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Upper airway stenosis

In relation to surgical technique, causation, and impact on quality of life

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Academic dissertation

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Abstract

Background
Subglottic stenosis (SGS) is a rare fibroinflammatory airway disorder characterized by progressive narrowing of the subglottic lumen. The condition predominantly affects middle-aged women and is associated with substantial morbidity, impaired health-related quality of life (HRQoL) and recurrent need for surgical intervention. Despite increasing clinical recognition, the pathogenesis of SGS remains incompletely understood.

Objective
To improve the understanding and clinical management of SGS through epidemiological characterization, evaluation of endoscopic treatment outcomes, assessment of patient-reported outcomes, and exploratory whole-genome sequencing (WGS) of stenotic tissue.

Methods
Four complementary studies were performed. Two retrospective cohort studies evaluated patients with subglottic and laryngotracheal stenosis in northern Sweden. Endoscopic treatment outcomes following balloon dilatation and CO_2 laser surgery were compared using surgery-free interval (SFI) as the primary endpoint. A prospective cohort study assessed symptom burden and HRQoL before and after balloon dilatation using the Dyspnea Index (DI) and Short Form Health Survey-36 (SF-36). In a second prospective cohort, stenotic tissue underwent high-depth shotgun WGS with bioinformatic taxonomic classification and sequence validation.

Results
Balloon dilatation and CO_2 laser surgery demonstrated comparable long-term SFI, although balloon dilatation showed a transient early advantage. SGS was associated with marked impairment in HRQoL, with significant postoperative improvements in DI and multiple SF-36 domains. WGS identified consistent enrichment of *Cutibacterium Acnes* within stenotic tissue, suggesting a potential role in disease-associated inflammatory and fibrotic processes. In the broader laryngotracheal stenosis cohort, unilateral vocal fold immobility was the most prevalent underlying diagnosis.

Conclusions
SGS remains a clinically challenging disorder with an incompletely defined pathogenesis. These studies provide novel insights into disease epidemiology, treatment outcomes, patient experience, and potential biological mechanisms. The findings support the integration of validated patient-reported outcome measures and molecular characterization into future SGS research and clinical practice.

Keywords: Subglottic stenosis, Laryngotracheal stenosis, Quality of life, Whole genome sequencing,

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