ONLINE SUPPLEMENTS

Appendix 1. Details of surgery and anaesthesia

Anaesthesia. All procedures were performed under general anaesthesia. Patients had intravenous induction of anaesthesia with a bolus of propofol (3mg/Kg) (Fresenius Kabi Ltd, Runcom, UK) and fentanyl citrate (100mcg) (Auden Mckenzie Ltd, Middlesex, UK) and were temporarily paralyzed with atracurium besilate (Hameln Pharmaceuticals Ltd, Gloucester, UK) muscle relaxant. The airway was initially secured using a classic laryngeal mask airway (Intavent, Orthofix, UK) (LMA) and intermittent positive pressure ventilation was established. The LMA was removed in the operating room and a suspension laryngoscope was positioned to visualize the vocal cords and the subglottis/proximal trachea. High-frequency supraglottic jet ventilation at a rate of 100Hz was then established. Total intravenous anaesthesia, using an infusion of propofol and alfentanil hydrochloride (Janssen-Cilag Ltd, High Wycombe, UK) was used throughout the procedure. At the end of the operation the laryngoscope was removed and the LMA was again used to secure a supraglottic airway. Paralysis was reversed using neostigmine (2.5mg) and glycopyrolate (500mcg) (Robinul®-Neostigmine Injection: Anpharm Ltd, Tipperary, Ireland) and the patient was ventilated until spontaneous breathing was re-established. There were no differences in the administration and maintenance of anaesthesia between patients being treated for tracheal or bronchial lesions.

Surgery. For subglottic/tracheal procedures the airway was visualized with a combination of microscopic and endoscopic techniques, using a standard operating microscope and a 4mm 0^o Karl-Storz airway endoscope (Karl Storz GmbH & Co KG, Tuttlingen, Germany). Lesions were treated with 60-80mg of methylprednisolone acetate (Depo-Medrone®; Pharmacia; Walton-on-the-Hill, UK) circumferentially injected at the base of the lesions. This was delivered via a 27 gauge BD Valu-Set™ butterfly needle (BD Infusion Therapy, Helsingborg, Sweden) as previously described. [15]. A carbon dioxide laser was cautiously used to make radial incisions into the lesion, preserving intact bridges between the cuts to prevent circumferential re-stenosis. Laser surgery was used both to reduce the lesions and to improve the efficacy of the subsequent balloon dilatation. The subglottis/trachea was then dilated using a CRE™ Pulmonary Balloon dilator (Boston Scientific, Natick, MA, USA). In seven patients, topical mitomycin C (MMC) (Kyowa Hakko UK Ltd, Slough, Berks, UK) at a concentration of 1mg/ml was applied for 3 minutes at this point. Mitomycin C was used in selected patients with high-grade or recurrent lesions.

For patients undergoing treatment for bronchial lesions the operative sequence was almost identical, consisting of intralesional steroid injection, radial laser incision and balloon dilatation. The differences lay in the choice of equipment, and the fact that no patient received topical mitomycin C. The carinal/bronchial region was visualized either with a 4mm 0^o Karl-Storz airway endoscope, or a flexible channelled bronchoscope introduced through the laryngoscope (Figure $S1_A$). Intralesional steroids were delivered using transbronchial eXcelon™ needles (Boston Scientific, Natick, MA, USA) introduced via the channel of the bronchoscope (Figure $S1_B$). KTP laser was delivered to the lesion via 0.4mm disposable fibreoptic filaments (Laserscope, San Jose, CA, USA) (Figure $S1_C$). Dilatation was performed using a bronchial CRE™ Pulmonary Balloon dilator (Boston Scientific, Natick, MA, USA)

(Figure $S1_D$ and $S1_E$). Since all patients with bronchial lesions had retention of secretions, suction catheters were introduced alongside the bronchoscope and were guided into the main and lobar bronchi to remove retained and often infected secretions.

Patients were observed for a few hours following the procedure on a surgical high-dependency unit and were subsequently managed in a multidisciplinary team facility.

Appendix 2.

An example of the characteristic computed tomography changes and associated endoscopic findings in a patient who presented with grade V shortness of breath (as determined by the Medical Research Council Dyspnoea Scale) and pneumonia are shown (Figure S2).