

Author Year Country Research Design Score Sample Size	Methods	Outcome
<p>Peterson et al. 1999 USA Cohort Level 2 N = 42</p>	<p>Population: Age range: 15-60 yr; Gender: male=37, female=5; Level of injury: C3-C4; Severity of injury: complete.</p> <p>Intervention: Patients either received HTV (20mL/kg) or low tidal volume (LTV) (15.5mL/kg) for progressive ventilator-free breathing (PVFB).</p> <p>Outcome Measures: incidence of atelectasis, lung pressure measured through centimeter of water (cmH₂O).</p> <p>Chronicity: Mean duration of injury at time of hospital admission=56 days (LTV group) and 49 days (HTV group).</p>	<ol style="list-style-type: none"> 1. Patients who received LTV had significantly more atelectasis compared to patients who received HTV (p=0.01). 2. Patients who received HTV had significantly higher cmH₂O compared to patients who received LTV (p<0.001).
<p>Kornblith et al. 2014 USA Case control Level 3 N = 344</p>	<p>Population: Mean age: 43 yr; Gender: male=275, female=69; Level of injury: cervical to lumbar; Severity of injury: complete=69, incomplete=275.</p> <p>Intervention: Patients either had a tracheostomy or did not. Of those requiring a tracheostomy, patients either experienced an ET or a LT. In addition, patients were either mechanically ventilated at discharge or were not.</p> <p>Outcome Measures: The following retrospectively: instances of prolonged MV,</p>	<ol style="list-style-type: none"> 1. Patients who received a tracheostomy had higher rates of VAP (p<0.05), higher rates of ALI (p<0.01), spent significantly more days in ICU (p<0.05) and hospital (p<0.05), and had fewer ventilator-free days (p<0.05) compared to patients who did not receive a tracheostomy. 2. There were no significant differences with regards to death (p>0.05) between patients who received a tracheostomy and patients who did not. 3. Patients who had a LT had higher rates of VAP (p<0.05), ALI (p<0.05), and ARDS (p<0.05)

	<p>VAP, ALI, ARDS, duration in ICU, duration in hospital, number of ventilator-free days, extubation attempts, ISS.</p> <p>Chronicity: Time since injury not specified. Average number of hospital days=20.</p>	<p>compared to patients who had an ET.</p> <p>4. Patients who required MV at discharge had a higher ISS ($p<0.05$), significantly higher rates of VAP ($p<0.05$) and ALI ($p<0.05$), and longer ICU ($p<0.05$) and hospital stays ($p<0.05$) compared to patients who did not require MV at discharge.</p>
<p>Nakashima et al. 2013 Japan Case control Level 3 N = 164</p>	<p>Population: Mean age: 45 yr; Gender: male=143, female=21; Level of injury: cervical; Severity of injury: complete=58, incomplete=106; AIS A-E.</p> <p>Intervention: Patients either received a tracheostomy or did not. Of those who did, they were either successfully decannulated or not.</p> <p>Outcome Measures: Proportion of patients who received a tracheostomy, proportion of patients who were successfully decannulated, level of injury, ASIA score.</p> <p>Chronicity: Mean time interval from injury to tracheostomy=5 days; Mean time interval from tracheostomy to decannulation=46 days. Time since injury not specified for patients who did not receive tracheostomy.</p>	<p>1. 15.2% (25/164) received a tracheostomy, 84% (21/25) of these were successfully decannulated.</p> <p>2. Patients who received a tracheostomy had a history of smoking significantly more than patients who did not receive a tracheostomy ($p=0.02$).</p> <p>3. Patients with a complete injury from C1–C4 ($p=0.01$) or C5–C7 ($p<0.001$) received a tracheostomy significantly more than patients with an incomplete injury at any level.</p> <p>4. All patients with C5–7 ASIA A were successfully decannulated. Patients with C1–4 ASIA A were significantly more common in the non-decannulation group compared to patients with other injury severities and injury levels ($p<0.05$).</p>
<p>Call et al. 2011 USA Case control Level 3 N = 87</p>	<p>Population: Mean age: 39 yr; Gender: male=70, female=17; Level of injury: cervical to lumbar; Severity of injury: not specified.</p>	<p>Outcome of patients by degree of injury severity:</p> <p>1. Patients with cervical injuries and complete motor loss had a higher rate of no attempt at extubation ($p=0.041$),</p>

