

Dysphagia in patients with severe disorders of consciousness during early rehabilitation

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Background: Individuals experiencing Disorders of Consciousness (DoC) often suffer from neurogenic dysphagia. Among these patients, many have a tracheal cannula, serving as a tool for general ventilation and respiratory mechanics while posing clinically relevant challenges, emphasizing the need for a timely decannulation.

Objectives: The aim of this retrospective study is to identify patients who exhibit improvements of consciousness (IC) and investigate potential predictors for such improvements. Specifically, the aim is to investigate the interrelations between the level of dysphagia and consciousness, and identifying potential predictors for decannulation based on dysphagia or consciousness measures.

Methods: Patients with DoC ($n=155$) were classified according to their Coma Recovery Scale - Revised (CRS-R) score at hospital admission into Unresponsive Wakefulness Syndrome (UWS, $n=85$) or Minimally Conscious State (MCS, $n=70$). Those who progressed to a higher level of consciousness during early rehabilitation were identified as experiencing an IC. A binary logistic regression was used to identify predictors of an IC and to analyze whether the CRS-R or BODS (Bogenhausener Dysphagiescore) at admission are potential predictors for decannulation. The rank biserial correlation was applied to assess the relationship between the decannulation status and the variables CRS-R score and BODS either at discharge or for the improvements during rehabilitation.

Results: More than half of the study population (55.43%) experienced an IC during rehabilitation, defined as gain of at least 1 point in the CRS-r. Overall, the level of consciousness at admission ($OR=2.235$, $CI=[1.121, 4.455]$, $p=.022$) and decannulation ($OR=8.788$, $CI=[3.543, 21.797]$, $p<.001$) were identified as potential predictors of experiencing an IC. The greatest improvements measured by means of the CRS-R occurred before decannulation (0.77 (SD=0.492) points per week) and less after (0.09 (SD=0.220) points per week). The CRS-R score at admission did not serve as a predictor for decannulation, while decannulated patients displayed higher CRS-R scores at discharge ($rb=0.572$, $CI=[0.43, 0.686]$, $p<.001$). The BODS at admission also did not emerge as a predictor for decannulation, yet BODS 1 ($rb=-0.832$, $CI=[-0.882, -0.763]$, $p<.001$), BODS 2 ($rb=-0.602$, $CI=[-0.71, -0.466]$, $p<.001$), and BODS total ($rb=-0.712$, $CI=[-0.793,$

$-0.604]$, $p<.001$) at discharge were significantly higher among decannulated patients. Patients who could be decannulated exhibited greater weekly improvements (-0.45 (SD=0.123) points per week) compared to patients who did not undergo decannulation (-0.12 (SD=0.182) points per week).

Conclusions: The findings indicate a positive relationship between the improvements in the level of consciousness and decannulation, i.e., patients with greater clinical improvements during rehabilitation are more likely to undergo successful decannulation. Interestingly, many patients showed significant improvements which were most prominent between admission and decannulation. While a retrospective analysis can only suggest a causal relationship this finding supports the hypothesis of a positive effect of brain reorganization that improves consciousness as well as better swallowing mechanisms. Further studies need to investigate however whether a decannulation results primarily from clinical improvements or if the preparatory procedures in dysphagia therapy function as a proactive step to improve consciousness in rehabilitation.