difficulty making decisions and problem solving skills, inability to multitask, impaired concentration and learning.
- Montreal Cognitive assessment test can be used as a screening test for mild cognition impairment and is considered to be a more sensitive than Mini Mental Status Exam.
- Standardized neuropsychological assessments are different tests taken by the patient for the analysis of the cognition e.g. Clock drawing test,Trail making test .
- A list of differentials should always be kept in mind to exclude psychiatric ,other medical conditions or substance abuse.
- Look for the involvement of other cognitive domains.
- Brain imaging and lab investigations can be helpful.

Treatment plan

Different approaches for post stroke EF are as follows:

- To reinstate the EF functions that have been lost post stroke.

- Instruct the patient the compensatory strategies
- Use of external aids and adjustments in the environments.

- **Reinstating EF functions** include strategies that focus on computer based training and face to face training with a physician.

- **Computerised Working memory training** this strategy can improve the working memory and and attention. Working memory training is used to store information for a short period of time, and is Important for day to day activities.

Most common type is COG MED training that include 30 - 40 minutes sessions for 5 weeks,including both audio and visual tasks. Computer based test that can be done at rehabilitation centre or at home. The therapist will monitor the progression and provide the feedback to the patient.

- **Computerised Dual task training** this training is for improving balance and cognition in the patients post stroke This intervention includes visual media and computer technologies.

This strategy works on building cognition,balance,gait as well as visuospatial executive performance.

- **Verbal working memory training** this intervention involves working on language production e.g. activities like 'word spelling'.Its a 60 minute session for 3days a week for 6 months.

- **Compensatory strategies for executive dysfunction**
- **Analogical Problem solving training** Strategies that help patient to cope up with stressful situations and problem solving training.
- **Goal management training** because stroke patients have difficulty in completing day to day activities/tasks because of the distractions GMT makes them stop and realise them to refocus on the goal,increasing the attention span.

- **CO OP approach (Cognitive orientation to daily occupational performance)** to improve the occupational performance for stroke patients ,metacognitive strategy. Client centered approach mainly to improve the goal performance.

- **External Aids and Environmental modifications** for the patient, aiming that he engage in daily activities and an approach to reduce the social impairments.
- External cues/reminders(alarms,mobile phones,smartphones, pagers)
- To do list
- Visual cues
- Reminders from the family/carers
- Developing a daily routine
- Keeping appointment calendars
- Keeping a checklist
- Step by Step instructions

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