Critical care of the head and neck patient
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Head and neck patients often present a formidable challenge to health care providers. Sensitive structures in the head and neck complicate airway management, impair neurological assessment, and pose a significant threat to life. The close anatomical proximity of nerves, vessels, airways, and parts of the digestive tract in a relatively narrow space predisposes patients to infectious complications that are difficult to treat. These patients also often have preexisting comorbidities that need to be recognized in order to optimize care.

Head and neck patients have usually undergone extensive surgery resulting in unique postoperative management and complications. Because of the complexity of the performed surgery and the compromised preoperative health condition of the patient, close cooperation is required between the treating physicians [1]. The intensivist assumes a pivotal role as the coordinator of care, integrating knowledge of the performed specialized surgery, the preoperative system dysfunction, and the early recognition and treatment of the postoperative complications.

There are three main categories of head and neck patients requiring critical care: the head and neck cancer patient, either postoperatively or preoperatively; the head and neck trauma patient; and the patient who will require critical care because of medical or procedure-associated complications related to the head and neck. The majority of patients belong to the first category, but a high level of awareness is required to recognize and treat other conditions affecting the area.

Critical care of the head and neck cancer patient

Intensive care unit use

In a carefully planned, elective surgery environment, a head and neck cancer patient might bypass the ICU. At Memorial Sloan-Kettering Cancer Center in New York City, only 1.5% of all surgical patients received postoperative ICU monitoring and care, most often for respiratory (38%), cardiac (31%), and wound-related complications (19%) [2]. In a recent report involving multiple medical centers, mortality and morbidity from head and neck surgery were less than 3% and 6%, respectively [3]. After many ICU admissions for head and neck cancer were criticized as unnecessary [4], specialized, step-down otolaryngology units were created, offering a safe and cost-effective means of postoperative care for selected patients [5]. The implementation of critical care pathways has further decreased length of stay and cost [6–8]. Godden et al found similar postoperative morbidity in patients observed on the general wards and those who were transferred to the ICU for postoperative care [9]. In a study by de Melo et al, nearly half of all oral cancer patients (42.7%) were admitted to the ICU postoperatively, and the inpatient postoperative death rate was 3.6% [10], similar to death rates reported in the literature. It appears that most head and neck cancer patients can be managed outside the traditional ICU, but the comorbid conditions of some patients often make intensive care a prerequisite in postoperative care.

Identification of risk factors for developing postoperative complications is an important component of the critical care of head and neck cancer patientd. In oral cancer patients, bilateral neck dissection and the APACHE II score were identified as risk factors for postoperative complications, and they were associated with increased length of hospital stay [10]. In one representative series, the overall complication rate in all such patients was 50%, dehiscence and infection rates were 21% and 23%, respectively, and death rate was 3.6% [10]. Complications have been linked to the type of surgery performed, though not to duration of surgery [11]. Bilateral neck dissection, when performed simultaneously, is connected with complication rates around 60% (including fistula, wound infection, flap dehiscence, and necrosis) and a mortality rate of 3% [12]. Blood transfusion, prognostic comorbidity, and number of surgeons operating on the patient correlated with length of stay. Others have found the preoperative Specific Activity Scale ratings and the presence of alcohol abuse to correlate significantly with poor outcome and high complication rates [13]. Flap complications were associated with smoking and administration of more than 7 L of crystalloid during surgery. Major flap complications occurred when the patient was a smoker, if there was preoperative weight loss of more than 10% of body weight, and when multiple surgeons operated on a given patient [14]. Singh et al found the Charlson comorbidity index to be a significant predictor of postoperative complications on multivariate analysis [15].

