T1a glottic cancers may be removed by "cold steel" excision biopsies

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ABSTRACT

INTRODUCTION: Phonosurgical excision biopsies are gradually replacing traditional punch biopsies during direct laryngoscopy. As excision aims at removing all pathologic tissue, some malignant lesions may be completely removed. We present our experience with phonosurgical excision biopsies of T1a glottic cancers without primary radiotherapy.

MATERIAL AND METHODS: From 2001 till 2010, 24 patients with T1a glottic squamous cell carcinoma did not receive primary radiotherapy as tumours could not be observed at the postoperative control or because of concurrent malignancy or the presence of other co-morbidity. All lesions were excised by instrumental ("cold steel") phonosurgery in which only the epithelial layer above the vocal ligament was removed (type 1 cordectomy). All patients were closely followed by an ear-nose-throat (ENT) surgeon in collaboration with a radiation oncologist.

RESULTS: Relapse was observed in nine of the 24 patients (37.5 %), all within 12 months. The per-operative evaluation of resectability and the results of margin biopsies were insufficient for prediction of recurrence risk. Neither tumour size, primary or secondary excision nor differentiation of the carcinoma influenced the relapse rate.

CONCLUSION: T1a glottic cancers may be removed by "cold steel" phonosurgical excision biopsies, but this is inferior to treatment with radiotherapy or laser-assisted phonosurgery. As more than half of the patients did not need radiotherapy, phonosurgery may be considered as sole treatment in selected cases, provided close follow-up with videostroboscopy for the first year after surgery is performed.

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Phonosurgery is surgery on the vocal folds with the aim of preserving or restoring the voice [1]. In its classic form, phonosurgery is performed using an operating microscope allowing for excellent visualisation of the vocal fold lesions and precise removal of the pathology. The removal can be performed using either microinstruments (scissors, knives, dissectors and forceps) only, termed a "cold steel" procedure, or using cold steel and laser in a "laser-assisted" procedure.

Phonosurgical excision biopsies are gradually replacing traditional punch biopsies in direct laryngoscopy as the latter procedure is likely to harm the vocal cords and may not represent the true pathology due to imprecise excision. These risks are reduced by phonosurgical excision biopsies which aim to remove all pathology while preserving the structures of the vocal cords which are fundamental for voice production.

Rohde et al recently described their results of "aggressive" laser-assisted phonosurgical excision biopsies of precancerous lesions of the vocal cords, recommending this procedure with a view to avoiding that precancerous lesions evolve into cancer [2]. This procedure, however, may identify a T1a glottic cancer, which then raises the question whether the cancer has been removed or whether the patient should receive additional radiotherapy.

For a variety of reasons, we have had the opportunity to follow a number of patients who received "cold steel" phonosurgical excision biopsies of T1a glottic cancers without radiotherapy. These patients were all followed closely with videostroboscopy, which gives a detailed, dynamic video recording of the vocal folds, allowing for the detection of very small pathologic changes.

All patients were immediately referred to radiotherapy in case of relapse. The decision to refrain from radiotherapy was based on individual priorities in patients with no apparent remaining tumour after the biopsy. In this paper, we review and discuss our experience with "cold steel" phonosurgical excision biopsies of T1a glottic cancers in this selected patient group.

MATERIAL AND METHODS

Patients

The patient list was initially gathered from an in-house database. To ensure that all relevant patients were included, patient lists from 2001-2010 with the International Classification of diseases (ICD) diagnosis DC32.0, Neoplasma malignum laryngis pars glottica (subtype T1a), were retrieved from the data bank of the Department of Otolaryngology and the Department of Oncology at a National Danish University Hospital. The vast majority of the patients were excluded as they were immediately referred to the Department of Oncology for radiotherapy according to local treatment guidelines. After exclusion of one patient with a spindle cell carcin-

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TABLE 1

The patient cohort divided according to tumour size (large tumours defined as those involving more than half the length of the vocal cord).

