New surgical technique for the larynx

Transventricular Chondroplastic Laryngotomy - TCL

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Surgical approaches to the larynx

trans-oral

external

Transventricular Chondroplastic Laryngotomy - TCL

trans-oral / endoscopic approach

Difficulties with:
vision, hemostasis, suture
and flaps transposition

San Francisco, USA

Rio de Janeiro, Brazil
Difficulties:
Trauma of anterior commissure
Tracheotomy

Thyrotomy or Laryngofissure
Buck (1851) Semon (1897 e 1907) Gluck & Sorensen (1930)

The Problem
What can we do in cases with very difficult (or no) exposure?
Can indirect surgery and/or special or flexible endoscopic procedures solve all these cases?
In these cases, what can we do for lesions affecting the anterior third of one vocal fold – like initial tumors, major polyps or Reinke’s edema, for example?

The Idea
This procedure was born from the conviction that a different way of approaching the larynx externally should exist, while not traumatizing the anterior commissure and allowing for easier and more direct access to the endolarynx.

And it should be possible with the naked eye and/or lenses, microscopes and endoscopes.

The Idea and Intentions
It should be possible to create an access to the endolarynx through the thyroid cartilage, using a large window, directly to the bottom of the laryngeal ventricle.
Complete reconstruction of the organ should be achieved, with no functional sequelae.
Through this opening it should be possible to touch and operate directly on both vocal and ventricular folds and ventricles, from the anterior commissure to the arytenoid.
We call this procedure Transventricular Chondroplastic Laryngotomty (TCL).
Rouvière (1927)  An anatomical review

Jackson and Jackson (1959)
Relation between ventricle (VM), cartilage (CT), external (1) and internal (2) pericondrium and thyrohyoid muscle (MTH)

Andrea (1975)
Avascular area between ventricle (VM) and internal pericondrium (1)

Silver (1981)

Netter (1989)
Laryngotomy for teflon® removal

Gray SD, Bielamowicz SA, Titze RI, Divi H, Lustik C.
Experimental Approaches to Vocal Fold Alteration:
Introduction to the Minithryotomy

Thome R, Thome DC, De La Cortina RA
Lateral Thyrotomy Approach on the Paraglottic Space for Laryngocele Resection
Laryngoscope. 2000;110(3 Pt 1):447-50

Simultaneous flexible or rigid laryngoscopy

- Horizontal incision
- Median dissection
- Laryngotomy
Based on Dingman and Love
TCL - Questions

- Do we still have patients with unsatisfactory results? Yes
- Do we tend to be too conservative in choosing the approach? Yes

As a new external approach to the larynx, TCL could be used in patients with very difficult (or impossible) exposure or if it's necessary to perform a more elaborate reconstruction.

- Is this situation frequent?
- Can indirect surgery and/or flexible endoscopic procedures solve all these cases?
- In these cases, what can we do for lesions affecting the anterior third of vocal fold—tumors, major polyps or Reinke’s edema?

TCL - Specific Questions

- What happens to the cartilage after making this window?
- What happens to the ventricle after being opened and sutured?
- Is there any dysfunction of the larynx after TCL?

Animal Experiment

3 pigs = opening the window without accessing the larynx
7 pigs = opening the endolarynx through the ventricle, between the superior 1/3 and the inferior 2/3 of TA

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TCL Steps

Exposing TA
Incision between the superior 1/3 and the inferior 2/3 of TA
So, anatomically speaking, there are no contraindications for this procedure.

Discussion

- We need alternative methods because the current techniques have limitations, for some special patients.
- Anatomically, accessing the larynx through the cartilage and ventricle was shown to be simple and direct;
- No structures like nerves or pyriform sinus are on surgical field or in direct risk of damage;
- So, anatomically speaking, there are no contraindications for this procedure;

Results

Answering the questions

- What happens to the cartilage after making this window? ✓ OK
- What happens to the ventricle after being opened and sutured? ✓ OK
- Is there any dysfunction of the larynx after TCL? ✓ OK
Discussion

- TCL can be considered intermediate between microlaryngoscopy and thyrotomy, and, employing microscopes and opticals, these techniques can be replaced in special diseases and patients.

Three objectives can be achieved by TCL:
- precise surgery
- easier and safer hemostasis
- easier reconstruction

Speculations and Expectations

about possible future applications

TCL, as a direct, unilateral or bilateral access to the endolarynx, allowing image magnification and surgery with up to 4 hands, could be used for:
- treatment of major benign lesions (polyp, bridges, glottal insufficiency);
- removal of scars and stenoses (safer suturing);
- resection of benign and malignant tumors;
- flap rotation from close regions and more complex reconstructions of vocal folds (from mucosa to TA muscle);
- grafts and implantation of tissues and materials;
- treatment of uni or bilateral paralysis;
- treatment of spasmodic dysphonia (TA partial removal or TA nerve section).

Conclusion

This new technique called “Transventricular Chondroplastic Laryngotomy” has been demonstrated to be viable, providing wide exposure of the endolarynx and adequate reconstruction of this organ.
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