Age is an important issue in head and neck cancer surgery. In western societies, the fastest growing segment of the population is older than 75 years. Elderly patients (> 70 years) have a higher incidence of malignancy, a heavier burden of comorbid conditions, and therefore a lower life expectancy. Fifty years ago, surgery was generally considered to be contraindicated for these patients. Advances in surgery, anesthesia, and critical care have considerably extended the chronological limits for head and neck cancer surgery. Elderly patients have a higher incidence of concomitant diseases, which makes postoperative complications more likely and worrisome (eg, a 25% increase in flap failure after reconstruction has been reported in elderly patients) [16]. A number of studies have shown that chronological age is not as important a prognostic indicator as biological age, or the general state of health. [17–22]. In a recent retrospective study by Shaari et al, patients older than 70 years who underwent microvascular free-tissue transfers were compared with younger patients who underwent the same surgery. Older age was not associated with increased rate of surgical complications, and the reported overall free-flap success rate was 100%. As expected, and in accordance with other similar studies, medical morbidity was increased in the elderly group, pulmonary and cardiac complications being the most common [21]. Bhattacharyya et al reported increased mortality with increasing age [3]. Another retrospective study involving 236 patients who underwent free-flap reconstruction of the head and neck, age over 55 was associated with major medical complications [14]. Risk of medical complications seems more directly related to concurrent illness in the patient rather than age alone, though when complications do occur, they are more severe in older patients and have a higher mortality and cost [15,22,23].

Complications

Several complications may need to be addressed in the postoperative care of head and neck cancer patients (Table 1). The respiratory condition of patients undergoing head and neck cancer surgery can be compromised prior to surgery due to smoking habits. Smoking history appears to be the most significant risk factor related to pulmonary postoperative complications. In a study by McCullogh et al, 15% of head and neck patients developed pulmonary postoperative complications, mainly pneumonia and, to a lesser degree, adult respiratory distress syndrome (ARDS) and failure to wean. A smoking history was the most important adverse prognosticator, whereas preoperative blood urea nitrogen, white blood cell count, antibiotic choice, and operative chest flap closure all approached but did not reach statistical significance [24]. Although postoperative pneumonia rates of less than 4% have been reported, it is still the leading nonsurgical infection in all series [3,25]. Changes in pulmonary function after head and neck cancer surgery have been less well studied. Using special tracheostomy masks, Matsuura et al demonstrated a decrease in the postoperative vital capacity of these patients, which was attributed to a decrease in dead space after laryngectomy. Arterial blood gases and FEV-1 values were not affected. That study suggested that V25/HT (maximal expiratory flow rate at 25% of vital capacity divided by height) might be the best parameter for evaluation of pulmonary function after laryngectomy [26].

Table 1. Complications in the head and neck cancer patient

Complications	Reported incidence (%)
ARDS	2
Failure to wean	3
Delirium	≤ 17
Hypertension	30
Surgical infections	21–50
Flap complications	10–30
Nonsurgical infections	
Pneumonia	4–15
Urinary tract infection	0–1
Phlebitis	0–1
Myocardial infraction	3–5
Hypothyroidism (immediately postop)	< 1
Hypoparathyroidism	
Transient	≤ 30
Permanent	< 1

SIADH	3
Thromboembolic disease	0–1
Recurrent laryngeal nerve injury	
Transient	1–2
Permanent	1–2
Death	2–5

Abbreviations: ARDS, adult respiratory distress syndrome; SIADH, syndrome of inappropriate ADH secretion.

ARDS complicates 2% of major head and neck cancer surgery. The amount of transfused blood and early postoperative complications requiring further surgical intervention under general anesthesia were found to be significant predisposing factors to this dangerous complication [27].

As a result of preoperative compromise of respiratory function (eg, tobacco abuse, chronic obstructive pulmonary disease, malnutrition) and postoperative complications, a minority of head and neck cancer patients fail weaning trials postoperatively. In a series reported by McCulloch, 2.7% of 144 patients had a prolonged ventilation course after surgery [24]. It appears that head and neck surgery does not pose a significant risk for failure to wean, but the treating physician should weigh in possible comorbid conditions (chronic obstructive pulmonary disease, malnutrition, cardiovascular disease) that may prolong mechanical ventilation substantially. Inability of a patient to be liberated from mechanical ventilation should therefore prompt a search for occult airway obstruction, inability to expectorate secretions, alcohol withdrawal, muscular weakness, and silent myocardial ischemia among other, more obvious, reasons.

