Management of ventilator-dependent tetraplegic patients in a Physical Medicine and Rehabilitation Neurological department
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Materials and methods.– Retrospective study of patients with assisted ventilation on their admission to the neurological physical medicine and rehabilitation department of the University Hospital of Nantes. Evaluation of the clinical and electrophysiological respiratory status, mode of ventilation on admission and 3 months later, the duration of ventilator weaning, lifestyle after discharge.

Results.– Six patients including 5 men, 1 female admitted between 1993 and 2010. Mean post-trauma survival time: 4.4 years [1–8.5], one patient died 8.5 years post-traumatic.

On admission, the neurological level of injury was C2 in 5 cases, C1 in 1 case. Five patients were AIS A, 1 AIS C. All the patients had a volumetric ventilation mode by a tracheostomy tube, cuff inflated.

The outcome at 3 months post-trauma showed a recovery of the diaphragmatic function in 2 patients with a level of injury becoming C3 in these 2 patients, staying C2 in 3, C1 in 1. All patients were ventilated with volumetric mode leakage, deflated cuff.

For these two patients, a respiratory autonomy was obtained in the first year after the injury, at least 12h/24 (mean duration of the weaning: 9 months), including in one the removal of the tracheostomy tube. The electrophysiological finding confirmed the recovery of a voluntary control. The remaining patients have a complete motoneuronal lesion. Two patients were discharged at home, three are still hospitalized (objective of a discharge at home for 2).

Discussion.– The clinical and electrophysiological evaluations, patient disconnected from the ventilator, have to be performed every 3 months in order to detect a late diaphragmatic recovery, to distinguish the type of the lesion (upper vs. lower motoneuronal lesion) and to discuss diaphragm pacing or phrenic reinnervation.

The management of ventilator-dependent tetraplegics has to be performed in the context of an holistic approach, including all the goals of the rehabilitation of these patients: the control of an electric wheelchair, home and environmental adaptations, access to computers, management of the urinary function.

Patients with ventilator-dependent tetraplegia have to be managed in regional reference spinal units, close to home and allowing discharge at home.


Virtual-reality, robot-assisted rehabilitation training for people living with limited hand function
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Restoration of hand function is most important for functional activities of daily living, independence, community re-integration, and thus, improved quality of life. Hand and arm movements are much more complex than leg movements and require greater precision and 3-dimensional control. Rehabilitation research and assistive devices for improving hand function will necessarily be a more demanding goal. Virtual-reality, robot-assisted movement therapy is new and the current status will be summarized in relation to other more established rehabilitation approaches, including: 1) constraint induced movement therapy (CIMT), 2) sensory stimulation (e.g. functional electrical stimulation, FES), 3) movement strategy training (pre-planning visualization), and 4) task specific physical and occupational therapy. All forms of active rehabilitation can provide benefit, but those patients who have retained at least some limited hand function are likely to show the greatest improvement. It is hoped that robot-assisted movement therapy will complement and extend the efforts of therapists. Rehabilitation training has to be enjoyable to improve patient compliance and long-term outcomes and many patients find the virtual-reality environments both challenging and entertaining. Active rehabilitation also requires a training continuum that extends beyond sub-acute (in-patient) therapy and tele-health (in-home) approaches will be presented. Regardless of approach, there are still several unresolved issues to answer before rehabilitation training can be optimized, including: 1) when to start physical and occupational rehabilitation, 2) which rehabilitation regimen is best for each type of neurological disorder and when should training of compensatory behaviors be included, 3) are achieved benefits task specific or can you train multiple functional activities/modalities (simultaneously or concurrently), 4) how to best measure rehabilitation effort, 5) what duration is required for each rehabilitation session, 6) what frequency of sessions is required per day or week, 7) how many weeks of rehabilitation are required to recover a specific functional capacity or activity of daily living, 8) how long will any beneficial effects be sustained, 9) what type of maintenance programs are required, and 10) what are the reasons for lack of compliance or maintenance of rehabilitation by patients?


Virtual-reality, robot-assisted movement therapy for cervical spondylotic canal stenosis
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Objectives.– To study the functional prognosis of spinal cord injury (SCI) on cervical spondylotic canal stenosis