

Primary surgical treatment for carcinoma of the larynx: influence of the local invasion

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Abstract

In the period from 1976 to 1988, 417 patients with supraglottic carcinoma of the larynx were treated by primary surgery.

Infiltration of the pre-epiglottic space was found in 11.99 per cent (50/417) of the patients. Carcinomas of the infrahyoid epiglottis spread to this space more frequently—14.24 per cent (44/309), than those of suprahyoid localization—5.55 per cent (6/108). Tumour invasion of the pre-epiglottic space is a relative contra-indication for reconstructive surgery. Partial conservation operations were performed on 32 per cent (16/50) of patients with invasion of the pre-epiglottic space. The remaining patients had a total laryngectomy.

Infiltration of the paraglottic space intra-operatively was found in 2.4 per cent (10/417) of patients and all of these tumours were from the infrahyoid localization. Spread of tumours to this site is an indication for radical surgery and laryngectomy was performed on 80 per cent (8/10) of patients.

Introduction

Local spread of supraglottic carcinomas of the larynx is possible through the mucosal or the submucosal layers by lymphatic, vascular and perineural invasion.

In 1968, carcinomas spreading through the mucous membrane were described as 'caper carcinomas' by Kleinsasser. In diagnosis and treatment, however, greater problems are associated with carcinomas with submucosal spread or, as Tucker (1974) said, the carcinomas with 'three dimensional' growth.

Several factors influence the direction of local spread of supraglottic carcinomas of the larynx such as localization of the tumour, relationship to the laryngeal cartilages, macroscopic appearance of the tumour, histological type and distribution of the submucosal glands, small blood vessels and nerves of the larynx.

Materials and methods

Our purpose was to investigate the incidence of supraglottic carcinomas of the larynx according to their localization and spread. Our particular intention was to establish the frequency of infiltration of the pre-epiglottic and the paraglottic space and the appropriateness of surgical treatment in these cases.

The records of patients presenting in the period from 1976 to 1988 with supraglottic carcinoma of the larynx, treated with primary surgery were analyzed. The patients data were entered in questionnaires and then statistically processed.

The follow-up period ranged from 10 months to 13 years, mean 6.3 years. For 289 patients treated in period 1976–84, a 5-year survival assessment was possible.

We applied UICC TNM Classification of malignant tumours (1987). The supraglottis is divided to two sub-sites—epilarynx (including marginal zone) and supra-glottis excluding epilarynx. The epilarynx contains the suprahyoid epiglottis (including tip), aryepiglottic fold and arytenoid. The supraglottis, excluding the epilarynx, contains the infrahyoid epiglottis, ventricular bands (false cords) and ventricles.

Results

At the Clinic for Otorhinolaryngology and Maxillofacial Surgery of University Clinical Center in Belgrade in the period from 1976 to 1988, 417 patients with a supraglottic carcinoma of the larynx were treated with primary surgery. Operations included radical or conservation techniques such as laryngectomy and pharyngolaryngectomy, supraglottic partial horizontal laryngectomy, partial vertical laryngectomy and subtotal laryngectomy (Table I). Radical surgery was performed on 217 patients, and reconstructive surgery on 200 patients.

In 11.99 per cent (50/417) of patients tumour spread into the pre-epiglottic space was found intra-operatively. The pre-epiglottic space was infiltrated in 5.55 per cent (6/108) patients with suprahyoid lesions and in 14.24 per cent (44/309) of patients with infrahyoid lesions. In 32 per cent (16/50) of patients a classic or extended partial horizontal laryngectomy or subtotal laryngectomy was performed. Classic supraglottic partial horizontal laryngectomy means resection of the epiglottis, pre-epiglottic space, anterior two-thirds of the aryepiglottic folds and ventricular bands. During extended supraglottic laryngectomy we resect also the

TABLE I
TUMOUR DISTRIBUTION ACCORDING TO THEIR LOCALIZATION AND SPREAD

LOCALIZATION	LOCAL SPREAD				TOTAL
	T ₁	T ₂	T ₃	T ₄	
EPILARYNX	21	34	13	40	108
SUPRAGLOTTIS EX- CLUDING EPILARYNX	31	114	98	66	309
TOTAL	52	148	111	106	417

vallecula and/or base of the tongue and/or medial wall of the pyriform sinus. Subtotal laryngectomy means resection of the supraglottic region and one of vocal cords. The reconstruction is provided by hypopharyngeal mucous membrane.

In cases of massive infiltration of the pre-epiglottic space, invasion of the hyoid bone, thyrohyoid membrane, thyroid cartilage, or petiolus of the epiglottis, radical surgery was unavoidable (Table II).

In 6.25 per cent (1/16) of patients after reconstructive surgery, and in 8.82 per cent (3/34) of patients after radical surgery, local recurrences occurred. In patients treated by reconstructive surgery, the 5-year survival rate was 68.75 per cent (11/16), and in patients treated by radical surgery it was 52.94 per cent (18/34).

In 2.4 per cent (10/417) of patients tumour spread to the paraglottic space was found and in all cases this was directly from infrahyoid tumours. In eight of the ten cases radical surgery was necessary (Table III).

One of patients had an epiglottic-ventricular tumour with insignificant spread to the paraglottic space. He was operated by partial horizontal supraglottic laryngectomy. The other patient had a tumour on the ventricular band spreading to the ventricular cavity and paraglottic space. He was operated by partial vertical laryngectomy. During this operation we resect two-thirds of the lamina thyroid cartilage, paraglottic space, ventricular band, ventricular cavity and vocal cord. The reconstruction is provided by the perichondrium of the thyroid cartilage.

