

# Use of tracheal stenting in the palliation of anaplastic thyroid carcinoma: tertiary centre experience

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## Abstract

**Background:** Anaplastic thyroid carcinoma is rare but carries a poor prognosis. Anaplastic thyroid carcinoma leads to tracheal compression, airway compromise and eventually death. Airway compromise, a particularly distressing symptom, can be palliated with tracheal stenting.

**Method:** A retrospective case note analysis was conducted of patients diagnosed with anaplastic thyroid carcinoma between July 2003 and July 2013.

**Results:** Twelve patients with anaplastic thyroid carcinoma were identified. Four patients underwent palliative tracheal stenting. Three patients had no dyspnoea at the time of stenting. Two stented patients subsequently developed dyspnoea secondary to stent migration; this was managed successfully with stent exchange. The other stented patient remained asymptomatic with regards to dyspnoea. All non-stented patients died with or from airway compromise.

**Conclusion:** Tracheal stenting is a relatively safe and effective method for palliation of distressing airway symptoms in patients with anaplastic thyroid carcinoma. Early prophylactic tracheal stenting in anaplastic thyroid carcinoma may be an effective option to prevent development of airway compromise as the disease progresses.

**Key words:** Thyroid Neoplasms; Anaplastic Thyroid Cancer; Airway Obstruction; Palliative Care; Stent

## Introduction

Anaplastic thyroid carcinoma is rare and accounts for around 2 per cent of thyroid malignancies.<sup>1</sup> The disease is extremely aggressive and carries a poor prognosis, with a median survival time of 4 to 12 months from diagnosis.<sup>2</sup> Anaplastic thyroid carcinoma is locally aggressive, leading to tracheal compression and airway compromise. Airway compromise is a common cause of death in fatal thyroid carcinomas, including anaplastic thyroid carcinoma.<sup>3</sup>

Airway compromise is a distressing component of terminal anaplastic thyroid carcinoma,<sup>4</sup> both for the patient<sup>5,6</sup> and the family members.<sup>5</sup> Tracheostomy and tracheal stenting are two options for palliating airway compromise in anaplastic thyroid carcinoma. The current American Thyroid Association guidelines reserve these options for impending airway compromise only.<sup>7</sup>

There is a paucity of evidence assessing the efficacy of tracheal stenting in the palliation of airway compromise in anaplastic thyroid carcinoma. One small case series reported effective palliation with tracheal

stenting of anaplastic thyroid carcinoma patients who had a critically compromised airway, albeit with no survival benefit.<sup>8</sup>

We utilise tracheal stenting in the palliation of airway compromise in anaplastic thyroid carcinoma at our tertiary head and neck centre. On the basis that almost all patients with anaplastic thyroid carcinoma develop airway obstruction, we modified our approach and started to prophylactically stent asymptomatic anaplastic thyroid carcinoma patients. Our aim was to prevent the development of airway compromise or slow its progression. This novel approach has not been described in the literature and we report our early experiences.

## Materials and methods

### Patient selection

Patients with anaplastic thyroid carcinoma and tracheal compression were selected for tracheal stenting after multidisciplinary team discussion. We utilised specific selection criteria (Table I) to determine the suitability of a patient for palliative tracheal stenting. The criteria

**TABLE I**  
SELECTION CRITERIA FOR TRACHEAL STENTING IN ANAPLASTIC THYROID CARCINOMA PATIENTS

Inclusion criteria	
– Medically fit for anaesthesia	
– Tracheal stenosis located at least 1 cm distal to vocal folds	
Exclusion criteria	
– Medically unfit for anaesthesia	
– Tracheal stenosis located less than 1 cm distal to vocal folds	
– Anatomical distortion of trachea preventing safe stent insertion	

pertained to the extent of disease, location of tracheal stenosis and fitness for anaesthesia. Tracheal stenting was initially performed on patients with airway compromise; however, we modified our technique to prophylactically stent asymptomatic patients with a view to prevent the development of airway compromise.

*Stent placement*

Stents were placed under general anaesthesia with a ventilating bronchoscope, under direct vision. We utilised covered, expandable metallic stents (Boston Scientific® stents) of an appropriate length. After the procedure, routine chest radiography was performed to confirm correct positioning of the stent and assess the lung.

