Endoscopic Surgery in the Paediatric Airway

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History of paediatric stenosis

- **60’s**  Premature infants survive
  - Acquired Subglottic Stenosis
  - Tracheostomy
- **70’s**  Open laryngeal surgery, Rib graft repair
- **80’s**  Cricoid split to deal with early cases
- **90’s**  Single stage laryngeal reconstruction
  - Partial cricotracheal resection
- **2000+** Endoscopic techniques
Why endoscopic rather than open?

• Concerns with existing techniques
  • Tracheostomy
  • Poor vocal outcome
  • LASER

• Initially encouraging results
  • Convergent thinking: not alone
  • Concepts fit with my animal work

• New techniques available
  • Sharp division
  • Radial dilatation
  • 12+ Bar without shearing
  • Microdebrider
  • Mitomycin
  • Steroids
  • Stents
  • Lateralisation sutures
Minimally invasive techniques in the literature

• Surgeons using advanced endoscopic techniques in the airway
  – Rutter
  – Froehlich
  – Rothera

• Endoscopic balloon dilatation of subglottic stenosis

• Endoscopic posterior cricoid split and rib grafting in 10 children
  – Inglis and Manning
    Laryngoscope 2003
Conditions now treated endoscopically

– Laryngomalacia division/resection
– Cysts sharp avulsion
– Soft early stenosis cricoid split
– Restenosis after LTR T-tube
– Established stenosis grafts
– High tracheal stenosis stents
– Webs keel
– Vocal cord palsy lateralisation suture
– Interarytenoid scar lateralisation suture
Basic Endoscopic Techniques

• Anaesthesia
• Adrenaline
• FESS style 2 handed surgery

• Initial Techniques
• Cut/divide/shave
• Balloon
• Injection

• Later Techniques
• Stent
• Suture
• Graft
Anaesthesia

- Spontaneous respiration
  - Halothane/Sevoflurane
- Topical anaesthesia
  - Intramuscular Atropine
- Topical Epinephrine

- OR

- Total Intravenous anaesthesia
Initial Techniques

- Sharp division in stenosis or even laryngomalacia
- Sharp removal granulations and cysts
- Sharp division of stenosis and webs
- Radial balloon dilatation
- Microdebrider
- Inject steroids
- Apply Mitomycin
Laryngomalacia
Sharp Removal Of Cysts
Endoscopic Decompression Of Edematous Larynx
Balloon radial dilatation
Microdebrider
Mitomycin C

- Antineoplastic antibiotic - acts as an alkylating agent by inhibiting DNA and protein synthesis
- Dose 0.4 to 4 mg/ml
- 2 mg/ml
Triamcinolone Injection

- 40 mg in 1 ml
Later Techniques

• Repeat radial dilatation
• Mitomycin/Steroids

• Lateralisation sutures

• Montgomery T-Tube
• silastic keels
• tube stents

• Wedge resection
• Endoscopic grafts
AZ: 8 years, anterior web following laser for papilloma

• Division with insertion of silastic stent
CW 12 years-
Endoscopic Insertion of Endolaryngeal Stent
EJ: 12 years old, failed laser division of web stenosis
RC: 12 years skiing accident
• Division of interarytenoid scar, anterior web and subglottic stenosis
MK: Downs, microtrachea

• Cricotracheal resection

• Multiple stents

• Thin stenosis
MK: Downs, microtrachea

- Repeated:
- Sharp division
- Balloon
- Steroid injection
EB: ex prem with stridor
ES 8, years, Larsens syndrome
T tube to prevent restenosis
N.A 6 years, vocal cord palsy
Lateraliisation suture
BB, 12 years, posterior scar
Endoscopic posterior graft
Summary

- Advanced endoscopic procedures may reduce the need for open surgery.
- The indications, risks and benefits need to be determined.
- My experience has been mostly positive:
  - No major complications
  - A few notable success stories
  - Time and cost a consideration