Cardiac risk factors for head and neck cancer patients lead to an increased risk of myocardial infarction, as shown in earlier studies [13,28]. A lower risk of around 5% has been reported subsequently by Eagle et al, with previous coronary artery bypass graft surgery offering significant protection to patients with coronary artery disease [29]. A recent retrospective study of 3932 head and neck cancer patients from the National Hospital Discharge Survey found myocardial infarction to be rare (less than 2%) [3], probably as a result of advances in preoperative management. In another study by Kumar et al [30], a rate of cardiac events around 3% is reported. Head and neck surgery is categorized as intermediate risk. The authors suggest the use of a likelihood ratio nomogram predicting the patient's risk for a specific surgical procedure. This is done after the computation of the cardiac risk index for each individual patient, which takes into account five patient-specific variables that are associated with serious and severe perioperative cardiac complications: myocardial infarction within 6 months, a remote infarction, emergency surgery, history of congestive heart failure, and nonsinus rhythm. The nomogram incorporates the specific surgical procedure and determines the individual patient's operative risk [30]. Overall, it appears that although cardiac risk is declining for head and neck cancer patients, careful identification of the high-risk cardiac patient should be undertaken, and preoperative cardiac optimization should be employed.

Postoperative hypertension after radical neck dissection has been described in 20% of patients undergoing radical neck dissection, and it is attributed to carotid sinus denervation. The presence of postoperative hypertension after the first operation is a significant risk factor for hypertension occurring after surgery on the contralateral side [31,32]. Nicardipine appears to be an effective agent for the treatment of postoperative hypertension after head and neck surgery. It has to be stressed that the opposite effect, hypotension, can have devastating effects on flap viability and should be avoided at all costs. The treating physician should be careful with the titration of antihypertensive medications, preferably short-acting ones.

Head and neck cancer patients often present with a history of alcoholism and tobacco use. It is important that this possible aspect of the social history be elucidated and, if proven positive, appropriate measures be taken to prevent complications such as alcohol withdrawal and delirium tremens. Patients might not disclose alcohol and tobacco abuse to the treating physicians out of embarrassment [33], but because of the adverse effect on postoperative outcome [13], it is an important issue. These patients may develop withdrawal symptoms postoperatively, which, if left unrecognized, can progress to delirium tremens. The incidence of delirium has been reported to be as high as 17% in one study [34]. Living alone was the strongest predictor for the development of delirium in this cohort. Careful social history screening (> 70 years of age, alcohol abuse, poor cognitive status, and poor functional status) and monitoring of basic laboratory values (marked abnormalities in serum sodium, potassium, magnesium, and glucose levels) succeeded in predicting high-risk patients for the development of delirium [34]. Under careful evaluation, patients may also show evidence of chronic obstructive pulmonary disease, bronchitis, hypertension, and coronary artery disease [35].

Data regarding the occurrence of thromboembolic complications (TEC) in head and neck patients are controversial. Moreano et al found an overall TEC rate of only 0.3% over 7 years in their institution [36]. In a recent practice survey, as much as 57% of interviewed ENT physicians did not use routine deep venous thrombosis prophylaxis in head and neck cancer patients [37]. Still, cancer patients undergoing head and neck surgery may have significant predisposing factors for TEC. In another series, 70% of the examined patients had protein C deficiency, which was occasionally blamed for impaired flap survival [38]. It appears that despite the reports of the low incidence of TEC in head and neck patients and given the devastating effects of thromboembolism when it does occur, deep venous thrombosis prophylaxis should be routinely employed in these patients.

