بسم الله الرحمن الرحيم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

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جامعة عين شمس

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MONA MAGHRABY

Bronchoscopic Management as an Alternative Treatment In Non Operable Benign Tracheal Stenosis

Thesis

Submitted for Partial Fulfillment of M.D. Degree in Pulmonology

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List of Contents

List of Tables

List of Figures

List of Abbreviations

Abb.	Full term
AP	Anteroposterior
BMP-2	Bone morphogenetic protein 2
COPD	Chronic obstructive pulmonary disease
CT	Computed tomography
EDAC	Excessive dynamic airway collapse
EMS	Expandable metal stent
ENT	Especially otolaryngology
FDA	Food and Drug Administration
FEV1	1 s forced expiratory volume
HCT	Helical CT scanning
LTS	Laryngotracheal stenosis
MDCT	Multi-detector computed tomography
MRI	Magnetic resonance imaging
SGS	Subglottic stenosis
TM	Tracheomalacia
TPO	Tracheobronchopathia osteochondroplastica
TS	Tracheal stenosis
WHO	World Health Organization

INTRODUCTION

Tracheal stenosis (TS) is an abnormal narrowing of the tracheal lumen, which can affect adequate airflow and causes significant pulmonary morbidity. It can occur at any anatomical level. TS refers to narrowing of the airway lumen from the cricoid cartilage to the main carina. Subglottic stenosis (SGS) refers to airway narrowing in between the glottis (i.e. vocal cords) and the cricoid cartilage. Laryngotracheal stenosis (LTS) encompasses any obstruction involving the larynx and/or the trachea. TS can be congenital but is usually acquired. Acquired TS can be caused by a wide range of pathologies including tracheal trauma, infections, non-infectious, neoplastic, and iatrogenic causes. The most common cause of TS is endotracheal intubation ***(Bacon et al., 2014).***

Tracheal stenoses with extensive scarring ≥1cm varying degrees of cartilage involvement or circumferential contraction scarring or tracheal stenoses associated with malacia and inflammation were defined as complex; simple stenoses were defined as lesions having endoluminal occlusion of a short segment (<1 cm), with the absence of tracheomalacia or loss of cartilaginous support ***(Cavaliere et al., 2009).***

Treatment of TS remains unclear and challenging. Surgeons especially otolaryngology (ENT) have traditionally managed it and many physicians consider surgical resection as the first and best option. Early studies suggested that

endoscopic treatment was less effective for circumferential disease and for stenosis greater than 1cm in length. Recent studies have demonstrated that involvement of the cricoid cartilage and stenoses over 3cm are associated with an even more reduced chance of success ***(Schweinfurth et al., 2012).***

Galluccio et al. proposed the classification of TS into simple and complex, with simple stenosis defined as those less than 1cm in length with no associated tracheomalacia or loss of cartilaginous support ***(Galluccio et al., 2009).***

Endoscopic procedures can be considered in simple stenosis, as a bridge to definitive surgical intervention or for patients deemed at high risk for surgical intervention. However, with the recent advances in the field of interventional pulmonology, definitive management of TS using minimally invasive endoscopic methods became increasingly common ***(Wong et al., 2010).***

Examples of endoscopic methods that have been used include mechanical dilation with the barrel of the rigid bronchoscope, balloon dilation, laser resection, cryotherapy, electrocautery, photodynamic therapy, stent insertion, and local treatments such as steroids, 5-fluorouracil, and mitomycin C. Although the traditional approach is to use rigid bronchoscopy for endotracheal intervention, other centers have described using flexible bronchoscopy to intubate, dilate, and stent patients with TS without complication ***(Bhora et al., 2016).***

AIM OF THE WORK

The aim of the study is to investigate the role of structured algorithmic bronchoscopic management of non operable tracheal stenosis either by simple dilatation or stent insertion evaluating treatment strategies used and complications encountered and outcome.

REVIEW OF LITERATURE

Tracheal Stenosis

I) Basic facts

- ***Anatomy of the trachea***

The trachea extends from the lower body of the cricoids to the top of the carina spur. Average tracheal length was found to be 11.8cm, with a range of 10 to 13cm. there are approximately 2 cartilaginous rings per cm for a total of 18 to 22 rings. These C shaped rings form the anterior and lateral walls of the trachea. The posterior wall is membranous. The internal diameter of the trachea measures about 2.3cm laterally and about 1.8cm antero-posteriorly. Looked at laterally, the trachea starts in the subcutaneous position at the cricoids level and ends in a prevertebral plane at the level of the carina. The proximal trachea is cervical and becomes mediastinal at the sternal notch. When the head is flexed the trachea can become completely mediastinal ***(Grillo, 2004).***

Conversely when the head is extended a longer portion of the trachea becomes cervical. The blood supply is as follows: It is segmental and approaches the trachea laterally. The upper trachea is perfused by the inferior thyroid artery, while the lower trachea is perfused by the bronchial arteries with contributions from the subclavian, internal mammary, innominate, internal thoracic and the supreme in intercostals

arteries.Importantly the recurrent laryngeal nerves course posterolaterally to the trachea in the groove between the trachea and the oesophagus and enter the larynx between the cricoids and the thyroid cartilages immediately anterior to the inferior cornua of the thyroid cartilage ***(Minnich and Mathisen, 2007).***

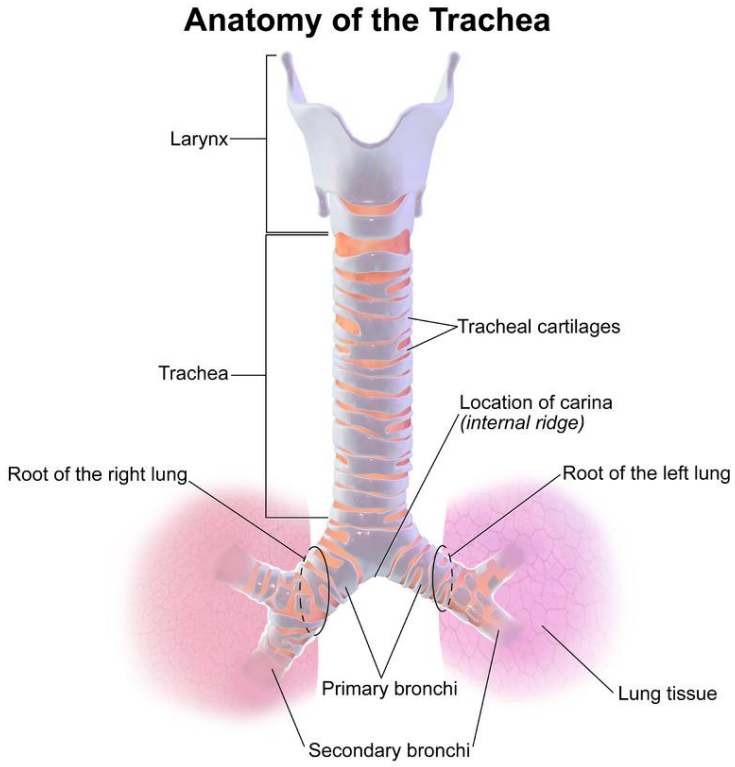

Figure (1): Tracheal Anatomy.

- ***Physics of air flow***

Flow through a tube, whether through the trachea, circulation, or any other orifice, can be difficult to measure. It is important to distinguish between flow and velocity, which can be often confused. Flow, often denoted as Q, is defined as