*Data analysis*

A retrospective case note review was carried out to identify patients diagnosed with anaplastic thyroid carcinoma between July 2003 and July 2013. All patients with follow-up data complete until the time of death were included. We collected and analysed data pertaining to patient characteristics, treatment received and outcomes with respect to survival and the development of dyspnoea.

**Results**

Twelve patients with anaplastic thyroid carcinoma were identified, consisting of 2 males and 10 females. The mean age at presentation was 71.8 years (range, 54–87 years). Presenting symptoms of anaplastic thyroid carcinoma included dyspnoea (*n* = 2), dysphagia (*n* = 7) and a neck mass (*n* = 9). Tumour–node–metastasis (TNM) staging at diagnosis was as follows: T<sub>4b</sub>N<sub>0</sub>M<sub>0</sub> (*n* = 2), T<sub>4b</sub>N<sub>1b</sub>M<sub>0</sub> (*n* = 2), T<sub>4a</sub>N<sub>0</sub>M<sub>1</sub> (*n* = 2), T<sub>4b</sub>N<sub>0</sub>M<sub>1</sub> (*n* = 1) and T<sub>4b</sub>N<sub>1b</sub>M<sub>1</sub> (*n* = 5). Treatment included palliative radiotherapy alone in seven patients and chemoradiotherapy in two patients.

Five patients that met the inclusion criteria were selected for tracheal stenting after multidisciplinary team discussion. Tracheal stenting was successfully performed in four patients (Table II) and was not possible in one patient due to distorted airway anatomy.

Three patients did not have airway symptoms at the time of stenting, but were stented with a view to prevent development of airway compromise. Of these three patients, one remained asymptomatic with regards to dyspnoea. The other two patients subsequently developed

**TABLE II**  
CHARACTERISTICS OF ANAPLASTIC THYROID CARCINOMA PATIENTS WHO UNDERWENT TRACHEAL STENTING

Pt no	Age (y)	Sex	Cancer (TNM) stage	Dyspnoea at presentation?	Dyspnoea developed later?	Surgery	RT alone?	CRT?	Obstruction type	Tracheal stenosis (%)	Stent length (cm)	Stent exchange?	Survival post-stenting (days)	Survival post-diagnosis (days)
1	82	F	T <sub>4b</sub> N <sub>1b</sub> M <sub>1</sub>	No	No	None	Yes	No	Intrinsic	50	4	No	31	39
2	61	F	T <sub>4b</sub> N <sub>1b</sub> M <sub>1</sub>	No	Yes	None	Yes	No	Extrinsic	50	6	Yes	60	64
3	63	F	T <sub>4b</sub> N <sub>1b</sub> M <sub>1</sub>	Yes	N/A	None	No	Yes	Extrinsic	70	8	No	15	52
4	55	F	T <sub>4a</sub> N <sub>1</sub> M <sub>1</sub>	No	Yes	Right hemithyroidectomy	Yes	No	Extrinsic	40	8	Yes	175	189

Pt no = patient number; y = years; TNM = tumour–node–metastasis; RT = radiotherapy; CRT = chemoradiotherapy; F = female; N/A = not applicable

acute dyspnoea as a result of stent migration secondary to tumour ingrowth. These two patients were treated with stent exchange (at 59 and 161 days after the original stenting procedure respectively). Following stent exchange, the dyspnoea resolved in both of these patients.

One patient who had dyspnoea prior to stenting continued to have dyspnoea following successful stent insertion; this was thought to be because of the burden of pulmonary metastasis.

No other complications from stent insertion were noted. Of the remaining eight non-stented patients, all died with or from dyspnoea.

In the stented group, mean survival time post-diagnosis was 86 days (range, 39–189 days), compared to 90.8 days (range, 8–233 days) in the non-stented group. Mean survival time post-stent insertion was 70.3 days (range, 15–175 days).

