



Incidence and risk factors for postoperative delirium after major head and neck cancer surgery

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ABSTRACT

Background: Postoperative delirium is a common and serious complication after extensive surgery. This study aimed to investigate the incidence and risk factors for postoperative delirium after major head and neck cancer surgery.

Methods: A retrospective analysis was performed for 293 patients who underwent major head and neck cancer surgery lasting >6 h at our institution between January 2012 and November 2015. All data were assessed by two psychiatrists. Univariate and multivariate analyses were performed.

Results: Postoperative delirium developed in 50 (17.1%) patients; most cases (84.0%) of postoperative delirium were observed between postoperative day (POD) 1 and POD 3. Multivariate analysis revealed that an age >70 years was the significant risk factor for postoperative delirium incidence after major head and neck cancer surgery; the multivariate hazard ratio was 3.935 (95% confidence interval 1.873–8.265, $p < 0.001$).

Conclusions: Most cases of postoperative delirium after major head and neck cancer surgery were observed between POD 1 and POD 3, and a multivariate analysis revealed that an age >70 years was a significant risk factor for postoperative delirium incidence. Clinicians should pay particular attention to the possibility of delirium incidence during the first 3 days after surgery for patients aged >70 years.

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1. Introduction

Delirium is defined as a change in mental status that is caused by physical problems and is characterized by a disturbance in consciousness with a reduced ability to focus and changes in cognitive functions (Takeuchi et al., 2012). Delirious patients often experience disorientation of time, place, and person. Delirium has been classified into three motor subtypes: hyperactive/agitated, hypoactive/somnolent, and mixed type; the latter of these

fluctuates between the hyperactive and hypoactive types during the course of the illness (Lipowski, 1983).

Postoperative delirium is a common and serious complication after extensive surgery. However, postoperative delirium includes several pre-, peri-, and postoperative factors. Postoperative delirium is occasionally associated with high morbidity, prolonged hospital stays, higher costs, and increased mortality (Edlund et al., 1999; Francis et al., 1990; Inouye et al., 1990; Marcantonio et al., 1994a).

Major head and neck cancer surgeries are often accompanied by free-flap reconstruction with facial changes or a tracheostomy and patients are considered to be at a high risk for postoperative delirium (Montes, 2014; Shah et al., 2012; Weed et al., 1995;

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Yamagata et al., 2005). In previous studies, the postoperative delirium incidence was 11%–26% after head and neck cancer surgery (Shah et al., 2012; Weed et al., 1995; Yamagata et al., 2005). In the multivariate analysis studies, there were numerous risk factors, including age, preexisting cognitive impairment, operation duration, alcohol-related factors, and no use of minor tranquilizers (Shah et al., 2012; Weed et al., 1995; Yamagata et al., 2005). However, to our knowledge, these earlier studies were based on small sample sizes or did not clarify the criteria used for diagnosing delirium (Montes, 2014; Shah et al., 2012; Weed et al., 1995; Yamagata et al., 2005). Here, we hypothesized that pre-, peri-, and postoperative risk factors would have a high correlation with postoperative delirium incidence after major head and neck cancer surgery.

This study aimed to investigate the incidence and risk factors of postoperative delirium in patients undergoing major head and neck cancer surgery.

2. Materials and methods

2.1. Patients

Between January 2012 and November 2015, a total of 1503 patients underwent head and neck cancer surgery at Shizuoka Cancer Center Hospital, Shizuoka Japan. Here, we included the major head and neck cancer surgeries that lasted >6 h, and we retrospectively analyzed the records of these 293 patients. This study was conducted with the approval of the Ethics Committee of Shizuoka Cancer Center Hospital.

2.2. Postoperative management

All patients were managed in the intensive care unit (ICU) after surgery. All patients who underwent free-flap reconstructive surgery were mechanically ventilated and received propofol after surgery while on the ventilator. All patients who were mechanically ventilated were extubated on postoperative day (POD) 1 and were admitted to the general surgical ward. Fentanyl was provided through an intravenous catheter, and ropivacaine hydrochloride hydrate was provided through an epidural catheter as postoperative analgesia. Feeding tube nutrition was initiated on POD 1. If the surgeons noticed symptoms of delirium in a patient, such as delirious, agitated, confused, or disoriented behavior, they administered psychoactive medications and consulted the psychiatrists as needed. In almost all cases, haloperidol was prescribed for the treatment of delirium.

2.3. Methods

A retrospective chart review was used to collect data. Checklists for preoperative, perioperative, and postoperative demographic and surgical data were based on the reported predictive factors for delirium (Brouquet et al., 2010; Chang et al., 2008; Edlund et al., 1999; Tei et al., 2010).

