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Perioperative Airway Management in Deep Neck Space Infections

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Abstract

Introduction: Airway management in deep neck infection are contraversial. In our study we retrospectively reviewed perioperative airway management methods practiced in the last 30 consecutive cases of deep neck infection. *Materials and Methods*: Inclusion criteria was deep neck space infection patients requiring surgical drainage under general anaesthesia. Exclusion criteria were small abscess managed medically and abscess drained under local anaesthesia. Patients were grouped into tracheostomy, fiberoptic intubation, blind nasal intubation and rigid laryngoscopic intubation. *Results*: In our study all 19 patients who had trismus were planned for fiberoptic intubation. It was successful in all 19 patients. Laryngoscopic intubation was attempted in 11 patients, 7 patients with good mouth opening and in 4 patients with severe stridor. However 2 patients in stridor who could not be intubated with laryngoscope, underwent emergency tracheostomy. In 6 patients tracheostomy was done along with incision and drainage for post-op airway management. Five patients were sent to intensive care unit with endotracheal tube, 3 out of this proceed to tracheostomy within 4 days. Rest of the patients were extubated immediately after surgery. *Discussion*: Fiberoptic intubation is a very safe airway management in trained hands when adequate time is available. Trial of rigid laryngoscopy can be given only with tracheostomy backup during emergency. Patients with advanced deep neck infection requiring post-operative airway are better managed with tracheostomy than with endotracheal tube. *Conclusion*: Fiberoptic intubation for general anaesthesia and tracheostomy for postoperative airway in advanced cases gave good results in our study.

Keywords: Deep Neck Infection; Fiberoptic Intubation; Tracheostomy; Airway.

Introduction

Infection of potential spaces of neck is common. All abscess have to be treated with incision and drainage under good antibiotic cover. Problem arises when large abscess compromises the airway. Airway management becomes crucial during perioperative period. Perioperative airway management is a challenge to both anaesthetist and otorhinolaryngologist. Distorted neck anatomy, trismus, airway oedema and neck stiffness makes airway management difficult. Endotracheal intubation and tracheostomy are two options available to secure airway. Endotracheal intubation can be done with rigid laryngoscope, fiberoptic intubation and blind nasal intubation. Under sedation there is risk of airway collapse and airway loss. Hence airway has to be secured when awake. This may not be possible in all patients. Laryngeal nerve block may not work in the presence of abscess. Only surface anaesthesia can be used. Abscess can rupture during intubation causing aspiration or already ruptured abscess can also cause aspiration under sedation. Trismus, risk of rupture of abscess and oedema of airway are challenges which anaesthetist have to face. Post operative airway management is another challenge. All methods of airway management has its own advantage and

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disadvantage. Fiberoptic intubation may be difficult due to narrow airway, risk of rupture of abscess, poor local anaesthetic effect due to inflamed mucosa, no laryngeal block and poor cooperation of patient due to hypoxia. Tracheostomy under local anaesthesia is the gold standard way for airway management in patients with deep neck infection. Oedema of neck, distorted neck anatomy, increased neck vascularity due to inflammation and poor positioning for tracheostomy make tracheostomy difficult. Rigid laryngoscopy and blind nasal intubation are also challenging and difficult in deep neck infections.

In our study we retrospectively reviewed perioperative airway management methods practiced in the last 30 consecutive cases.

Materials and Methods

Thirty consecutive deep neck infection patients who attended ENT outpatient department were retrospectively included in the study. Inclusion criteria was deep neck space infection patients requiring surgical drainage under general anaesthesia. Exclusion criteria were small abscess managed medically and abscess drained under local anaesthesia. Demographic data of the patients were recorded. The type of abscess, its extension and co-morbid conditions were recorded. Method by which airway was secured was noted. Patients were grouped into tracheostomy, fiberoptic intubation, blind nasal intubation and rigid laryngoscopic intubation. Post-operative airway management were noted.

In patients where fiber-optic intubation is planned, patient was nebulised with 4% lignocaine, 15 minutes before the procedure. Nose was packed with 4% lignocaine with adrenaline. 4% lignocaine was also used for spray as you go technique.