## Discussion

Anaplastic thyroid carcinoma is an aggressive malignancy that carries the poorest prognosis of all thyroid carcinomas. The disease is more common in elderly patients, with a female preponderance.<sup>9</sup> This pattern is demonstrated in the characteristics of the anaplastic thyroid carcinoma patients in this study. A younger age appears to be linked to better survival rates.<sup>10</sup> The treatment of anaplastic thyroid carcinoma remains palliative, and further evidence regarding the efficacy of radiotherapy and chemotherapy is required.<sup>11</sup>

Death from anaplastic thyroid carcinoma is attributed to airway obstruction in 50 per cent of cases.<sup>12</sup> Airway compromise represents a distressing mode of decline and death.<sup>4–6</sup> Airway obstruction can be palliated with tracheal stenting or tracheostomy. Tracheostomy in anaplastic thyroid carcinoma patients can be surgically challenging because of tracheal distortion.<sup>13</sup> In addition, a tracheostomy requires extensive care from the patient, family and nursing staff, and is potentially complicated by bleeding, tube displacement and fungation of the tumour around the tracheostomy.<sup>13</sup>

Tracheal stenting presents a less invasive palliative option in patients with anaplastic thyroid carcinoma and other thyroid malignancies. Their use not only relieves dyspnoea immediately but also improves the quality of life reported by patients.<sup>14–17</sup> Only one study has assessed the use of tracheal stents solely in anaplastic thyroid carcinoma patients; that study reported improved dyspnoea in patients presenting with critical airway obstruction.<sup>8</sup>

Tracheal stents are available in a variety of materials. Silicon stents are popular, but carry a risk of mucus retention<sup>18</sup> and stent displacement.<sup>18–20</sup> Metallic stents adhere to tracheal walls better than silicon stents through the process of epithelialisation, and this theoretically reduces the risk of stent displacement.<sup>21</sup> In addition, the use of a covered stent may reduce tumour ingrowth. Expandable metal stents are

good for restoring airway patency in end-stage malignancy.<sup>22</sup>

Complications of stenting include infection,<sup>14</sup> retained secretions,<sup>14</sup> stent migration,<sup>14,21</sup> growth of granulation tissue,<sup>23,24</sup> tumour ingrowth<sup>14,15,23</sup> and perforation.<sup>14</sup> Insertion of the stent with rigid bronchoscopy allows accurate and safe placement of the stent via direct visualisation. In the last six years, we have had no mortalities, and complication rates associated with rigid bronchoscopy have been low at our institution.<sup>25</sup> In the present study, there were no immediate complications from stent insertion and this safety is mirrored by other studies.<sup>23,26</sup>

Current approaches have focused on tracheal stenting in patients with airway compromise due to advanced thyroid malignancy. The results of our study suggest that airway stenting is a potential management option for patients with anaplastic thyroid carcinoma who have not yet developed airway symptoms. The theoretical basis for this is multifactorial. Airway compromise occurs in almost all patients, and early stent placement will reduce patient distress and suffering. In addition, when airway symptoms have already developed, the procedure can become technically more difficult and may not be possible because of airway distortion, as we found in one case. Whilst problems with stent migration and granulation can occur, these can be readily managed with bronchoscopic treatment and stent exchange. As patients with anaplastic thyroid carcinoma have limited survival, it is unlikely that patients will have to undergo repeated stenting procedures.

- **Anaplastic thyroid carcinoma is a rare but aggressive form of thyroid cancer with a poor prognosis**
- **Patients develop tracheal compression leading to airway compromise and distress prior to death**
- **Tracheal stenting can palliate airway distress in anaplastic thyroid carcinoma patients**
- **At our centre, tracheal stenting is undertaken in anaplastic thyroid carcinoma patients prior to airway compromise**
- **The results suggest that tracheal stenting is a safe and effective way of palliating airway compromise symptoms in these patients**

A limitation of this study is the small sample size. There is already some evidence for the use of airway stenting in the context of acute airway compromise in anaplastic thyroid carcinoma; however, further evaluation is necessary to assess the safety and efficacy of this procedure in preventing airway symptoms.

## Conclusion

Airway compromise is an almost inevitable feature of anaplastic thyroid carcinoma. Tracheal stenting is an effective alternative to tracheostomy in the management of this symptom. Early prophylactic tracheal stenting in asymptomatic patients may also have a role in the prevention of airway compromise, and could thereby improve quality of life for patients with this aggressive disease.

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Mr K Varadharajan takes responsibility for the integrity of the content of the paper

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