The preoperative data included age, sex, body mass index, medical disease history, psychiatric disorder history, smoking history (smoking >10 cigarettes daily for at least 2 years), alcohol consumption history (an estimated weekly ethanol intake of ≥ 200 mL), Eastern Cooperative Oncology Group (ECOG) performance status, and American Society of Anesthesiologists (ASA) physical status.

The perioperative data included tumor location, surgical procedure, operation duration, blood loss, urinary output, amount of blood transfusions, volume of infusion, and maximum body temperature after surgery.

The postoperative data included pain control management, mechanical ventilation, use of a feeding tube, postoperative complications, and use of sleeping medications.

Delirium was diagnosed according to the criteria in the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders, published by the American Psychiatric Association (American Psychiatric Association, 2013). All patients' charts, which had been logged by surgeons, psychiatrists, and nurses, were systematically assessed by two psychiatrists (T. M. and M. T.). Each chart was reviewed based on the methodology that had been used in a previous delirium study (Marcantonio et al., 1994a); a diagnosis of delirium was made when an agreement was reached (Takeuchi et al., 2012). Data were collected from the day of admission until POD 14. Here, we included hyperactive delirium and mixed type delirium, which were both important during postoperative management; hypoactive delirium was excluded.

2.4. Statistical analysis

Statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS) version 22 (IBM, Armonk, NY). Demographic and surgical data (preoperative, perioperative, and postoperative) were compared between patients with and without delirium. Categorical data were analyzed using the Fisher's exact test or χ^2 test when appropriate. Quantitative data were analyzed using an unpaired Student's *t* test. A *p* value of <0.05 was considered statistically significant. Variables that achieved significance on the univariate analysis were entered into the multivariate analysis to estimate the risk of postoperative delirium. Multiple logistic regression analysis was used to adjust for multiple risk factors and

Table 1
Demographic and preoperative data in patients with and without delirium.

Variable	All patients	Delirium (+)	Delirium (–)	<i>p</i> value
Total	293	50	243	
Age (y)	61.9 $\pm$ 13.6	68.8 $\pm$ 13.0	60.4 $\pm$ 13.3	<0.001
Age category, n (%)				
<70 y	204 (69.6%)	22 (44.0%)	182 (74.9%)	<0.001
≥ 70 y	89 (30.4%)	28 (56.0%)	61 (25.1%)	
Gender, n (%)				
Male	205 (70.0%)	38 (76.0%)	167 (68.7%)	0.307
Female	88 (30.0%)	12 (24.0%)	76 (31.3%)	
Body mass index (kg/m ²)	20.5 $\pm$ 3.7	20.5 $\pm$ 4.6	20.5 $\pm$ 3.5	0.940
Medical history, n (%)				
Hypertension	89 (30.4%)	22 (44.0%)	67 (27.6%)	0.021
Diabetes mellitus	45 (15.4%)	11 (22.0%)	34 (14.0%)	0.153
Hyperlipidemia	13 (4.4%)	3 (6.0%)	10 (4.1%)	0.556
Stroke	19 (6.5%)	5 (10.0%)	14 (5.8%)	0.268
Coronary heart disease	8 (2.7%)	3 (6.0%)	5 (2.1%)	0.119
Renal dysfunction	3 (1.0%)	2 (4.0%)	1 (0.4%)	0.022
Malignant tumor	62 (21.2%)	9 (18.0%)	53 (21.8%)	0.548
Psychiatric disorder	15 (5.1%)	5 (10.0%)	10 (4.1%)	0.086
Alcoholism, n (%) ^a	165 (56.3%)	23 (46.0%)	142 (58.4%)	0.106
Chronic smoking, n (%) ^b	215 (73.4%)	38 (76.0%)	177 (72.8%)	0.645
ECOG performance status				
0	205 (70.0%)	25 (50.0%)	180 (74.1%)	0.001
1	71 (24.2%)	18 (36.0%)	53 (21.8%)	
2	17 (5.8%)	7 (14.0%)	10 (4.1%)	
ASA physical status				
Grade 1	85 (29.0%)	6 (12.0%)	79 (32.5%)	<0.001
Grade 2	181 (61.8%)	33 (66.0%)	148 (60.9%)	
Grade 3	27 (9.2%)	11 (22.0%)	16 (6.6%)	

ECOG, Eastern Cooperative Oncology Group; ASA, American Society of Anesthesiologists.

^a Alcoholism was defined as drinking an estimated weekly ethanol intake of ≥ 200 mL.

^b Chronic smoking was defined as smoking >10 cigarettes daily for at least 2 years.

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