Postoperative infection of wound sites count among the major complications in head and neck cancer surgery and can appear in up to 30% of the cases, carrying a significant potential for mortality. The risk may be even higher if surgery is performed after chemoradiation [39]. In major clean-contaminated head and neck cancer surgery, preoperative antibiotic prophylaxis is mandatory, although the regimens may vary. Any regimen should include coverage of the obligate and facultative anaerobic oral flora. The duration of prophylaxis can also vary. A study comparing a 1-day with a 3-day prophylactic antibiotic treatment with clindamycin and cefonicid found no difference in postoperative wound infection rates [40].

Postoperative hypothyroidism is common after treatment for nonthyroid head and neck cancer. Patients undergoing total laryngectomy with thyroid lobectomy and radiotherapy were found to have a 61% incidence of hypothyroidism in one study, though few will develop clinically significant symptoms in the immediate postoperative period [41–43].

Hypoparathyroidism has been observed mainly after surgery for thyroid cancer [44]. Transient postoperative hypocalcemia is a frequent finding in patients undergoing thyroid surgery, with more than 30% of patients developing this complication in some series [45]. Calcium and phosphate levels should be measured frequently after any procedure involving the parathyroid area. Clinical signs of tetany should be looked for, and if present, calcium supplementation should be instituted. Most cases of hypoparathyroidism after thyroid surgery are transient, and only a minority of patients progress to permanent hypoparathyroidism [45].

The recurrent laryngeal nerve (RLN) innervates both the abductor and adductor musculature of the vocal cords. The abductor muscles are the most sensitive to injury. This leads to the seeming paradox that a partial RLN injury (especially if bilateral) causes greater airway obstruction than a total RLN injury, where the vocal cords assume the so-called “cadaveric” (midway) position [46]. Permanent RLN palsy has been reported in approximately 2% of cases after thyroid surgery [47], transient RLN palsy in 1% to 2% [48,49]. Neck trauma and surgery involving the aortic arch (for the left RLN) are also high-risk situations for RLN injury [50].

One neglected aspect of intensive care monitoring in head and neck cancer patients is the intraoperative and ICU-related blood draws. Blood loss resulting from diagnostic phlebotomies has been reported to amount to 36% of the total blood loss, resulting in a drop in hematocrit by roughly 3% [51]. These patients also undergo extensive surgery with significant blood loss requiring blood transfusions. Anemia has also been shown to adversely affect radiotherapy and chemoradiation outcomes [52]. Although a prospective randomized controlled study is lacking, erythropoietin appears to be an efficient adjunct for anemia prevention in patients scheduled for major head and neck cancer surgery [53,54]. Autologous blood transfusion, in combination with perioperative erythropoietin and iron, has also been suggested as effective for limiting postoperative anemia and postoperative heterologous blood transfusions [55,56].

The nutritional status of head and neck cancer patients is usually poor. This can be due to tumor-related obstruction of the upper digestive tract, to the malignancy itself, and to dysphagia or odynophagia from radiation mucositis [57]. Alcohol abuse in many of these patients is another predisposing factor for low-quality nutrition. There are data to suggest that a preoperative weight loss of more than 10% of body weight is predictive for the occurrence of major postoperative complications [58]. Nutrition in these patients therefore needs to be addressed early and aggressively to cover their increased caloric needs. Nasogastric feeds should be introduced from the first postoperative day [59], preferably high-calorie formulas. Contrary to popular belief, hypertonic nasogastric tube feedings do not necessarily cause diarrhea in head and neck cancer patients [60]. If the upper digestive tract needs to be bypassed because of the surgical techniques employed, then the insertion of gastrostomy should be contemplated early on, often as a part of the surgery

for cancer. Another approach is radiological percutaneous gastrostomy with a complication rate of about 13% (11% minor and 2% major) [61].

