ECRONICON OPEN ACCESS

EC PULMONOLOGY AND RESPIRATORY MEDICINE

Mini Review

The Red Rubber Nelaton Catheter as an Auxiliary Material for Use in Thoracic Surgery

René Agustín Flores-Franco*

Pulmonary Diseases Division, Regional General Hospital of Zone 1, "Morelos" Unit, Mexican Institute of Social Security, Universidad and Garcia Conde Av., Chihuahua, Chih., México

***Corresponding Author:** René Agustín Flores-Franco, Pulmonary Diseases Division, Regional General Hospital of Zone 1, "Morelos" Unit, Mexican Institute of Social Security, Universidad and Garcia Conde Av., Chihuahua, Chih., México. **E-mail:** rflores99@prontomail.com

Received: March 05, 2021; **Published:** March 31, 2021

Abstract

The red rubber Nelaton catheter is usually utilized for urological purposes such as clean intermittent catheterization of the bladder. In thoracic surgery, the Nelaton catheter has been given multiple uses. Its current applications and future potentialities are briefly discussed.

Keywords: *Nelaton Catheter; Chest Tubes; Tracheal Stenosis*

Introduction

The red rubber Nelaton catheter is usually utilized for urological purposes such as clean intermittent catheterization of the bladder. It is commonly known as the Nelaton catheter, after its inventor, the French surgeon Auguste Nelaton (1807 - 1873). It is the most flexible among the various catheter materials, which has allowed it to be used for other multiple purposes in surgery. The length is usually near to 40 cm, the thickness of the number 1 is 1.5 mm in diameter, and as the number is increased, the diameter increases by 0.5 mm. The Nelaton catheter has a rounded and straight distal end with two lateral eyes for drainage. As others urinary catheters, the Nelaton catheter is made of natural rubber or latex, a material that is in abundance at relatively low cost and possesses a range of properties suitable for fabrication [1]. It also has excellent physical characteristics, including good resistance to gouging, excellent recovery and relatively high tensile strengths. In thoracic surgery, the Nelaton catheter has been given multiple uses. As an example, the most popular use of the Nelaton catheter is for intercostal chest drain. This is how it is regularly used in austere environments and as well adapts to any thoracic drainage system. Because to its elastic characteristic, can hardly be fragmented with any clamps, it is more comfortable for the patient, and allows milking maneuvers [2]. The available diameters of the Nelaton catheter are the same as those of PVC or silicone chest tubes, but unlike these, the Nelaton catheter is not fenestrated along the sides, it is not translucent and do not have a radiopaque stripe. Alternatively, the Nelaton catheter also has been used as a guide, like Seldinger technique for the insertion of an Argyle-type chest tube [3].

Lobar or segmental atelectasis are the respiratory complications most frequently observed in the immediate postoperative period, especially when surgery is performed urgently. Occasionally, a mucus plug located in one of the main bronchi is the cause of lobar atelectasis, and not infrequently, conventional respiratory physiotherapy is insufficient to achieve its clearance, especially when the mucus plug is located in the left main bronchus. With the patient already extubated but still under electrocardiographic and oximetric monitoring, a simple method of aspirating a mucous plug located in the left main bronchus by means of transglottic introduction of a 32 Fr Nelaton with the aim of partially obstruct the lumen of the right main bronchus so that, when passing a second catheter in the same way, it can access the left main bronchus in order to finally be able to aspirate the mucus plug (Figure 1). Optionally, the first catheter can be connected to a source of oxygen, an ambu bag or a capnometer. Local anesthetic block of the superior laryngeal nerves and some degree of sedation may

be necessary. Nelaton catheters offer the advantages over conventional endotracheal tubes greater flexibility and not having a balloon with which it could interfere with the adjacent passage of another catheter. In addition, on the Nelaton catheter corresponding to the right main bronchus, some side holes could be made to improve ventilation if required. As prerequisites, the patient should not have increased the work of breathing since there would be other priorities in its management, such as securing the airway or establishing some mode of ventilatory support. Also, it is necessary to previously evaluate the airway by means of a chest radiograph for ensure the lack of patency of the left main bronchus. The technique of selective aspiration of mucus plugs located in the left main bronchus using catheters has already been described by Ozturk and Bayrakci in the pediatric population with good results [4]. Likewise, ventilation through a Nelaton catheter has also been described by other authors as an auxiliary technique in the face of a difficult airway [5] and seeing how the 32 Fr calibers offers an adequate airflow resistance equivalent to a 5 mm endotracheal tube internal diameter.

