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Prospective analysis of a Surgical algorithm to achieve Ventilator weaning in Cervical Tetraplegia

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Chronic ventilator dependency in cervical tetraplegia is linked with substantial morbidity. Diaphragm pacing is the primary surgical treatment when non-invasive weaning methods have failed. Diaphragm motor units and phrenic nerve integrity are requirements for effective pacing but may need to be restored for successful weaning. A surgical algorithm that includes: 1. Phrenic nerve reconstruction, 2. Diaphragm pacing, and 3. Diaphragm muscle replacement, may provide the capability of lowering or reversing ventilator dependency in virtually all cervical tetraplegics. The outcomes of ten patients with ventilator-dependent cervical tetraplegia are presented in this prospective case series. Patients were treated with pacemaker alone or pacemaker + diaphragm muscle replacement or pacemaker + phrenic nerve reconstruction.

Time from surgery to observed reduction in ventilator

requirements (\downarrow VR), ventilatory needs as of most recent follow-up [no change (NC), partial weaning (PW, 1-12 h/day), or full weaning (CW, >12 h/day)], and complications are included in outcome measurements. At 6-month follow-up both patients in Group I achieved CW. At 1.5-2-year follow-up two patients in Group II achieved CW, and in another two patients PW was achieved. At 6 and 8-month follow-up the remaining two patients are NC, respectively. Both patients achieved PW at 2-year follow-up in group III. Complications included pacemaker malfunction requiring revision (n = 3) and mucous plugging (n = 1). Although more investigation is necessary, diaphragm muscle replacement or phrenic nerve reconstruction performed (when indicated) with pacemaker implantation may allow virtually all ventilator-dependent cervical tetraplegics to wean partially or completely.

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