The syndrome of inappropriate antidiuretic hormone production (SIADH) may occur in 3% of patients with head and neck cancer, often as a paraneoplastic syndrome [62]. Not surprisingly, serum arginine vasopressin was studied as a possible tumor marker in these patients [63]. Squamous carcinomas of the oral cavity are the neoplasms most commonly associated with SIADH. Other risk factors associated with the syndrome are neck dissection, especially with jugular vein ligation, and preoperative radiotherapy [64,65].

Critical care of the head and neck trauma patient

Head and neck injuries can result from motor vehicle accidents, shootings and airgun accidents, and sports accidents [66–68]. The major morbidities and mortality result from injuries to the airways, major neck vessels, and digestive tract (Table 2).

Table 2. Head and neck trauma

Type of injury	Reported incidence (%)
Airway injury	Up to 20
Vascular injury	
Blunt	0.7–4
Penetratimg	Up to 25
Digestive tract injury	0–5

Penetrating neck injuries involve the tracheobronchial tree in up to 20% of patients [69–71]. Mortality reports vary widely and can also reach up to 20% [72–75]. A secured airway access needs to be ascertained as early as possible, especially in the presence of acute respiratory distress, airway compromise from blood or secretions, extensive subcutaneous emphysema, tracheal shift, or severely altered mental status [72,76,77].

Vascular injury is found in up to 25% of penetrating neck injuries, and the attributed morbidity can be as high as 50% [67]. A diagnosis is usually readily made, and the patients are treated before reaching the ICU.

The digestive tract is affected less than 5% of the time in penetrating neck injuries [78,79], but the injury is frequently occult and therefore difficult to assess through physical examination alone [67,80]. Moreover, a delay of more than 12 hours in establishing the diagnosis can lead to increased mortality in the range of 11% to 17% [67,80]. The presence of dysphagia, odynophagia, hematemesis, subcutaneous emphysema, and retropharyngeal air on lateral cervical radiographs should alert the clinician to the possibility of a digestive tract injury, as should the presence of trauma of the carotid artery, vocal cords, trachea and larynx, or the spinal cord, because multisystem injuries occur in up to 30% of all cases [81].

Blunt carotid injuries occurred in approximately 0.7% to 4% of head and neck trauma patients in two large representative series [82,83]. Most of the patients had severe head injuries as well, and the finding was often serendipitous during MRI studies done for other indications [83]. Mortality approached 31%, but an adverse outcome was seen in 11 of 15 patients who did not receive heparin, and in only 14 of 47 patients who did receive heparin treatment. Heparin was thus the single favorable predictor in outcome [82].

The development of a retropharyngeal hematoma after blunt cervical trauma with vascular involvement can lead to serious airway compromise, which can only be solved with prompt recognition of this condition and early intervention [84].

The presence of facial burns, airway soot, and singed nasal hair are likely predictive of an inhalation injury. These factors are present in more than 90% of patients with airway burns. Respiratory distress and hoarseness are less sensitive predictors in that only 50% of patients with airway injury present with these findings; stridor and wheezing are present in only 20%. Early intubation should be initiated when there is evidence of cardiovascular instability, respiratory insufficiency, airway obstruction, apnea, CNS depression, massive burns (> 60% total body surface area), and in all cases where there is evidence of head and neck burns [85,86]. In all these cases, an evaluation for CO poisoning, as well as inhalation of other toxic gases (depending on the nature of the fire), should also follow.

Other conditions in head and neck patients

Several other potentially lethal conditions can affect the head and neck area. Timely diagnosis and anticipation of complications (mainly airway compromise) are the most important factors leading to a favorable outcome (Box 1).

