

## A Clinical Study Of Percutaneous Tracheostomy In Medical ICU By Non Surgical Doctors

Dr. Nanda Rajan\*, Dr. Jain Subhash C.\*\* , Dr. Qureshi Salim\*\*\*, Dr. Gupta Sanjeev\*\*\*

\*Professor Anaesthesiology , \*\*Associate Professor Medicine, \*\*\* Medical Officer  
Jhalawar Hospital & Medical College Jhalawar

**Abstracts: Introduction:** Tracheostomy is one of the oldest surgical procedures to access the airway. The majority of cases who require tracheostomy are in ICUs. The ICUs are monitored by intensivists who are mostly Anesthesiologists or Physicians (non-surgical personnel). While doing surgical tracheostomy, there is dependency on other departments like surgeons of ENT department. In most cases, critically ill patients are made to shift to operating room, where we may have to wait for the availability of operating table. **Method:** This clinical study was carried out to access the airway when required by nonsurgical doctors like anesthesiologists or physicians at bed side and to save cost and operation theatre time. **Result:** Sixteen male & twelve female patients with an average age of 28 Years (range, 19 to 40Years) underwent PCT from Oct. 2008 to Oct.2011. Fourteen patients were of snake bite, 10 were of organo-phosphorus poisoning & 4 were of G.B. Syndrome. **Conclusion:** Percutaneous tracheostomy has replaced the surgical route in several intensive care units and it is indeed the procedure of choice in the majority of cases. [Rajan N NJIRM 2014; 5(1):6-9]

**Key Words:** Percutaneous Tracheostomy (PCT), Surgical Tracheostomy (ST), Medical intensive care unit (MICU), critically ill, complications, tracheal injury, bleeding.

**Author for correspondence:**Dr.Subhash Chand Jain, MD Medicine, Associate Professor , Department of Medicine, Jhalawar Hospital & Medical College Society, C-35 Indira Colony, Opp SRG Hospital, Jhalawar 326001 Rajasthan Email: Subhash.nopra@gmail.com

**Introduction:** A Tracheostomy is frequently performed in the critically ill patient if it is expected that prolonged mechanical ventilation will be necessary. It prevents complications associated with prolonged trans laryngeal intubation, improves the care and eases the processes of weaning from mechanical ventilation. The decision on when to perform a tracheostomy has always been controversial. The tracheostomy as a means of airway access is one of the oldest surgical procedures documented, approx. 4000 year ago. Since Ciaglia et al<sup>1</sup> introduced the percutaneous dilatational tracheostomy (PDT) in 1985, percutaneous tracheostomy (PCT) has become increasingly popular and has gained widespread acceptance in many ICU and trauma centers as a viable alternative approach. In some institutions PCT has become the procedure of choice. Surgical tracheostomy (ST) has the disadvantage of transporting the critically ill patient to O.T. as well as costly operating room time performed. Even if performed bedside it is associated with inconvenient operating conditions. When ST is done we are dependent on staff of ENT department which may cause some delay in procedure. PCT using Seldinger guide wire technique as described by Ciaglia et al<sup>1</sup> minimal skin incision.

**Material and Methods:** Following approval from institutional ethical committee, this prospective study was done in 28 cases who were admitted in Medical ICU. Out of 28 cases, 14 were of snake bite (neuroparalytic), 10 were of organophosphorus poisoning & 4 were of Guillain-Barre syndrome. Sixteen were male & 12 were female. PCT set of Portex, Smiths Medical, a UK based medical industry, was used in this study. Indications for PCT were the same as those of standard open tracheostomy. Contraindications of PCT over ST by most of the published articles consider cervical injury, pediatric age, coagulopathy, whereas short and fat neck or obesity are relative contraindications<sup>2, 3, 4, 5, 6, 7</sup>.

Such patients were not included in this study. PCT was done as bedside procedure in MICU. A pillow was placed under the chest of the patient in order to extend the neck of patient (Figure 1) for better position and easy insertion of tracheostomy tube. All aseptic precautions were taken as for any surgical procedure. First thyroid cartilage of patients was palpated, then cricoid cartilage was identified, then 1<sup>st</sup> and 2<sup>nd</sup> tracheal ring was identified. Local infiltration of lidocaine with adrenaline was done at incision site. PCT was

mostly done in between 1st & 2nd tracheal ring and sometimes in between 2nd & 3rd tracheal ring.

**Figure 1: Post op Condition**



As patients were intubated pre-procedure, the ET tube was deflated and with drawn up to level of vocal cords after complete oral suction in order to make trachea free for passage of tracheostomy tube. Skin incision was made in between 1st & 2nd or 2nd & 3rd tracheal ring. Aspiration needle was attached to 5ml syringe prefilled with 2ml of xylocard. The position of needle was conformed on free aspiration of air in syringe (Figure 2).

**Figure 2**

**Aspiration of Tracheal Air**



1-2ml of xylocard was infiltrated inside the trachea in order to desensitize the trachea for the procedure. The J tip guide wire was passed into the trachea through the needle (salidiner technique) and then needle was removed. Dilator was passed over the guide wire to make the hole for passage of Grigg's forceps. Dilator was removed leaving the guide wire into the trachea, and then Grigg's forceps was introduced in trachea by sliding over the guide wire and dilatation of peritracheal cartilaginous tissue done by opening of Grigg's forceps (Figure 3).

After dilatation the Grigg's forceps was removed leaving guide wire in position, finally PCT tube was introduced into trachea by sliding over the guide wire, cuff of the tracheostomy tube was inflated and guide

wire removed and then plunger of the tracheostomy tube removed and patient connected to ventilator.

