Vertical Partial Laryngectomy
An Atlas

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Introduction:

Vertical partial Laryngectomy is a conservative laryngeal surgical procedure which involves removal of one half of the larynx while the other half is preserved. The dead space created after removal of one half of the larynx is closed using various flaps. This surgery was first proposed by Solis – Colen in 1869 to manage early malignant lesions involving vocal folds.

Indications:

1. Malignant tumors involving a single vocal cord early T1, T2 and select T3 lesions
2. Anterior commissure of the vocal cord should be free of the lesion

This surgery is not suitable for patients with growth vocal cord involving the anterior commissure and the opposite cord.

Advantages:

1. This is a conservative procedure where in patient is able to speak without the aid of prosthesis
2. Patient need not have a permanent tracheostome
3. Patient does not have any swallowing problems

Procedure:

This surgery is performed under general anesthesia.

Tracheostomy:
As a preliminary step a tracheostomy should be performed under local anesthesia via a transverse skin crease incision. Through the tracheostome a Laryngectomy endotracheal tube (Laryngoflex) is introduced. It is shaped like a Shepard’s crook.

Figure showing laryngoflex endotracheal tube

Advantages of laryngoflex endotracheal tube:

1. Its shape helps in anchoring the tube to the anterior chest wall without fear of tube migration.
2. After insertion this tube is away from the field of surgery
3. The presence of curvature prevents development of excessive pressure over the stoma while the patient is being ventilated

Incision:

Gluck Sorenson incision is preferred. This incision ensures adequate exposure of the surgical field. It is a curved incision extending along the anterior border of sternomastoid muscle from the mastoid tip on both sides. In the midline incision of both sides are joined at the level of tracheal stoma. Before incising the skin it is always better to mark the incision over the skin using skin pencil.
Elevation of flap:

Neck flap is raised in the subplatysmal plane. This plane is ideal because blood supply to the flap is derived from the platysma muscle.

After elevating the cervical flap the strap muscles of the neck are identified. The Sternohyoid muscle on the side of surgery should be identified, separated and held aside using a tape. This muscle is vital during reconstruction of the defect which arises after vertical partial Laryngectomy.
Figure showing Sternohyoid muscle being separated

The sternothyroid and thyrohyoid muscles are divided at the level of the thyroid cartilage and held apart using tied silk threads.
Image shows Sternohyoid muscle being held apart by tapes. The sternothyroid muscle is seen being divided and marked with a silk knot.

The perichondrium over the lamina of the thyroid cartilage on the side of the surgery is elevated and dissected out. Its lateral attachment to the lateral/posterior border of thyroid cartilage should be preserved. This perichondrium can be reliably used to reconstruct the surgical defect after surgery.
Figure showing thyroid perichondrial incision marks

Figure showing perichondrium being incised
Before incising the perichondrium it is always better to infiltrate saline under the perichondrium in order to facilitate easy elevation of the same.

As shown above a fissure burr is used to make a vertical cut in the middle of thyroid cartilage beginning at the thyroid notch. Care must be taken not to enter
the larynx at this juncture. The inner perichondrium of the thyroid cartilage is left intact till the interior of larynx is completely examined from below.

Examination of interior of larynx from below:

This is possible by incising the cricothyroid ligament and visualizing the vocal folds from below. If there is no subglottic extension the surgery can proceed without any modifications.

![Figure showing ligation of superior laryngeal pedicle](image)

Ligation of superior laryngeal pedicle:

This is a must before the interior of larynx is entered. If done before entering larynx the field inside the larynx would be dry without any troublesome bleeding. The superior laryngeal artery and vein should be identified close to the superior pole of larynx on its lateral aspect and are ligated.
Figure showing larynx being entered in the midline

Two more cuts are made in the horizontal direction over the thyroid cartilage. These cuts are made using fissure burr. The superior transverse cut is made just below the superior border of the thyroid cartilage and the inferior transverse cut is made in the lower border of the thyroid cartilage just above the level of cricoid cartilage.

Entry in to larynx:

The larynx is entered in the midline after incising the inner perichondrium of the thyroid cartilage in the midline. The thyroid cartilage opens like a book revealing the contents of the larynx. The growth in the vocal cords can be clearly viewed now.

The lamina of the thyroid cartilage is held using Allis forceps / Babcocks forceps. The whole of one side of the larynx is removed by cutting the attachments along with the true and false vocal folds. The cut should not be made across the arytenoid cartilage as it would cause troublesome swelling in patients who have undergone preoperative irradiation. The arytenoid cartilage and its muscular process are usually retained as it is very rare for malignant lesion to involve cartilage.
Repair:

This is the most critical element of the whole surgical procedure. If not done properly it could lead to breathing and feeding difficulties. The pyriform fossa
mucosa which is redundant on the side of laryngeal resection is dissected out and used to line the interior of larynx on the involved side.

Image showing the redundant pyriform fossa mucosa being used to line the larynx on the involved side

The strap muscles sternothyroid and thryohyoid are used to reconstruct the vocal folds. This is made possible by suturing their everted edges together using a non-absorbable suture like prolene.

The other strap muscle Sternohyoid which was retracted and held away using tapes can be mobilized to line the lateral surface of the reconstructed larynx. The redundant cervical fascia can be sewn over this muscle in order to strengthen it.
Image showing the cervical fascia being sutured over the Sternohyoid muscle

The wound is closed in layers after keeping a Romovac drain in place.

Skin closure being performed after placing the drain in the cavity

Complications:

1. Emphysema – Is common due to air leak in the immediate post-operative period. It can be managed by compression dressing.
2. Oedema of remaining arytenoid
3. Polypoidal changes in the laryngeal mucosa – Needs to be excised if present