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CORRESPONDENCE

Weaning from mechanical ventilation using tracheostomy cuff deflation and a one-way speaking valve: a historical-cohort series

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To the Editor,

Overall, 5–15% of ventilated patients require prolonged mechanical ventilation, most frequently with a tracheostomy.[1] The optimal method for weaning patients has not been established. Prior research indicates that gradually increasing spontaneous breathing results in faster liberation.[2] Unfortunately, gradual liberation can take weeks to months, and the use of tracheostomy renders the patient unable to speak. With a speaking valve trial (SVT), however, the tracheostomy cuff is deflated and a one-way valve is attached. Hence, on expiration, air exits the lungs through the vocal cords, enabling vocalization.

We report a historical case series on tracheostomized patients undergoing SVT. The sample consisted of 34 patients admitted to the intermediate intensive care unit during 2013-2014. We conducted a chart review following approval of the University of Manitoba Health Research Board (January, 2017) to identify those with an SVT. Patient profiles were extracted, and data are reported as means (standard deviation).

Seventeen patients underwent an SVT (Table). Two patients failed the SVT: Patient 1 had repeated aspiration pneumonia, and attempts at cuff deflation were eventually stopped. Patient 2 had poor bulbar function with no control of oral secretions, precluding cuff deflation, which was obvious immediately. The remaining 15 patients' male/female ratio was 9/6, with a mean (standard deviation [SD]) age of 53 (17) yr All patients had respiratory muscle weakness with a mean (SD) vital capacity of 893 (461) mL and a maximum inspiratory force of −20 (11) cm H_2O during the initial SVT. SVT patients were ventilated for 94 (44) days and could speak after 71 (39) days of ventilation. Thus, on average, these patients could speak and clearly communicate for 24% of their time on a ventilator. Patients 3 and 17 were liberated completely from mechanical ventilation within days of initiating the SVT. The mean (SD) duration of the initial SVT was 238 (238) min [range, five minutes to 12 hr].

This case series reports the successful use of SVTs in a diverse group of patients who required prolonged mechanical ventilation. There was no protocolized use of the SVTs. The SVTs were initiated based on the attending physician's judgement, as some patients were closer to being liberated than others. The main contraindication was the risk of aspiration.

The major observation among patients with speaking valves was the psychological benefit. Many patients had been unable to speak for months, which can be a great psychological burden to the patients and their families. The paucity of research in this context is surprising given that 90% of patients who remember their intensive care unit experience indicate being "moderately" to "extremely" bothered by the inability to speak.[3,4] Tracheostomized patients report symptoms including frustration, fear of safety, sadness, anxiety, and powerlessness related to loss

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Table Course of ventilation in patients with a speaking valve tracheostomy

Patient #	Diagnosis	Intubation to speaking[a] (days)	Speaking to liberation (days)	Intubation to liberation[b] (days)	Duration of initial SVT (min)
1	Stroke	89	NA	246	60
2	MVA-SCI	45	NA	233	2
3	GBS^{+}	65	26	91	480
4	Pancreatitis	140	3	143	240
5	Pancreatitis	62	12	74	60
6	Lung transplant	52	45	97	360
7	MVA^{++}	168	39	207	240
8	GBS^{+}	53	16	69	60
9	Colon resection	19	13	32	720
10	MVA-SCI^{+++}	97	15	112	30
11	Lower GI bleed	83	21	104	60
12	Lung transplant	33	8	41	720
13	MVA^{++}	39	22	61	240
14	Stab to aorta	72	38	133	5
15	Myasthenia gravis	72	30	102	240
16	Aspiration pneumonia	51	28	79	60
17	MVA-SCI^{+++}	59	3	62	60
Mean (SD)[c]		71 (39)	21 (13)	94 (44)	238 (238)

[a] Intubation to speaking: time from initial intubation until the tracheostomy cuff was deflated, with a speaking valve in place, for two consecutive days

[b] Intubation to liberation: time from the initial intubation until the patient was breathing unassisted for 48 consecutive hours

[c] Values for patients 3–17 only

GBS = Guillain-Barre syndrome; MVA = motor vehicle accident; SCI = spinal cord injury. SVT = speaking valve trial

of voice. Patients view the inability to speak as worse than the pain and discomfort associated with the tracheostomy itself. Patients have described the meaning of their non-vocal experience as: "…being trapped in a silent world makes me feel frustrated and incomplete."[5]

The inability to speak also has healthcare consequences as it has been found to be associated with patient disengagement in health care and noncompliance with the care plan, which may extend the length of stay and could have significant, negative long-term health sequelae.[4]

The purpose of this case series was to shed light on the utility of SVT to facilitate further research on this important and overlooked intervention. Randomized controlled trials should seek to understand the psychological and health benefits of SVT in patients on prolonged mechanical ventilation with tracheostomy. Identified health benefits may significantly affect the standard of care of tracheostomized patients with earlier initiation of cuff deflation enabling speech. The Roman philosopher Publius Syrius stated, "Speech is a mirror of the soul; as a man speaks, so is he."

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Conflicts of interest None declared.

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