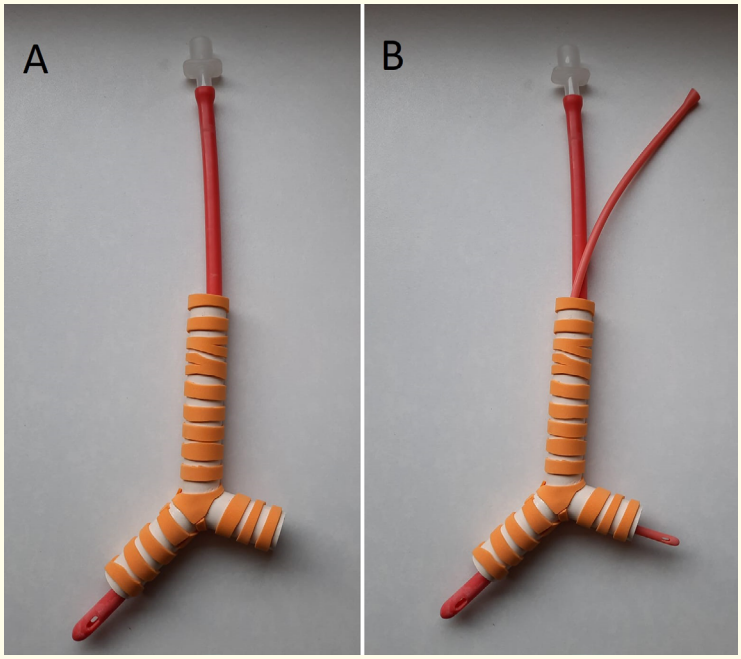

Figure 1: *A. Anatomical model of an adult trachea (19 mm ID) illustrating how when a 30 or 32 Fr Nelaton catheter is inserted, it easily accesses the right main bronchus. B. When a second 16 Fr catheter is introduced, it is directed to the left main bronchus due to the partial obstruction of the right main bronchus by the larger diameter catheter.*

Airway stenting is a specialized procedure requiring specific expertise and facilities. Hence, it is usually performed in few designated centers. With the large number of patients requiring prolonged intubation during the current COVID-19 pandemic, it is expected that many will develop post-intubation tracheal stenosis. The rapid deterioration with impending death due to asphyxia posed a dilemma in these circumstances as a tracheal stent often is not immediately available. If a dedicated tracheal stent is not immediately available, a modification of the Nelaton catheter, as shown in the figure 2, may be a life-saver in the occasional patient presenting with life threatening benign or malignant tracheal obstruction. This modification is made by cutting the wider proximal end of the Nelaton catheter and folding its ends on itself thus obtaining a piece similar to a stent. The folds are helpful to prevent migration of the stent within the airway, provided the appropriate diameter is selected. These latex stents are easily inserted and easily replaced or removed, and there is no risk of airway wall perforation.

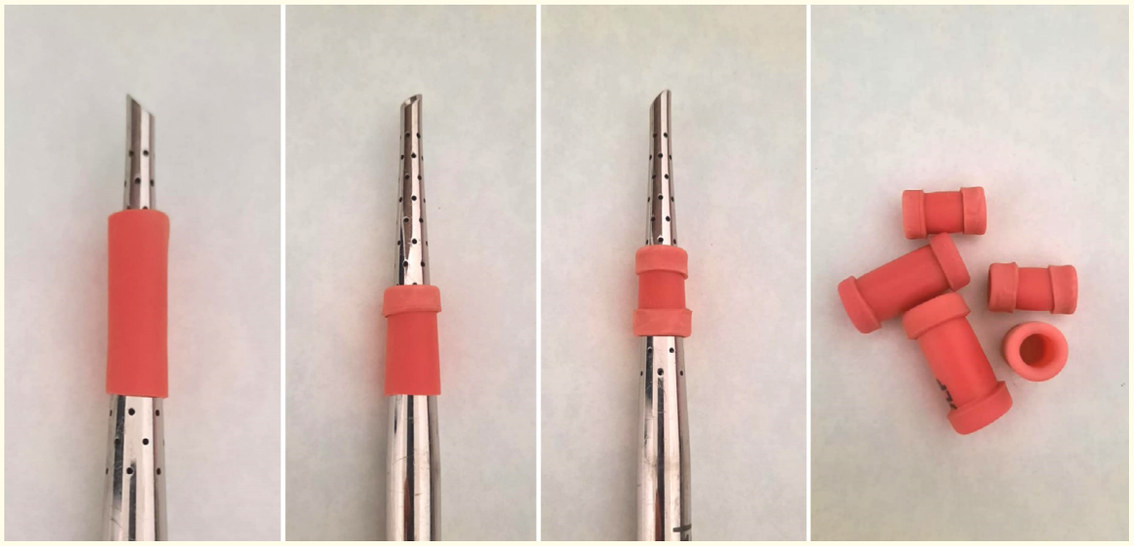

Figure 2: *Simple method of improvise a tracheal stent using the proximal end of a Nelaton catheter and a dilatational tracheoscope. From left to right, the catheter section is mounted on the tracheoscope, and then the edges are sequentially folded until obtaining a stent-like piece.*

Conclusion

Using available technology integrated to humanistic factors and local contexts make it superior to the most advanced technology. In the meantime, a simple improvisation on an existing resource may alleviate the problem in challenging clinical scenarios with no additional cost incurred. More than 150 years after its invention, the Nelaton catheter still offers a valuable alternative in surgical units in many locations of least developed countries.

Conflict of Interest

The author declare that there have not any financial interest or any conflict of interest exists.

Bibliography

1. Lawrence EL and Turner IG. "Materials for urinary catheters: a review of their history and development in the UK". *Medical Engineering and Physics* 27.6 (2005): 443-453.

2. Flores-Franco RA. "Intercostal chest drain clamping". *Lung India* 37.1 (2020): 79-80.

3. Altman E, *et al*. "Modified Seldinger technique for insertion of standard chest tubes". *The American Journal of Surgery* 181.2 (2001): 354-355.

4. Ozturk Z and Bayrakci B. "A novel technique with double catheter suctioning for clearing away the left lung atelectasis: selective left bronchial aspiration (SeLBA)". *The Clinical Respiratory Journal* 13.11 (2019): 1-5.

5. Sezari P., *et al.* "Tracheal intubation using Nelaton catheter: a simple device, an airway rescue option". *Turkish Journal of Anaesthesiology and Reanimation* 48.5 (2020): 414-416.

Volume 10 Issue 4 April 2021