Box 1:

Disorders that may lead to airway compromise

Necrotizing fasciitis

Ludwig's angina

Lemierre's disease

Supraglottitis

Infectious mononucleosis

Toxic epidermal necrolysis

Tetanus

HIV/AIDS

Obstructive sleep apnea syndrome

Paraganglioma

Von Recklinghausen's disease

Angioedema

Necrotizing fasciitis of the head and neck is a rare occurrence but can have serious, even fatal repercussions in 20% to 50% of the cases, partly arising from generalized toxic shock syndromes [87–89]. The infections may arise from the oral cavity or the pharynx, but in some instances, a primary entry site is not found [88,90,91]. Patients often have predisposing immunosuppressive conditions such as diabetes mellitus [87]. Necrotizing fasciitis can be the first presentation of a head and neck malignancy [92], which, together with septic shock, is an adverse prognostic marker [93]. Spread of the infection can lead to mediastinitis requiring extensive surgical treatment [87]. Necrotizing fasciitis can present with minimal external signs; there may be only a few overlying red papules, and characteristically, there is local anesthesia or hypesthesia of the affected area. Only prompt surgical involvement and adequate intensive antibiotic therapy can give the patients a chance at recovery [87–91].

Ludwig's angina, a bacterial infection of the floor of the mouth often secondary to dental infections, has become much less feared since the advent of potent antibiotic therapy, but it can be life threatening in up to 10% of affected patients. The patient has a painful, woody submandibular area and floor of the mouth. The tenderness and stiffness are present bilaterally and are not localized. Ludwig's angina is a widespread cellulitis and not a localized abscess, a fact that makes treatment more difficult. It should be emphasized that airway compromise develops insidiously, and obstruction occurs abruptly. Airway complications should be anticipated well in advance as the concurring supraglottic edema, nuchal rigidity, and trismus may interfere with securing an airway in an emergent situation [94]. Aspiration, mediastinitis, pneumonia, empyema, and septicemia are other possible complications [95].

Angioedema is a rare immunological disorder presenting as an acute onset edema in a localized area of skin or mucosa. It has many different causes, including hereditary, allergic, and idiopathic. Head and neck involvement is frequent and may cause potentially life-threatening airway compromise when there is laryngeal involvement. Angiotensin-converting enzyme inhibitors have been implicated in the development of tongue angioedema, and their use should be particularly sought because they have been reported as a

possible cause of airway obstruction and respiratory arrest several hours after uneventful extubation [96,97]. Angiotensin II receptor antagonists have also been implicated as causes of angioedema, questioning the speculated mechanism of angioedema formation via the potentiation of bradykinin [98]. Early diagnosis and appropriate management are thus critical.

Patients with von Recklinghausen's disease may present with orthopedic ailments, such as severe scoliosis, which may impede intubation, but other complicating conditions have also been described, such as fibromatous tumors of the airways, which may jeopardize airway patency [99].

Tetanus (lockjaw) is a toxin-mediated lethal disease caused by the gram-positive *Clostridium tetani*. Circulatory compromise, involvement of the respiratory muscles, and trismus-impairing mouth opening make early intensive care and securing of a patent airway mandatory [100,101]. The treating physician should be aware that trismus may be intermittent in the initial stages of the disease, conveying a false sense of security.

Obstructive sleep apnea syndrome (OSAS) is a common occurrence in the adult population in western societies, often associated with the high prevalence of obesity in these countries. A history of loud snoring, nighttime apnea episodes, daytime somnolence, early morning headaches (due to hypercapnia), obesity, hypertension, and clinical findings of pharyngeal crowding and inspiratory wheezing should alert the clinician to the possibility of OSAS. This may complicate airway management because it both decreases visualization and inhibits noninvasive ventilation. These patients are usually obese, hypertensive, diabetic, and have difficult venous access, all factors complicating their care. The postoperative management of the patients operated for OSAS should focus on the postsurgical airway edema and on the possible development of apnea secondary to low levels of pCO_2. Sedation should be avoided preoperatively and postoperatively. Patients with severe sleep apnea should be monitored in a controlled environment for 24 to 48 hours postoperatively.