Results

Four patients were below 20 years, 4 were between 20 to 40 years, 6 were between 40 and 60 years, and 10 were above 60 years. The youngest was 7 years and oldest was 75 yr old.

Age group	No of patients
Below 20 years	4
20-40 years	6
40-60 years	10
Above 40 years	10

Sixteen were male and 14 were female.

	Male	female
No of patients	16	14

Fifteen patients were diabetic and four had chronic renal failure along with diabetes.

Four had parotid abscess, two retropharyngeal abscess, 3 parapharyngeal abscess and 21 had ludwigs angina.

Type of abscess	No of patients
parotid abscess	4
retropharyngeal abscess	2
Ludwigs angina	21
parapharyngeal abscess	3

In our study all 19 patients who had trismus were planned for fiberoptic intubation. It was successful in all 19 patients. Laryngoscopic intubation was attempted in 11 patients, 7 patients with good mouth opening and in 4 patients with severe stridor. However 2 out of 4 patients in stridor, who could not be intubated with laryngoscope, underwent emergency tracheostomy.

Intra-operative airway management	No of patients
direct laryngoscopic intubation	9
fiberoptic intubation	19
tracheostomy	2
Blind nasal intubation	0

Two underwent tracheostomy due to failure of direct laryngoscopic intubation in emergency. In 6 patients tracheostomy was done along with incision and drainage for post-op airway management. Five patients were sent to icu with endotracheal tube, 3 out of this proceed to tracheostomy within 4 days. Rest of the patients were extubated immediately after surgery.

Post op airway management	No of patients
tracheostomy	8
endotracheal tube	5
No intervention	17

Three patients died within 3 days of procedure. One due to septic shock, second died due to aspiration of blood and pus on the same day of surgery and third due to mediastinitis.

Discussion

Deep neck infection usually follow dental infection, infection of tonsil, salivary gland infection,

malignancies and after foreign body impaction [1]. Common complications of deep neck infection are stridor/ respiratory distress, sepsis, mediastinitis and jugular vein thrombosis. The infection can spread from one space to another, can even extend to mediastinum and cause death if not treated. Death still occur due to airway obstruction in advanced cases especially in immunocompromised patient and patients with resistant infections [2]. Deep neck infection are life threatening if associated with comorbid conditions like diabetic, immunocompromised and elderly.

Ludwig's angina, the common deep neck infection presents as rapidly progressing cellulitis of submental, submandibular and sublingual space. As disease progresses, floor of mouth is elevated and tongue is pushed posteriorly causing respiratory distress and submasseteric space involvement can cause trismus [3]. Retropharyngeal and parapharyngeal abscess compromises the upper airway directly by indenting into pharyngeal wall . Risk of rupture and aspiration are more with pharyngeal abscess. Parotid abscess can spread to masseteric space causing trismus and it can indent the lateral pharyngeal wall. Most patients with deep neck infection will also have inflamed airway and are highly susceptible to laryngospasm.

Airway management, broad spectrum antibiotics and surgical drainage of abscess are important steps of managing deep neck space infection. Surgical drainage and empirical broad spectrum antibiotics followed by culture based antibiotic are conventional steps of surgery. Airway management in advanced cases is controversial and risky. In our study we retrospective observed airway management in 30 consecutive deep neck infection patients in perioperative period. By doing this the airway management method practised by anaesthetist and complications arising were noted. The study done by Cho SY suggested that anaesthetist can also use imaging with CT for evaluating preoperative airway for planning intubation [4].

In study done by Kataria, 55.26% were male and 44.7% were female [1]. In our study 53% of patients were male and 47% were female. Diabetes was co-existent in 10% of patients in Kataria's study [1]. In our study 50% of patients were diabetic. Ludwig's angina followed by peritonsillar abscess was common in Kataria's study [1]. Ludwig's angina was the common abscess in our study.