In the other patients the tumour infiltrated muscle and/or thyroid cartilage: the larynx was fixed and patients were operated by total laryngectomy.

Two patients after reconstructive surgery had no local recurrence. In one patient after total laryngectomy, there has been a local recurrence. One patient, after reconstructive surgery, and five patients after radical surgery are alive more than five years later.

In the whole group of the supraglottic carcinomas intra-operative complications were developed in four patients. In two of them it was a haemorrhage and in the other two it was a lymphorrhage. There were no lethal intra-operative complications.

Post-operative complications were laryngeal stenosis,

TABLE II
DISTRIBUTION OF OPERATIONS IN PATIENTS WITH TUMOUR SPREADING TO THE PRE-EPIGLOTTIC SPACE

Operation	No.	%
Partial supraglottic laryngectomy	6	12
Partial (extended) supra-glottic laryngectomy	5	10
Subtotal laryngectomy	5	10
Total laryngectomy	34	68
Total	50	100

tracheal stenosis and pharyngo-cutaneous fistulae. Laryngeal stenosis occurred in 27 of patients after reconstructive surgery (13.5 per cent). Oedema and granulations were successfully treated by microlaryngoscopic techniques. In four patients of the seven with a scarred laryngeal stenosis, a plastic reconstructive operation was performed. In two of these, the tracheal cannula remains.

In eight patients who underwent radical surgery a tracheal stenosis occurred; in four of these stenosis occurred a result of granulations in the trachea. The other four patients had stenosis as a result of scarification. One patient with a severe tracheal stenosis was treated by a thoracic surgeon and died seven days post-operatively.

Pharyngo-cutaneous fistulae occurred in two patients after reconstructive surgery and in four after radical surgery. In all patients the fistulae healed by conservative treatment.

The frequency of local recurrence was 8.63 per cent (36/417); the regional recurrence occurred in 17.99 per cent (75/417) of patients. The 5-year survival was 63.67 per cent (184/289).

Discussion

Supraglottic carcinomas are most frequently located on the infrahyoid part of the laryngeal surface of the epiglottis, ventricular folds, aryepiglottic folds and on the arytenoids. The tumour usually involves one half of the supraglottis, but spread to the other side is frequently present with infiltration anteriorly across the mid-line. The possibility of carcinoma spreading to the pre-epiglottic space and paraglottic space is of great importance.

The pre-epiglottic space is the mid-line space anterior to the infrahyoid epiglottis, as described by Dayal *et al.* (1972). From above it is limited by the hyoid and the hyoepiglottic membrane and in front by the thyroid cartilage and the thyrohyoid membrane.

Tumour located on the epiglottis, and more rarely, in other parts of the supraglottis tend to spread to the pre-epiglottic space. This is a relatively enclosed space and a tumour in it can stay undiscovered for a long time. Exploration and excision of the pre-epiglottic space is a very important part of the surgical procedure for supraglottic carcinomas.

In 1976, McDonald *et al.* defined the paraglottic space as being limited anterolaterally by the thyroid cartilage, inferomedially by the conus elasticus and medially by the ventricular folds and the quadrangular membrane. Tumours of the ventricular folds and of the ventriculus Morgagni as well as the glottis and the internal wall of the pyriform sinus tend to spread to the paraglottic space. It is possible to have extensive vertically spread-

TABLE III
DISTRIBUTION OF OPERATIONS IN PATIENTS WITH TUMOUR SPREADING TO THE PARAGLOTTIC SPACE

Operation	No.	%
Partial supraglottic laryngectomy	1	10
Vertical partial laryngectomy	1	10
Total laryngectomy	8	80
Total	10	100

ing tumour inside the paraglottic space with minimal changes on the surface.

Conclusion

Out of the total number of 417 patients with supraglottic carcinomas of the larynx, 309 (74.1 per cent) were infrahyoid and 108 (25.9 per cent) suprahyoid in location. Tumours of various numeric values in 'T' stage are relatively uniform in representation.

Infiltration of the pre-epiglottic space was found in 11.99 per cent (50/417) of patients, mainly from tumours located in the infrahyoid region—14.24 per cent (44/309), compared with 5.55 per cent (6/108) of suprahyoid tumours.

In 68 per cent (34/50) of patients with tumour infiltration of the pre-epiglottic space, radical surgery was performed; in 32 per cent (16/50) of patients one of the reconstructive techniques was needed.

Local recurrence after reconstructive surgery occurred in 6.25 per cent (1/16), and after radical surgery in 8.82 per cent (3/34) of patients. The 5-year survival was 68.75 per cent (11/16) in patients treated by reconstructive surgery, and 52.94 per cent (18/34) in patients treated by radical surgery.

Infiltration of the paraglottic space was found in 2.4 per cent (10/417) of patients with infrahyoid tumours. In

eight of the 10 cases, radical surgery was employed. Two patients after reconstructive surgery were free from local recurrence; in one patient after total laryngectomy local recurrence occurred. One patient after reconstructive surgery, and five following radical surgery are alive after more than five years.

In the whole group of the supraglottic carcinomas, the frequency of local recurrence was 8.63 per cent (36/417). Regional recurrence occurred in 17.99 per cent (75/417) of patients. The 5-year survival is 63.67 per cent (184/289).

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