**Figure 3**



**Result:** Sixteen male & twelve female patients with an average age of 28 Years (range, 19 to 40Years) underwent PCT from Oct. 2008 to Oct.2011 (Table1). Fourteen patients were of snake bite, 10 were of organo-phosphorus poisoning & 4 were of G.B. Syndrome. All patients on whom PCT was performed were intubated pre operatively. Twelve were breathing spontaneously & sixteen were on ventilator. Average time for decision to do tracheostomy was 5 days with range of 4 to 6 days, when it was decided that particular patients will require long term ventilation/intubation.

**Table: 1 Demographic & Clinical Data**

Variable	Result
Age (Y)*	28 (19-40)
Male	16
Female	12
Snake Bite	14
Organpphosphorus Poisoning	10
Gullain-Barre Syndrome	4
Oxygen Saturation†	87% (83%-93%)

**Table: 2 Operative Data**

Variable	Result
Complete Anatomical Landmark Identification	26
Neck Extension	26
Decision of Tracheostomy after intubation	5 (4-6)
Snake Bite	14
Length of Operative Procedure	5.5 (5-6.5)
Oxygen Saturation	95% (90%-100%)
Fatal Complication	Nil

Two patients had difficulty in identification of land marks & extension of neck. Four patients who were breathing spontaneously and were not able to maintain saturation were taken on ventilator after PCT. PCT was performed in all patients without much difficulty & without conversion to open tracheostomy. The oxygen saturation improved to average of 95% with range of 90%-100% within 5 minutes of PCT. The mean time from skin incision to intubation of tracheostomy tube was 5.5 minutes with a range of 5 to 6.5 minutes (Table 2). The average stay in ICU after PCT was 7 days with a range of 5-12 days. Twelve patients died in post-operative period due to medical causes & not related to PCT. In 14 patients tracheostomy tube was removed with an average of 8 days after PCT with a range of 5 to 10 days. Stomal healed spontaneously without any complication. Two patients had removal of tracheostomy tube after one month.

**Complications:** There was difficulty in identifying land marks in 2 patients due to oedema, but PCT could be performed. Three patients had excessive bleeding from tracheal mucosa which was controlled by increasing pressure in cuff of tracheostomy tube for about 6-7 hours. Four cases had minimal infection at incision site. No tracheal stenosis or hoarseness of voice was observed at 2 months from discharge from hospital. There was no fatal complication due to PCT in this study.

**Discussion:** There are several advantages of tracheostomy in ventilator dependent critically ill patient. Due to the inherent secure nature of the tracheostomy tube, the risk of inadvertent extubation is greatly reduced, thus enhancing the patient's mobility. The risk of accidental extubation is reduced to 1% in tracheostomised patients as against 8-21% in endotracheally intubated patients, which predisposes them to adverse cardiopulmonary and hemodynamic events.<sup>8,9</sup>

Since tracheostomy is better tolerated in a majority of patients, it results in a reduced need for sedation and enables better oral hygiene and airway suctioning. Therefore, the incidence of nosocomial pneumonia is reduced and the period of mechanical ventilation may be shortened.<sup>10</sup> In addition, tracheostomy reduces the risk of complications such as laryngeal injury, tracheal injury and the like. It decreases airway resistance and facilitates early speech and oral

feeding. As compared to surgical tracheostomy, percutaneous approach has several advantages. It is a relatively simple technique for trained staff in the critical care setting, it does not require an operating theatre and the operation is usually performed under local anaesthetic and sedation. By forming a stoma between tracheal rings, the blood loss is reduced significantly as there is usually no disruption of blood vessels. Moreover, the tracheostomy tube is fitted snugly in the stoma thereby minimizing any tendency to bleeding after the procedure. The infection rates are also reduced considerably by percutaneous tracheostomy, ranging from 0 to 3.3% whereas those for open tracheostomy have been reported as high as 36%<sup>11, 12</sup>. Stenosis rates for percutaneous tracheostomy range from 0 to 9%<sup>12,13</sup>. The reported incidence of late complications resulting from open tracheostomy such as tracheal stenosis, tracheomalacia, fistula and scarring varies widely.

Small and neat stoma of dilatational tracheostomy generally results in a more cosmetic scar. Comparing PCT with historical data of complications for ST is erroneous and may give a biased picture. Furthermore, due to different definitions of complications used by authors, these figures should be interpreted cautiously. Nevertheless, comparative studies have shown that PCT has certain advantages. Firstly, it can be performed immediately once the decision is made and few personnel are needed. In contrast, ST requires more organization and since it needs to be done in the operating room, transporting a critically ill patient from the intensive care unit to operating room is a complex coordinated effort and may endanger the patient. Moreover, the time required to perform PCT is about one-quarter that of surgical route, which implies less stress to the patient and better use of available resources. The rate of perioperative complications for ST does not generally differ from that for PCT.

A prospective study by Stock et al<sup>14</sup> revealed a rate of 6.0%. In a prospective comparison of Griggs technique with standard ST, Griggs et al<sup>15</sup> reported rates of 3.9% and 8.1% respectively, for perioperative complications. However the rate of stomal infection for ST is significantly higher (6.8- 22.2%) which has been associated with the larger wound surface and tissue devitalization. Late complications of ST particularly tracheal stenosis are reported to be low, ranging between 0 - 1.1%. Although cost analysis

between PCT and ST is not easy because of varying reimbursement systems and hospital structures, available studies show that PCT is considerable cheaper than the surgical route.

**Conclusion:** Percutaneous tracheostomy has replaced the surgical route in several intensive care units and it is indeed the procedure of choice in the majority of cases. This is attributable to the fact that it is safe, easy and quick, and there is no need to move the patient to the operating room. Perioperative complications are at least comparable with those of surgical tracheostomy and most of them are minor. An important advantage of PCT over the surgical route is the very low rate of stomal infections. Furthermore, PCT is cheaper than ST.

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