

Tranoral Laser Microsurgery For Laryngeal Carcinoma

단국대의 이비인후과

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Treatment modality for laryngeal carcinoma

conventional surgery : total or partial laryngectomy
radiation therapy for early carcinoma
transoral laser surgery
chemotherapy
photodynamic therapy

Historical aspects

AD 100, Aretaeus, Galen: described laryngeal cancer
1873, Billroth: first total laryngectomy (pt. Died 7m later)
1947, Alonso: supraglottic laryngectomy
1973, Strong & Jako: endoscopic laryngeal laser surgery
1998, Steiner : transoral supraglottic laser laryngectomy

Aim of laser microsurgery

complete resection of tumor
minimal morbidity
maximal preservation of function

Oncologic and surgical principles

complete tumor removal with sufficient resection margins
precise histopathologic examination of the resected specimen

Laser microsurgery is superior to open surgery

the possibility of an outpatient procedure
shorter operating time
less risk for overtreatment
better voice quality
less morbidity(no feeding tube or tracheotomy)
less complications
similar oncologic results

Laser microsurgery is superior to radiotherapy

small glottic tumors are often removed by the diagnostic biopsy
 better oncologic results
 fewer local recurrences and salvage laryng- ectomies
 less morbidity

Prerequisites for successful surgery

adequate exposure of affected regions
 cooperation with pathologist to secure the complete removal of cancer tissues
 cooperation with anesthesiologist for safe and effective surgery
 patients and his family must be cooperative and motivated

Operation room setting

ventilation system for evacuation of particled fumes
 safety goggles for every personels
 warning signs in the entrance
 well trained personel
 good equipment

Settings of laser for laser cordectomy

different from surgeon to surgeon and laser machine
 pulse mode vs continuous mode
 2 watt, suerpulse mode, 200 um spot size for sharp cutting of tissue
 4 watt, cw mode, 200-400 um spot size for tumor resection with less bleeding
 safety margin : 2mm (1-3mm)
 high magnification through surgical microscope

Safety protocol for laser surgery

Well trained doctors, nurses, and technicians
 Preparation of operating room
 Prevention of ocular damage
 Prevention of skin damage
 Adequate plume(smoke) evacuation
 Anesthetic consideration : laser tube, FiO₂<0.4
 Nursing consideration

Two different resection techniques

- 1) enbloc resection: small glottic cancer
- 2) blockwise(segmental resection technique)
 large glottic cancer

cancer is removed into several pieces

estimate deep margin by observing cut surface

*Less surgical radicality without loss of oncological radicality

Complications

endolaryngeal bleeding : 4% (fatal)

aspiration : less than 5%

perichondritis or chondritis : rare

surgical emphysema : rare

dyspnea : extremely rare

Local Control after Transoral Laser Excision

	Population	5 Year Disease-Free Survival	Local Control Rate	Laryngeal Preservation Rate	Ultimate Local Control with Laser Alone
Steiner, 1993	159(Tis,T1,T2)	NE	94 %	99 %	NE
Spector,1999	61 (T1)	NE	77 %	90 %	NE
Eckel, 2000	285(T1,T2)	NE	85 %	94 %	98 %
Moreau,2000	124(Tis,T1,T2,T3)	NE	100 %	100 %	100 %
Gallo, 2002	156(Tis,T1)	NE	94 %	100 %	94 %
Shvero, 2003	26(Tis,T1,T2)	NE	80 %	96 %	88 %
Stoeckli,2003	65(T1,T2)	NE	86 %	96 %	89 %
Peretti, 2004	322(Tis,T1,T2)	81 %	NE	97 %	91 %

NE = nonevaluated.

Endoscopic Laser Cordectomy

Endoscopic laser surgery is safe and reliable when (M Wolfensberger, Laryngoscope 1990)

perfect exposure of the entire carcinoma

limited to the membranous part of V.C.

the anterior commissure : free

mobility : normal

patient willing to accept slight dysphonia

Involvement of the anterior commissure (controversial)

higher local recurrence and salvage laryngectomy rates

larynx preservation rates : comparable to conventional surgery

→ NO CONTRAINDICATION AGAINST LASER SURGERY

- main cause for local recurrences in anterior commissure
 - : insufficient surgical radicality
- prerequisites for surgery of the anterior commissure
 - : adequate exposure
 - : stepwise tumor resection
 - : meticulous histologic assessment
- to avoid recurrence, the resection should include
 - : the anterior vocal ligaments
 - : the perichondrium of the thyroid cartilage
 - : cricothyroid membrane

Impact of Anterior Commissure Involvement on Local Control (n=263 Patients)

Anterior Commissure involved	pT1a (n=28)	pT1b (n=16)	pT2a (n=45)
Local control [%]	85.7	75.0	77.8
Larynx preservation [%]	92.9	87.5	93.4
Anterior Commissure not involved	pT1a (n=130)	pT1a (n=14)	pT1a (n=30)
Local control [%]	94.6	92.9	83.3
Larynx preservation [%]	99.2	94.3	96.7

Laser microsurgical resection is the treatment of choice for most early stages of glottic cancer with respect to oncology, function, and economy

Endoscopic Laser Supraglottic Laryngectomy (SGL)

Indications

T1/T2, some T3

suprahyoid epiglottis, aryepiglottic fold, vestibular fold

minimal preepiglottic space involvement

Contraindications

T4

paraglottic space involvement

Relative Contraindications

T3

infrahyoid epiglottis, upper false vocal cord
extensive preepiglottic space involvement

Tumor control (Ambrosch, et al)

: T1: 100% (5-year)
: T2: 89% (5-year)
similar to open SGL
slightly better than primary XRT

Functional outcome

- Ambrosch, et al
 - : average requirement for postop NGT: 6 days
 - : normal voice
- Eckel
 - : average requirement for postop NGT: 10 days
 - : no tracheostomy for 40/46 patients
 - : normal voice

pT1 and pT2 Supraglottic Carcinoma (n=95)

	pT1 (n=23)	pT2 (n=72)
5y local control rate [%]	95	85
Salvage laryngectomy [%]	4	1
5y overall survival rate [%]	87	73
5y rec.-free survival rate [%]	91	77

pT3 and pT4 Supraglottic Carcinoma (n=121)

	pT3 (n=76)	pT4 (n=45)
5y local control rate [%]	79	69
Salvage laryngectomy [%]	5	16
5y overall survival rate [%]	67	54
5y rec.-free survival rate [%]	67	60

Median follow-up interval: 52 months

- the oncological results : similar to open surgery, the functional results are superior
- the oncological results : superior to radiotherapy, the functional results are similar

Management of the neck

- neck disease is associated with 50% decrease in overall survival
- supraglottic cancer is associated with early metastasis to the neck
- more than 50% of patients will present with neck disease
- more than 25% of patients will have occult neck disease
- selective neck dissection is routinely performed for N0 to N2 cases,

primarily as a delayed procedure

- advanced neck disease(multiple metastasis, large solitary metastasis)
: adjuvant radiotherapy

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