	<p>Intervention: Patients were either discharged on ventilator support, tracheostomy collar, or natural airway. Of patients who were extubated, they were either successful on their first try, experienced 1 failure, or experienced multiple failures.</p> <p>Outcome Measures: The following during hospital stay: attempt at extubation, number of ventilator-free days, incidence of MV at discharge.</p> <p>The following at discharge: length of ICU stay, incidence of VAP.</p> <p>The following after extubation: length of ICU stay, number of ventilator-free days, length of hospital stay, incidence of VAP.</p> <p>Chronicity: Time since injury not specified. The mean time to tracheostomy=12 days. The mean length of hospital stay=33 days.</p>	<p>significantly fewer ventilator-free days ($p=0.003$), and higher incidence of MV at discharge ($p=0.014$) compared to patients without complete motor loss.</p> <p>Outcomes of patients at hospital discharge:</p> <ol style="list-style-type: none"> 2. Patients who were discharged on positive pressure ventilation had longer ICU stays compared to extubated patients ($p<0.001$). Patients discharged on a tracheostomy collar had longer ICU stays than those who were extubated or decannulated ($p<0.001$). 3. The incidence of VAP was significantly higher in patients requiring MV ($p<0.001$) and those discharged on tracheostomy collar ($p=0.001$) compared to patients who were discharged with a natural airway. <p>Outcome of patients who underwent extubation:</p> <ol style="list-style-type: none"> 4. Of patients in whom extubation was attempted, those who extubated successfully on the first attempt had significant shorter ICU stays ($p<0.001$), more ventilator-free days ($p<0.001$), and shorter hospital stays ($p=0.009$) compared with patients who failed one or more weaning or extubation attempts. 5. Patients failing one or more attempts had a significantly higher incidence of VAP ($p<0.001$) compared to patients who were successful on their first attempt.
<p>Peterson et al. 1994 USA</p>	<p>Population: Mean age: 39 yr; Gender: male=80%, female=20%; Level of</p>	<ol style="list-style-type: none"> 1. At one month post injury, significantly more patients who received PVFB had weaned