Infectious mononucleosis (IM) may cause severe pharyngotonsillitis, which may result in upper airway obstruction. This occurs by enlargement of the lymphoid tissue of Waldeyer's tonsillar ring and inflammatory edema of the surrounding soft tissues. The disease affects predominantly children, but it is also seen in adolescents and young adults. The diagnosis is usually straightforward and most patients with significant upper airway obstruction can be managed by observation through pulse oximetry and treatment with head-of-bed elevation, intravenous hydration, humidified air, and intravenous corticosteroids [102]. Occasionally there will be a lack of response to conservative measures, and urgent airway management accompanied by acute tonsillectomy has been advocated [103]. Great care should be exercised before administering corticosteroids to patients with IM; there could be an underlying abscess contributing to the airway obstruction. To avoid catastrophic consequences, the area should be imaged, preferably by CT scan, and any suspicious collection should be aspirated. Although patients diagnosed with IM are kept off antibiotics, it is prudent to administer intravenous penicillin or clindamycin to those receiving corticosteroids until a concomitant infection has been ruled out.

Supraglottitis (epiglottitis), an infection of the supraglottic structures and a well-known disease of childhood, has been well described in adults [104]. The presence of fever and the common symptoms and signs of odynophagia, dysphagia, muffled voice, stridor, and drooling may be less prominent. Adults are often misdiagnosed as having pharyngitis. The distinguishing features are severe sore throat, which is localized lower than usual, or severe odynophagia and muffled voice, which rarely accompany uncomplicated pharyngitis [105]. Hoarseness is not a common feature of supraglottitis. In the early phases of acute supraglottitis, the most reliable indicator of impending airway obstruction is a rapidly developing severe sore throat [106]. In adults, indirect laryngoscopy or direct transnasal fiberoptic endoscopy is an essential and safe diagnostic step and more reliable than a lateral neck radiograph [107]. Since the universal institution of *Haemophilus influenzae* B vaccine, the epidemiology of supraglottitis has changed. Currently, more cases are being diagnosed in adults than in children, and the dominant organism has shifted from *H influenzae* to *Staphylococcus aureus* and *Streptococcus pyogenes*[108]. The disease is usually more indolent in adults. Indications for immediate airway securement to prevent rapid compromise are rapid onset of symptoms (less than 4 hours), high fever (higher than 102.5°F), and a white blood cell count greater than 20,000 cells/dL. Therapy also includes broad spectrum intravenous antibiotics, humidification, and corticosteroid therapy in the ICU [108]. If recognized early and treated appropriately, most adults will not require airway intervention [104,109].

Lemierre first described in 1936 a case of septic jugular thrombophlebitis, a condition that since has carried his name. The cause is usually an anaerobic infection, most commonly by *F necrophorum*, and the specific underlying precipitating event is usually unknown. Many cases occur in otherwise healthy young adults up to 3 weeks after a viral pharyngitis. The diagnosis is suggested by pain and swelling along the angle of the jaw and sternocleidomastoid muscle [110]. The syndrome is almost always accompanied by metastatic spread of the endovascular infection, and cavitating septic pulmonary emboli are the most common complication. Antibiotic treatment is with a beta-lactamase-stable agent such as ampicillin-sulbactam. Anticoagulation may also be employed [111]. In suppurative internal jugular vein thrombophlebitis, conservative therapy frequently fails; if so, surgery is necessary. In many patients with a parapharyngeal space infection, medical treatment suffices for a successful course [112].

Tumors such as paraganglioma of the carotid body, the jugular bulb, or vagus nerve or vagus neurinoma are exceedingly rare and commonly found at the carotid bifurcation [113]. The presentation is usually one of a slowly growing neck mass, with additional symptoms arising from the mass effect of the tumor. ICU admission is required because these are vascular tumors and there could be severe intraoperative or postoperative blood loss. Internal jugular vein central line placement should be avoided as the risk for potentially massive hemorrhage is high. Other complications are paralysis of the vagus nerve and severe bleeding resulting in common or internal carotid or internal jugular vein ligation.