Tracheostomy under local anaesthesia is considered gold standard airway management. Positioning patients with large deep neck abscess for tracheostomy was highly difficult as oxygen saturation may fall especially in patient with compromised airway. Increased vascularity, diffuse neck oedema and distorted neck anatomy adds to the difficulty encountered by surgeon and patient for tracheostomy under local anaesthesia. Hence in our study tracheostomy was done as a last option of attaining airway. It was required in only 2 out of 30 patients for anaesthesia. In this 2 patients, fiberoptic intubation could not be done as there was not enough time for preparation and rigid laryngoscopic intubation failed. In study done by Parhiscar in 2001, 75% patients with ludwig's angina underwent tracheostomy [5]. In our study, just 7% of deep neck infections required tracheostomy. Probably the better fiberoptic scopes and trained anaesthetist have reduced tracheostomies over a period of 15 years. In Kataria's study [1] only 5.26% underwent racheostomy, but this study included patients with medical management unlike our study which included only patients requiring surgical drainage under general anaesthesia.

Tissue oedema and immobility, distorted airway, copious secretions contribute to difficulty during fiberoptic intubation [2]. Adequate preparation is required for fiberoptic intubation. Topical anaesthesia spray without sedation on inflamed mucosa can precipitate laryngospasm. Pus and blood can reduce vision during fiberoptic intubation. Only trained anaesthetist will be able to do fiberoptic intubation as it needs systematic approach. In our study anesthetist were able to do fiberoptic intubation with topical anaesthesia in all 19 patients with trismus. Anaesthetist had adequate time for anaesthetising mucosa. Similar results were achieved in study done by Ovassapian [6]. In Wolfe study, with advanced airway control techniques like fiberoptic intubation, glidescope or retrograde intubation, patients with compromised airway were safely managed [7]. In centers with facility of fiberoptic intubation with trained anaesthetist, it could be used as primary method of airway management in deep neck infection especially when adequate time is available.

Rigid laryngoscopy will be difficult due to trismus, airway oedema, neck rigidity and distorted anatomy in deep neck infections. In eleven patients rigid laryngoscopy was attempted. Seven of them had good mouth opening and 4 had severe stridor. Out of eleven patients, 9 were intubated with rigid laryngoscopy and 2 patients with failed intubation underwent tracheostomy.

Blind nasal intubation has infrequent success rate

and requires repeated attempts which can traumatize already inflamed mucosa [6]. It is avoided due to risk of bleeding, laryngospasm, airway oedema, rupture and aspiration of pus [3]. In our study none of patients underwent blind nasal intubation.

Awake intubation requires good co-operation by the patient. Anaesthetist should be prepared for complications of awake intubation like hypertension, tachycardia, epistaxis and hypoxemia and airway loss. Under sedation, relaxation of pharyngeal muscle can make ventilation difficult and suppress airway reflex. Awake intubation is best done with fiberoptic intubation and more difficult with rigid laryngoscopic intubation. Awake intubation should be tried in all patients under topical anaesthesia. Laryngeal block should be avoided. Supine position can precipitate complete airway obstruction in advanced cases. Only fiberoptic intubation can be done in propped up position.

Postoperative airway is also important in patients with advanced disease. Oedema around airway due to abscess and surgical procedure can further compromise the airway in the immediate postoperative period. Tracheostomy or endotracheal intubation are two options available. Eight patients underwent tracheostomy and five had endotracheal intubation. Out of five patients who were sent to ICU with endotracheal tube, three of this were converted into tracheostomy due to requirement of prolonged intubation because of delayed resorption of abscess and trismus in spite of antibiotics. Inflamed airway mucosa leads to thick secretions which block the endotracheal tube in spite of regular suctioning compelling frequent tube change. In 8 patients who were on double cannula silicone tracheostomy tube, inner cannula was regularly changed without disturbing outer cannula. So airway maintenance was safer and easier in tracheostomy during immediate postoperative period. All tracheostomies were decannulated successfully after abscess resolved. In Potter's study, tracheostomy allows early recovery than endotracheal tube among patients requiring critical care support in postoperative period [8].

Conclusion

Fiberoptic intubation is a very safe airway management in trained hands when adequate time is available . Trial of rigid laryngoscopy can be given only with tracheostomy backup during emergency. Patients with advanced deep neck infection requiring post-op airway are better managed with tracheostomy than with endotracheal tube. Fiberoptic intubation for general anaesthesia and tracheostomy for postoperative airway in advanced deep neck infections gave good results in our study.

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