Recent Advances in Laryngology

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Introduction

Three areas of substantial evolution are covered in this review: the use of bioimplantable materials in glottic insufficiency, improvement in therapeutic strategies for laryngeal papillomatosis and surgical organ/function-preservation treatment of laryngeal malignancy. Overall, the discipline of laryngology continues to evolve and will become increasingly important with exciting technological advancements, yet the future of this emerging subspecialty is still full of challenges.

Bioimplantable Materials for Treating Glottic Insufficiency

Glottic insufficiency may result from vocal fold bowing due to ageing, paresis or paralysis, or from the loss of the superficial lamina propria as a result of vocal fold scarring or sulcus vocalis. The most noticeable symptoms of glottic insufficiency are hoarseness and vocal fatigue, and these are especially debilitating in professional vocal users like singers. Adequate closure of glottic insufficiency can also improve airway protection and decrease aspiration. The two main modalities of treatment nowadays include medialisation thyroplasty and injection laryngoplasty. Medialisation thyroplasty has been used extensively to treat glottic insufficiency since its introduction by Isshiki et al.1 Implants like silicone, Gore-Tex, titanium or calcium hydroxyapatite have been used to approximate the vocal folds. It is invasive and requires longer operation time in contrast to injection laryngoplasty.

Injection laryngoplasty provides a “quick-fix” to glottic insufficiency and can be carried out as an office-based procedure. Autologous materials like fat and fascia offer promising results and excellent biocompatibility, yet they will all be reabsorbed by the body with equivocal long-term efficacy. Cymetra (micronised acellular human cadaveric dermis) is metabolically compatible with the human body and readily available in an injectable form. However its cadaveric origin raises considerable concern despite tight scrutiny for viral and bacterial infectious diseases. Hyaluronic acid like Restylane seems to offer excellent biocompatibility without the risk of allergic reactions.2 Its similarity to the superficial lamina propria, which is essential for normal vocal fold vibration, makes hyaluronic acid an attractive treatment option for vocal fold reconstruction. The duration of graft survival in the human body is however unpredictable. Up till now most injectable materials are for temporary vocal fold augmentation. Radiance FN (calcium hydroxyapatite formulated in microspheres suspended in an aqueous polysaccharide gel) has a longer lasting effect. It has been approved recently by the US Food and Drug Administration for injection laryngoplasty and is supposed to be long-lasting. However, so far there is no literature investigating the survival of this material in the vocal folds.

New Paradigms in Management of Recurrent Laryngeal Papillomatosis

The traditional treatment of recurrent laryngeal papillomatosis (RLP) is surgical excision with microlaryngoscopy, which is mostly accomplished by cold steel instruments, carbon dioxide (CO₂) laser, or microdebrider. Cold instruments are still advocated by many surgeons due to the avoidance of thermal injury and thus better preservation of vocal fold function. However there is more blood loss and possibly a higher chance of lower airway contamination by the fragments of viral-infected tissue. CO₂ laser has been used extensively for laryngeal papillomatosis. Its precise excision and ability at vaporising superficial tissues at a low power setting offers accurate excision of the glottal papillomatosis. Recently both 585-nm pulsed dye laser (PDL) and 532-nm pulsed potassium titanyl phosphate (KTP) laser have provided an alternative treatment. Both these treatment measures can cause regression of the papilloma by photothermolysis of the sublesional microcirculation and selective eradication of the tumour microvasculature. Complications of CO₂ laser such as vocal fold scarring and thus the loss of pliability of the vocal folds can be avoided.

Many patients also require some form of adjuvant therapies, particularly those with repeated surgeries within a short period of time, distant disease migration, and airway compromise. Interferon is a biologic response modifier that stimulates existing host defences, modulates immune responses, inhibits cell growth and induces several enzyme systems. Gerein et al. demonstrated maximal effectiveness of interferon-alpha therapy in RLP patients with HPV 6 as compared with HPV 11 in a 20-year follow-up study.3 Thus they suggested HPV typing in RLP patients after the first biopsy.

Combination of intralesional injection of cidofovir with surgical excision have shown promising results in some literatures, but it has also been criticised for its possibly carcinogenic effects in humans. Although other adjuvant
pharmacotherapies for RLP including acyclovir, ribavirin, intralesional injection of mumps vaccine and photodynamic therapy have been proposed, viral persistence occurs following these adjuvant treatments. All these trials were of small scale, making it difficult to assess clinical benefits and risks in a systematic fashion.

**Surgical Organ/Function-preservation Treatment of Laryngeal Malignancy**

Chemoirradiation dramatically improves the quality and saves the lives of selected laryngeal cancer patients. Although the laryngopharynx can be preserved, the function however might be significantly compromised. Besides, there are concerns about the toxicities and long term complications like radiation-induced sarcoma.

Transoral laser surgery has gained widespread acceptance for patients with early-stage glottic cancer, but is progressively assuming popularity for more advanced diseases. It has the privileges of formal open resections without the necessity of reconstruction. The whole procedure is simply done through the mouth with the overlying tissues and laryngeal framework spared. Steiner has shown the successful use of transoral CO2 laser as a curative organ-preserving procedure in both early-stage and advanced-stage recurrent glottic cancers after radiotherapy. However, both open partial surgery and endoscopic transoral laser surgery require great surgical expertise and careful patient selection, particularly in advanced-stage laryngeal cancers.

Transoral robotic surgery (TORS) allows precise tissues handling and more agile instrument movements instead of the current long and cumbersome minimally invasive surgical instruments. TORS just simply brings the surgeon’s hands through a tight opening to the surgical field as if one is doing an open operation. It may be too early to say if TORS will bring a new paradigm shift in head and neck cancers and even skull base surgeries. The University of Pennsylvania is currently conducting human clinical trials with the application of TORS in various head and neck cancers. The preliminary results are encouraging with gentle tissue handling and effective dissection in various oropharyngeal and laryngeal cancers.

**References**