The Surgical Management of Laryngo-Tracheal Invasion in Locally Advanced Thyroid Carcinoma and The Myth of Tracheomalacia

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Societat Catalana de Cirurgia
Simposi de Complicacions de la Cirurgia de la Glandula Tiroide
Barcelona
Maig 2012
Guy’s and St Thomas Hospital

- Tertiary referral centre
- Full centralization since 2007
- 2.5 million population
- 450 head and neck cancers
- 175 thyroid surgeries
- 40 thyroid carcinomas
- RIA centre
- RT centre
- Weekly MDT
- 2 teams - Endocrine surgery and head and neck surgery
Outline

• Larynx and tracheal invasion in locally invasive differentiated thyroid carcinoma

• The myth of tracheomalacia and its management
Introduction

- DTC accounts for **80%** of thyroid cancers
- Often multifocal and up to **60%** may have lymph node metastasis
- Over **85%** have an excellent overall prognosis
- Up to **15%** may display aggressive behavior
Pathology of Differentiated Thyroid Cancer

Follicular Cell → Papillary/Follicular DTC → Tall/Columnar Cell → Poorly Differentiated → Anaplastic
Prognosis

- Presence of extra-thyroidal invasion is associated with worse prognosis
- Incomplete resection carries worse prognosis
- Shave or resect appears to confer similar survival results
- Controversy exists regarding management

Pre-operative Evaluation

- Essential
- USS guided FNAC
- CT Scan
- Magnetic Resonance Scan

*Patel and Shaha 2005, Czaja McCaffrey 2006*
Pre-operative Evaluation

**Pre-operative fibreoptic laryngoscopy**

- Essential
- Provides a dynamic view
- Essential medico-legal investigation

*Jeannon and Simo 2009, Czaja McCaffrey 2006*
Management Principles

- Adequate excision of gross tumour
- Preservation of functioning structures – allowing breathing, swallowing and phonation
- Preservation of vital structures
- Use of adjuvant therapies

Surgery for the Locally Advanced Thyroid Carcinoma

- Multidisciplinary approach essential
- Dedicated and experienced surgical team
- Anaesthetics, Thoracic, Plastics and UGI teams available
- Pre-operative planning and excellent post-operative care

Surgery for Locally Advanced DTCa

- Thyroid
- Pre-thyroid - strap muscles
- Recurrent Laryngeal Nerve
- Superior Laryngeal Nerve
- Parathyroids
- Larynx
- Trachea
- Pharynx
- Oesophagus
- Great vessels
- Neck
- Multi-structure involvement
Total Thyroidectomy with Level VI Selective Neck Dissection

- **Wide-field** total thyroidectomy and Level VI SND
- Exposure carotid sheath
- Lateral to medial approach

*Jeannon and Simo 2009, Patel and Shaha 2005*
Management of Larynx

*Laryngeal involvement*

- Laryngeal involvement is infrequent when compared with other peri-thyroid structures
- Minimal invasion does not carry worse prognosis
- Cartilage invasion without intraluminal involvement can be treated with shaving
- Intraluminal invasion requires resection

*Patel and Shaha 2005, Kowalsky 2002*
Management of Larynx

**When to shave?**

- Minimal cartilage involvement - Shaving +/- Repair
- Preservation of inner pericondrium - Shaving +/- Local repair

Management of Larynx

When to resect?

• Intraluminal involvement - Partial Laryngectomy or total laryngectomy

• Take in account co-morbidities and pulmonary reserve as many of these patients are elderly

Management of Trachea

Tracheal involvement

- More common than larynx
- Direct extension anteriorly or postero-laterally
- Staging system I to V to assist planning

*Patel and Shaha 2005, Czaja McCaffrey 2006, Grillo et al 1988*
Management of Tracheal Invasion

McCaffrey JD, Laryngoscope 2006
Management of the Trachea

When to shave?

- Tumour confined to the tracheal wall
- Stages II and III
- Invasion through perichondrium and superficially into the cartilage but preservation of the inner perichondrium

Management of Trachea

When to resect?

- Invasion through perichondrium, trough the cartilage and into the lumen – Stages IV and V
- Excision involved segment and Local repair,
- Segmental resection with primary end to end anastomosis or laryngo-tracheal reconstruction.
- Patient intubated for 48 - 72 hours
- High dose steroid therapy
- No suction drains

Shin et al 1993, Friedman 1990, Kowalski and Filho 2002
Tracheomalacia – Reality or Myth?
Aetiology and Pathophysiology

• Tracheal softening or destruction tracheal rings leading to lack of support
• Significant long-standing compression
• Goitre provides stability
• Degree of compression over 3.5 mm
• Bifasic stridor
• Inspiration – Bernouilley effect
• End of expiration – Bernouilley effect
## Incidence 25 years

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**Average incidence rate = 1.6**
Predictors of Tracheomalacia
Predictors of Tracheomalacia

• Age > 70 years
• Gender - Female
• Duration of goitre > 13.5 years
• Co-morbidities – Anaemia
• Pre-operative airway distress symptoms
• Size > 400gr
• Anatomical location – retrosternal/substernal goitres
• Presence of malignancy
• Partial resection of tracheal rings
Evaluation

• **Pre-operative evaluation**
  – Clinical assessment with Fibreoptic Nasendoscopy
  – CT/MRI
  – Risk assessment

• **Intra-operative evaluation**
  – Tracheal palpation
  – Static and Dynamic Laryngo-tracheo-bronchoscopy and tracheal observation
  – **Exclude recurrent laryngeal nerve injury**
Prevention

• Ensure adequate planning
• Use of nerve monitor
• Palpate trachea following surgery
• If unsure or high risk patients – perform prophylactic tracheostomy and assess vc function and trachea dinamycally
Management Mild Tracheomalacia

Mild Tracheomalacia

- Positive Pressure Ventilation and reassess
- Tracheal suspension
- Temporary Tracheostomy
Management Severe Tracheomalacia

**Small segment – 6 cm or less**
- Positive Pressure Ventilation
- Tracheal suspension
- Tracheal stenting
- Tracheostomy
- Segmental resection

**Large segment – <6cm**
- Tracheostomy
- Montgomery stents – T-tubes
- Marlex suspension Mesh
- Tracheal mini-plate fixation
Conclusions

• Tracheomalacia is extremely rare but does exist
• Always exclude bilateral recurrent laryngeal nerve injury
• If in doubt perform a tracheostomy and re-evaluate
• Definitive treatment will depend on severity which is usually proportional to the length of the tracheomalatic segment
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