Available online at www.sciencedirect.com
ScienceDirect
British Journal of Oral and Maxillofacial Surgery xxx (2017) xxx–xxx
BRITISH Journal of Oral and Maxillofacial Surgery
www.bjoms.com

TRACHY score: a simple and effective guide to management of the airway in head and neck cancer

H. Mohamedbhai [a,*], S. Ali [b], I. Dimasi [a], N. Kalavrezos [a]

[a] *Head and Neck Centre, University College London Hospital, 250 Euston Road, London NW1 2BU*
[b] *Southmead Hospital, Southmead Road, Westbury-on-Trym, Bristol, BS10 5NB*

Accepted 23 July 2018

Abstract

Our aim was to provide a simple and effective scoring system to guide decision making in management of the airway. We retrospectively reviewed the casenotes of all patients diagnosed with head and neck cancer and who were treated by resection with primary flap reconstruction. Those factors that were significant ($p < 0.05$) were analysed by logistic regression to establish their weighting. A total of 149 patients were included, 67 of whom (45%) were managed with endotracheal tubes, and 82 with tracheostomy (55%), of which eight were unplanned and late. From this we produced a score based on: T (T staging), R (Reconstruction), A (Anatomy of tumour), C (Coexisting conditions), H (History of previous treatment for head and neck cancer), Y (lateralitY- bilateral neck dissection). A score of 4 gave a sensitivity of 91.4%, a positive predictive value of 90.9%, a specificity of 90.8% and a negative predictive value of 88.2%. We applied this score to the patients, and it gave a mean score of: 2.1 (intubated), 5.7 (primary tracheostomy), and 4.6 (late tracheostomy). This is the largest published study of tracheostomies in head and neck cancer flap reconstructions that presents a scoring system for management of the airway. This scoring system can appropriately predict those patients who do not need tracheostomy and can act as a reliable screening tool in preoperative planning of the airway. It could aid management, and reduce the incidence of postoperative tracheostomies, with the potential that patients could be managed more safely, with reduced morbidity and mortality.

Keywords: tracheostomy; head and neck cancer; airway management; scoring; risk factors

Introduction

A considerable proportion of the morbidity of head and neck cancer is from the impact on the airway.[1] Conversely, the management, of head and neck cancer, both surgical and non-surgical, often leads to either temporary or permanent damage to the airway. These patients should therefore have a thorough airway plan in place to manage these complications. Typically the options are either intubation (with successful extubation), or a tracheostomy (either temporary or permanent).

The most effective and safest tracheostomy is that done electively (rather than urgently).[2] However, even then it is associated with early complications of infection, haemorrhage, and difficulties with feeding and speech, and often leads to increases in the inpatient stay of fourfold.[3,4] This morbidity, and the subsequent costs of healthcare and resources, demand that the decision to do an elective tracheostomy is made judiciously, particularly as the harm caused from disastrous obstruction of the upper airway because of inadequate management is grave. Prediction of the correct outcome is complex, and decision-making in management of the airway can be difficult.

* Corresponding author.
E-mail addresses: hussein.mohamedbhai@nhs.net (H. Mohamedbhai), stephen.Ali@nbt.nhs.uk (S. Ali), ioanna.Dimasi@nhs.net (I. Dimasi), n.kalavrezos@nhs.net (N. Kalavrezos).

https://doi.org/10.1016/j.bjoms.2018.07.015
0266-4356/

Please cite this article in press as: Mohamedbhai H, et al. TRACHY score: a simple and effective guide to management of the airway in head and neck cancer. *Br J Oral Maxillofac Surg* (2017), https://doi.org/10.1016/j.bjoms.2018.07.015

Table 1
List of risk factors analysed and their significance with β-weights.

Variables	p value	B-weight
Not significant:		
Age (years)	0.21	–
Sex	0.52	–
Significant:		
ASA grade	0.03	0.788
Size	0.01	1.487
Type of reconstruction	0.003	1.089
Site	0.001	1.434
Previous operation on the head and neck	0.007	0.288
Previous radiotherapy to the head and neck	<0.0001	2.649
Bilateral neck dissection	<0.0001	2.797

ASA = American Society of Anesthesiologists.

