

Tracheostomy "Two Years Prospective Study"

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Objective: To study the indications, complications and bacteriology of tracheostomy in King Fahd hospital.

Design: A prospective study of two years duration of all patients requiring tracheostomy. Personal data, indications, complications and bacteriology have been recorded and analyzed.

Setting: ICU and ENT wards at King Fahd Hospital of the University, Al-Khobar, Kingdom of Saudi Arabia.

Results: Forty-two (42) patients, thirty eight (38) adults (90.5%) and four (4) children (9.5%) had tracheostomy. Their age ranged from 4 months to 95 years (mean of 47 years). Twenty four were males (57%) and 18 females (43%). Thirty nine cases (92.8%) had an elective, 2 (4.8%) an urgent and one (2.4%) an emergency tracheostomy. The indications for tracheostomy were prolonged intubation with mechanical ventilation in 37 patients (88.1%), upper airway obstruction in 3 patients (7.1%) and recurrent aspiration pneumonia with excessive secretions in 2 patients (4.8%). The complications were minor bleeding in 2 patients (4.8%), discharging wound in 2 patients (4.8%), surgical subcutaneous emphysema in 1 patient (2.4%) and granulation tissue and stomal stenosis in 1 patient (2.4%). No major complications were encountered. The commonest micro-organisms found were staphylococcus aureus in 8 patients (19%), pseudomonas aeruginosa in 5 patients (11.9%) and mixed organisms in 3 patients (7.1%).

Conclusions: Tracheostomy is a safe procedure to secure airway and is accompanied by minimal complications. The commonest micro-organisms colonized were staph.aureus and pseudomonas aeruginosa.

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Tracheostomy is one of the most frequently performed operations in critically ill patients¹. It is uncertain when the first tracheostomy was performed, but a Greek physician in 100 B.C. referred to the procedure as being practiced in ancient times².

The first clear account for a successful tracheostomy was recorded in 1546. Habicot in 1620 described the operation under the name of "bronchotomy" and reported four successful cases^{2,3}. Historically, tracheostomy procedures have been associated with high morbidity and mortality⁴, leading to the suggestion that the procedure should be done only in the O.R. with adequate lighting, instruments and support facilities⁵. With the improvement in anesthesia, intubation, surgical technique and discovery of antibiotics, the indication for tracheostomy had expanded, its mortality and morbidity had sharply declined. Nowadays, tracheostomy is one of the safe commonly performed surgical procedures⁶.

METHODS

This is a prospective study of tracheostomy performed at KFHU between January 1995 and December 1996. It comprises 42 patients of different age groups and different sexes, admitted to the ENT ward and through the emergency room to the ICU with acute respiratory problems. All of them received an immediate tracheostomy either under general or local anesthesia using the standard technique (transverse incision, retraction of strap muscles, resection or retraction of thyroid isthmus, opening of tracheal lumen at the second to the fourth tracheal rings and fixation of tube in place). Post-operatively a swab for culture and sensitivity (C/S) was taken immediately from the tracheostoma and sent immediately to the laboratory. Immediate Post-operative and later secondary complications were observed and recorded.

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RESULTS

Forty two patients underwent tracheostomy, their age ranged from 4 months to 95 years with a mean of 47 years. There were 4 children (9.6%) and 38 adults (90.4%), 24 males (57%) and 18 females (43%). The duration of orotracheal intubation prior to tracheostomy ranged from 13 to 42 days. Tracheostomy was performed either in the O.R. using general anaesthesia in 39 patients (92.8%) or in ICU using local anaesthesia in 3 patients (7.2%).

The indications for tracheostomy were prolonged intubations with mechanical ventilations in 37 patients (88.1%), upper airway obstructions in 3 patients (7.1%) and recurrent aspiration pneumonia with excessive secretions in 2 patients (4.8%). Thirty nine cases (92.8%) of the procedures were considered elective, 2 patients (4.8%) were urgent (one was severe subglottic stenosis and the other was a laryngeal tumor) and one patient (2.4%) had an emergency tracheostomy for an obstructive laryngeal tumor. A postoperative chest x-ray was obtained for every patient.

The complications encountered in this study were all minor in the form of minimal bleeding in 2 patients (4.8%), discharging wounds in 2 patients (4.8%), subcutaneous emphysema in 1 patient (2.4%) and granulation tissue and stomal stenosis in 1 patient (2.4%). There were no major complications and no mortality related to the surgical procedure.

The commonest bacteria colonising the stoma were staphylococcus aureus in 8 patients (19%), pseudomonas aeruginosa in 5 patients (11.9%) and mixed organisms in 3 patients (7.1%). The other remaining 26 patients showed either normal flora or no growth at all.