<p>Case control Level 3 N = 52</p>	<p>injury: cervical to lumbar; Severity of injury: not specified.</p> <p>Intervention: Patients were either discharged on ventilator support, tracheostomy collar, or natural airway. Of patients who were extubated, they were either successful on their first try, experienced 1 failure, or experienced multiple failures.</p> <p>Outcome Measures: The following during hospital stay: attempt at extubation, number of ventilator-free days, incidence of MV at discharge.</p> <p>The following at discharge: length of ICU stay, incidence of VAP.</p> <p>The following after extubation: length of ICU stay, number of ventilator-free days, length of hospital stay, incidence of VAP.</p> <p>Chronicity: Time since injury not specified. The mean time to tracheostomy=12 days. The mean length of hospital stay=33 days.</p>	<p>compared to patients who received IMV (p=0.01).</p> <p>2. The overall ventilator weaning success rate for PVFB was significantly higher than the success rate of IMV (p=0.02).</p> <p>Outcome of patients by degree of injury severity:</p> <p>3. Patients with cervical injuries and complete motor loss had a higher rate of no attempt at extubation (p=0.041), significantly fewer ventilator-free days (p=0.003), and higher incidence of MV at discharge (p=0.014) compared to patients without complete motor loss.</p> <p>Outcomes of patients at hospital discharge:</p> <p>4. Patients who were discharged on positive pressure ventilation had longer ICU stays compared to extubated patients (p<0.001). Patients discharged on a tracheostomy collar had longer ICU stays than those who were extubated or decannulated (p<0.001).</p> <p>5. The incidence of VAP was significantly higher in patients requiring MV (p<0.001) and those discharged on tracheostomy collar (p=0.001) compared to patients who were discharged with a natural airway.</p> <p>Outcome of patients who underwent extubation:</p> <p>6. Of patients in whom extubation was attempted, those who extubated successfully on the first attempt had significant shorter ICU stays (p<0.001), more ventilator-free days (p<0.001), and shorter hospital stays (p=0.009) compared with patients who failed one or more</p>
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		<p>weaning or extubation attempts.</p> <p>7. Patients failing one or more attempts had a significantly higher incidence of VAP ($p < 0.001$) compared to patients who were successful on their first attempt.</p>
<p>Kim et al. 2017 Korea Case series Level 4 N = 62</p>	<p>Population: 62 patients with cervical SCI who had received invasive acute phase respiratory management and succeed in either decannulation or extubation, mean (SD) duration from tracheostomy to decannulation 7.0 (± 14.5) months); 55 males and 7 females; mean (SD) onset age 47.6 (± 15.8) years; ASIA A (n = 49) and ASIA B (n = 13); neurological level C- (n = 1), C1 (n = 3), C2 (n = 9), C3 (n = 23), C4 (n = 20), C5 (n = 2), C6 (n = 2), C7 (n = 0), and C8 (n = 2).</p> <p>Intervention: Invasive acute phase respiratory management (including mechanically assisted coughing and non-invasive mechanical ventilation (NIV)) for patients with tracheostomy (n = 60) and endotracheal intubation (n = 2).</p> <p>Outcome Measures: Medical charts (including discharge summaries), imaging studies, and detailed pulmonary function test results (FVC in sitting and supine position, MIP, MEP, and unassisted and assisted</p>	<p>1. Of the 62 patients:</p> <ol style="list-style-type: none"> a. 25/62 achieved transition to NIV after extubation/decannulation. b. 16/62 achieved ventilator weaning after extubation / decannulation. c. 2/62 were tracheostomy MV with re-tracheostomy after decannulation. d. 12/62 had simple decannulation without applying long-term MV. e. 7/62 were applied of NIV after decannulation. <p>2. For those who switched to NIV (n = 31), hours of daily need for ventilatory support gradually decreased to 5.7 ± 5.7 h at final discharge.</p>

	PCF assessed just before each patient's decannulation) were collected before initial admission and after the intervention (mean (SD) follow-up period 21.3 (\pm 29.8) months).	
Lotzien et al. 2017 Germany Case series Level 4 N = 7	<p>Population: 7 patients with SCI treated in ICU (paraplegia N = 2; and tetraplegia n = 5), 6 males and one female, AIS A (n = 3), AIS B (n = 2), AIS C (n = 1) and AIS D (n = 1), with ARDS. Study also used data from trauma patients (n = 49).</p> <p>Intervention: Post-traumatic lung failure treatment using extracorporeal lung support with extracorporeal membrane oxygenation (ECMO) (n = 5) or interventional lung assist (iLA) (n = 2).</p> <p>Outcome Measures: Successful weaning, ICU and hospital LOS, complications, and survival.</p> <p>Chronicity: Time since injury not specified, but patients were treated in at a level-one trauma center.</p>	<ol style="list-style-type: none"> 6/7 patients with SCI were weaned from the extracorporeal devices (100% were successfully weaned from ECMO, and 50% was weaned from the iLA). The median LOS in the ICU was 35 days, and the mean hospital LOS was 81 days, including the early phase of rehabilitation and further ventilation weaning. No minor complications were observed, but severe complications occurred in two cases (dislocation of the venous cannula (iLA) during prone positioning; and oxygenator clotting and thrombosis around the dual lumen cannula). In comparison with all trauma patients who received the same interventions, patients with SCI required longer ventilation periods (567 vs. 817 ventilation hours) and experienced a longer in-hospital LOS (46.7 vs. 81 days). The 71.4% survival rate indicates that extracorporeal devices are a feasible treatment option for patients with SCI.
Ross & White 2003 Australia Case series Level 4 N = 4	<p>Population: tetraplegia (n=3) and paraplegia (n=1), level: C5-T9, AIS A (n=3) & B(n=1), age: 20-71 yrs</p>	<ol style="list-style-type: none"> 4 participants who had evidence of aspiration were successfully decannulated after assessment by a multidisciplinary team.

	<p>Treatment: Interdisciplinary evaluation and assessment</p> <p>Outcome Measures: Successful decannulation.</p>	2. None experienced respiratory deterioration.
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