Predictive scoring systems are being used in both medicine and surgery as an objective and justifiable aid to making clinical decisions. Specifically within head and neck cancer, several studies have attempted to design a scoring system to guide the management of the airway,[5–7] but unfortunately, they have used outdated data, have not yet been externally validated, or have shortcomings in their present form.

Our primary aims, therefore were to design a simple, specific, and clinically-orientated scoring system to guide the management of the airway in head and neck cancer surgery and to establish the factors that lead to the choice between endotracheal tube and tracheostomy. Our secondary aim was to compare chaacteristics that led to the choice of elective rather than late tracheostomy.

Methods

We made a search of publications listed on PubMed with the MeSH terms: tracheostomy, scoring system, head and neck surgery, cancer, and airway management. This yielded various factors applicable to the operation, the patients, and the diseases (Table 1). Next, we made a retrospective analysis of these variables for all patients who had resection and primary flap reconstruction in our department between May 2015 and September 2017.

Patients were classified into three groups according to whether they were managed with an endotracheal tube, an elective tracheostomy, or a late tracheostomy (any unplanned tracheostomy during the postoperative period). Anatomical sites were categorised (Fig. 1) into either anterior (anterior floor of mouth, intercanine segment of mandible, or labial vestibule), central (partial or total tongue, central and posterior floor of mouth), lateral (lateral floor of mouth, mandibular body or buccal cavity), or oropharyngeal (retromolar trigone, soft palate, maxilla, and tonsillar fossa).[8] Reconstructions were categorised into their composition: fasciocutaneous (radial forearm and anterolateral thigh flap), myocutaneous (latissimus dorsi and pectoralis major flap), or composite (fibula, deep circumflex iliac artery, and scapula osseocutaneous flap) (Fig. 2).

Table 2
Score ≥4 = tracheostomy indicated, score <4 = manage with endotracheal tube alone.

Variable	Score
T-stage:	
T1-T2	0
T3-T4	1
Reconstruction:	
Fasciocutaneous	0
Myocutaneous or composite	1
Two flaps	3
Anatomy:	
Lateral or central	0
Anterior or oropharyngeal	2
Coexisting conditions:	
ASA 1 and ASA2	0
ASA 3	1
History:	
None	0
Previous operation on the head and neck	1
Previous radiotherapy to the head and neck	3
Laterality:	
Unilateral	0
Bilateral	3

Statistical analysis

We used IBM SPSS Statistics for Windows (version 24, IBM Corp, Armonk, NY). Categorical variables were analysed with Fisher's exact test (previous history of radiotherapy or operation and whether bilateral neck dissection was completed). For between-group comparisons for more than two categorical variables (reconstruction, site, size and American Society of Anesthesiologists (ASA) grade), we used the chi squared test (Table 1). In all statistical tests, probabilities of less than 0.05 were accepted as significant, and only these were included in the scoring system. Logistic regression analysis was used on all significant dummy-coded binary variables and their scoring weight was refined according to their β values for need of tracheostomy. The omnibus model test gave $p < 0.0001$. The Hosmer–Lemeshow test for goodness of fit ($p = 0.389$) showed an increase in the predictive value of the logistic regression model from 50.3% to 83.2%. The final equation for the logistic model is y = (p/1-p) = -3.581 + beta1 * var1 + . . . beta n * var n; with a group membership threshold of 0.5 (Table 2).

Results

Between May 2015 and September 2017 149 patients were diagnosed with head and neck cancer, which was managed by resection and reconstruction with a primary flap. There were no exclusion criteria. Sixty-seven patients (45%) were managed solely with endotracheal tubes, while 82 required tracheostomy (55%). Of those, eight (5%) were unplanned, late tracheostomies. Once a set of significant factors had been identified, a regression analysis was made of their beta values.

Please cite this article in press as: Mohamedbhai H, et al. TRACHY score: a simple and effective guide to management of the airway in head and neck cancer. *Br J Oral Maxillofac Surg* (2017), https://doi.org/10.1016/j.bjoms.2018.07.015