DISCUSSION

The most common indication for tracheostomy is ventilator dependency in the ICU⁷. These patients usually have had prolonged endotracheal intubation and have been submitted to long term positive pressure ventilation. Other indications for the operation are to bypass an obstructed airway and lastly to remove secretions from distal tracheobronchial tree.

In this study, the most common indications for the operation were prolonged intubation in 37 patients (88.1%), upper airway obstruction in 3 patients (7.1%) and recurrent aspiration pneumonia with excessive aspiration in 2 patients (4.8%).

Major controversy continues to exist concerning the ideal time to proceed from translaryngeal intubation to tracheostomy. The optimal time for performing a tracheostomy must weigh the potential benefits and risks of complications versus prolonged translaryngeal intubation⁸. Periods ranging from 3 days to 3 weeks are advocated in the literatures^{9,10}. In our series the duration of intubation ranged from 13-42 days.

Various complications can develop early or late and vary

from minor to life threatening. Bleeding is the most frequently reported complication, with an incidence of 1% to 37%^{4,11,12}. Fortunately, the vast majority were minor episodes of bleeding which were easily controlled by local measures. In our series, two patients had minor bleeding, both were treated successfully with local care.

Other serious complications of tracheostomy include pneumothorax, obstruction, and dislodgment of the tracheostomy tube. We had no such complications in our series. The mortality rate of tracheostomy has been reported in the literature to be between 0 and 5.3%^{11,13,14}. Chew reviewed the literature and found 30 deaths out of 1,928 tracheostomies; a mortality rate of 1.6%¹⁵. Most of the deaths were caused by hemorrhage, tube dislodgment, infection and tube obstruction. There were no deaths from tracheostomy in our series.

One of the patients developed subcutaneous emphysema due to tight closure of the tracheostomy stoma. This was treated by closing the skin loosely around the tracheostomy tube, allowing air to escape.

All our patients had postoperative chest radiography to evaluate the presence of pneumothorax, pneumomediastinum, subcutaneous emphysema, and tube position. The incidence of pneumothorax following tracheostomy reported in the literature ranges from 0% to 5%.^{12,16,17} Children have a higher incidence of 10% to 17%¹⁸. Their pleural domes lie higher in the neck and as such there is increased risk for injury.¹⁹ None of our patients had pneumothorax or pneumomediastinum.

In most series, the complication rate of pediatric tracheostomy has been found to 19-49%^{20,21}. It is generally accepted that pediatric tracheostomy is associated with nearly twice the morbidity and twice the mortality of adult tracheostomy.²² Mortality in children has varied from 3.2 to 8.5%²⁰⁻²². Tracheostomy is technically more difficult in children than in adults because the space is smaller, the larynx lies higher in the neck and it is not easily palpable. There were no complications in our four (9.6%) pediatric tracheostomies.

Many surgeons are reluctant to perform tracheostomies at the bedside in the ICU. Among the reasons cited are inadequate lighting, inadequate monitoring, risk of bleeding, and risk of loss of airway. Upadhyaya et al,²³ in his study of 311 bedside ICU tracheostomies, found that the complication rate in patients having bedside tracheostomy is the same as that for patients having O.R. tracheostomy. He claimed that transporting these patients out of the ICU may be associated with profound physiologic changes, hemodynamic instability and the risk of dislodging tubes²⁴. In our series, 3 patients (7.1%) had their tracheostomies in the ICU under local anesthesia with no complications.

Because most ICU patients undergoing tracheostomy are usually ill with poor nutrition, they are more predisposed to nosocomial infections. More than 50% of all patients with

tracheostomy develop nosocomial infection compared to 25% of patients with long-term endotracheal intubation²⁵. Patients with tracheostomy develop more serious infections such as pseudomonas and enteric gram-negative bacilli²⁶.

In the study of the respiratory tract colonization and infection with chronic tracheostomy, it was found that staphylococcus aureus, gram-negative enteric bacteria and pseudomonas aeruginosa were the most common colonizing bacteria.

In our study, staphylococcus aureus was found in 8 patients (19%), pseudomonas aeruginosa in 5 patients (1.9%) and mixed microorganism in 3 patients (7.1%). Adherence to strict antiseptic techniques can reduce the number of cases of nosocomial infections. Warm humidification, frequent suctioning and regular tube cleaning prevent accumulation of inspissated material²⁶.

CONCLUSION:

Tracheostomy is a safe procedure to secure airway and accompanied by minimal complications. It can be safely done in children and adults, in the ICU and in the O.R. The commonest microorganisms colonized were staphylococcus aureus and pseudomonas aeruginosa.

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