Airway involvement in toxic epidermal necrolysis (TEN) is widely reported. Severe inflammation of the mouth and oral mucosa is characteristically seen. Lesions may involve larynx and trachea, and can thus compromise airway patency. In that case, endotracheal intubation may prove difficult [85]. Another potential complication is aspiration pneumonia, which may occur because of oral lesions-induced dysphagia. Airway involvement in Stevens-Johnson syndrome is only rarely encountered and follows the same pathology as TEN.

The presence of HIV infection does not usually present any special difficulties in airway management. There have been isolated reports about difficult airway management in AIDS patients with Kaposi's sarcoma of the upper airways [114].

Airway management in the head and neck patient

Several clinical indices have been described for the evaluation of potentially difficult to manage airways, but few were designed specifically for ENT patients [115]. For nonvisualization of the larynx due to cancer- or trauma-induced malformation, the intubating practitioner may obtain a better view by applying laryngeal pressure (back maneuver). More success has been described with another method, which uses finger pressure to push the larynx simultaneously in a posterior direction against the cervical vertebrae, as superiorly as possible, and slightly laterally to the right (BURP maneuver) [116].

Postoperative extubation in head and neck cancer patients can be challenging. If after a head and neck operation a tracheostomy is not established, the timing of extubation depends upon the degree of edema and distortion of the upper airway after the surgery. After lengthy procedures, patients may be transported to the ICU intubated. At the time of extubation, the supervising physician should have equipment for securing the airway readily available. In some patients, extubation can be a challenge [117]. Airway edema and surgical changes in the patient's anatomy may prevent adequate mask ventilation. The use of oral or nasal airways may be contraindicated owing to surgery in the nasopharynx or oropharynx. In doubtful cases the patient can be extubated over a jet-ventilating stylet [118,119]. The patient should be placed in a semisitting position, and 4% lidocaine sprayed topically in the oropharynx, around the glottic area, and through the endotracheal tube [119]. Then a hollow jet-ventilating stylet with a small internal diameter can be inserted through the endotracheal tube into the trachea. After carefully withdrawing the endotracheal tube from the trachea over the stylet, the latter can be used as a means of jet ventilation, a reintubation guide, or both if the patient cannot maintain an adequate airway [117,120].

General issues in head and neck patients

Many patients undergoing major head and neck surgery receive routine central venous pressure (CVP) monitoring postoperatively. There is currently no evidence that this measurement offers any advantages over clinical indicators of intravascular volume status, and it may indeed be misguiding in some instances [121,122].

The head and neck area is a highly visible and prominent part of the human body. Cancers and operations involving head and neck structures might lead to significant disfigurement, which can be difficult for patients to cope with [123]. High levels of anxiety may be experienced [124], and this may be apparent as early as the first 4 days in the postoperative course, while the patient is still in the ICU [125]. Allowing patients to participate in self-care has been shown to decrease anxiety levels and improve patients' subjective feeling of well-being. Patients will have to become reacquainted with their bodies and learn to accept their new appearance in order to regain an acceptable quality of life [124].

The aspiration risk can be significant in head and neck patients, in whom important structures of the swallowing mechanism have been altered by the disease or the medical interventions. Postoperative subtotal or total glossectomy patients appear to be at a particular risk. Early evaluation, preferably through a fiberoptic swallowing study, is essential for the prevention of potentially dangerous aspiration [126,127].

Summary

The patient with head and neck disease has several peculiarities that need to be recognized for the treating team to offer optimal care. These arise from the primary disorders (eg, head and neck cancer or injuries) and the morbidity they might cause, the associated comorbidities, and the possible complications of treatment. A team approach involving the surgeon, the intensivist, and other caretaking personnel is essential to achieve high-quality care and ensure the best results possible.