Patient no.	Procedure	Time of recurrence, months	Disease-free follow-up, months	Voice	Current status
Small tumours					
1	Primary	–	48	Good	Continued follow-up
2	Primary	–	60	Good	Completed follow-up
3	Primary	–	38	Good	Continued follow-up
4	Primary	–	42	Good	Continued follow-up
5	Primary	–	60	Good	Completed follow-up
6	Primary	1	–	Moderate	Completed follow-up
7	Primary	6	–	Moderate	Completed follow-up
8	Secondary	–	23	Good	Continued follow-up
9	Secondary	8	–	Good	30 months in follow-up
10	Primary[a]	–	10	Poor	Deceased (heart disease)
11	Primary[a]	3	–	Poor	48 months in follow-up after laryngectomy
Large tumours					
12	Primary	–	60	Good	Completed follow-up
13	Primary	–	72	Moderate	Completed follow-up
14	Primary	–	3	Moderate	Deceased (heart disease)
15	Primary	1	–	Moderate	31 months in follow-up
16	Secondary	–	36	Good	Continued follow-up
17	Secondary	–	3	Poor	Deceased (pulmonary cancer)
18	Secondary	–	30	Good	Continued follow-up
19	Secondary	-	60	Good	Completed follow-up
20	Secondary	6	–	Moderate	24 months in follow-up
21	Secondary	2	–	Poor	29 months in follow-up
22	Secondary	12	–	Good	Deceased (liver failure)
23	Secondary	1	–	Moderate	36 months in follow-up
24	Secondary[a]	–	25	Moderate	Deceased (pancreatic cancer)

a) Use of laser.

oma, we identified 24 patients with a T1a glottic cancer due to squamous cell carcinoma who had been subjected to "cold steel" phonosurgical excision biopsies.

The reasons for abstaining from radiotherapy were: Palliation (patient no. 1), life-threatening co-morbidity (patient no. 2), patients followed for many years for laryngeal dysplasia (patient no. 4), patients with no visible tumour after primary resection (patient no. 10) and patients referred with superficial tumours possibly removed by the primary bioptic procedure (patient no. 7).

A total of 22 were males, and the median age at surgery was 70 years (range 48-89 years). In all, 14 had primary surgery, while ten were referred for secondary surgery of a biopsy-detected cancer. The patients were followed for five years, until death or until mid-2012. From the patient charts we obtained data on size and extension of tumour, histopathologic degree of differentiation of the carcinoma, results of margin biopsies, perioperative assessment of tumour resectability, additional superficial evaporation by CO_2 laser, date of relapse, results of secondary irradiation, death, causes of death and a crude estimation of the voice quality graded into normal, moderate hoarseness and severe hoarseness at the latest follow-up.

Surgical technique

A type 1 cordectomy respecting the vocal ligament [3] was performed in all cases using the "cold steel" phonosurgical technique described by Kleinsasser [1] with the intention of removing all pathologic tissue. Three patients were also treated with superficial evaporation using a CO_2 laser, but none of the patients had tumour excision by laser.

All phonosurgical exision biopsies were performed at the University Hospital. All but one of the diagnostic laryngoscopies in patients referred for secondary surgery were performed at local hospitals.

Follow-up

All patients were seen in the out-patient clinic with postoperative videostroboscopy after one week, one month, three months and every third month for the first two years and then every sixth month for another three years for a total follow-up of five years. If a relapse was suspected, a direct laryngoscopy with biopsy was performed in all but one case – the one case being referred to irradiation based on videostroboscopy alone. All patients with relapses were referred to radiotherapy according to local practice.

RESULTS

A summary of the results is given in **Table 1**. Examples of tumours before and after phonosurgical excision in two patients without relapse are shown in **Figure 1** and **Figure 2**.

A relapse was observed in nine of 24 patients (37.5%). All of these cases were seen within 12 months from surgery – seven within six months. In patients with primary surgery, four of 13 (30.8%) relapsed, while five of 11 (45%) with secondary surgery relapsed. Five of the 11 patients with secondary surgery did not have carcinoma in the resected tissue. Nevertheless, two of these patients later relapsed. Of 12 patients suspected of relapse, three did not have carcinoma in the resected tissue and none of these later relapsed.

Of the primary tumours, 15 were moderately differentiated, two were poorly differentiated and six were highly differentiated. The degree of differentiation was not stated in the remaining patient. All eight patients with a biopsy-provenrelapse had moderately differentiated tumours, two primarily described as highly differentiated.

Eleven patients had tumours involving less than half the length of the vocal fold (small tumours). Four of these (36.4%) relapsed. Of the 13 patients with large tumours, five patients (38.5%) relapsed, although one did not have a biopsy-proven relapse. Of the seven patients with small tumours, who were treated with primary surgery without additional laser evaporation, two (28.6%) relapsed. In one of these two relapsing cases, the tumour could not be totally removed - primarily due to difficult access to the tumour. In the other case, there was widespread severe dysplasia which was not totally removed.

In 14 of the 24 patients, the surgeon assessed the tumour to be superficial, i.e. not infiltrating below Reinke's space. In nine cases, sub-epithelial injection of saline was used both to facilitate this assessment and to facilitate subsequent surgical removal. Relapse was found in five of these patients. In the six patients in whom the tumour was suspected to adhere to the vocal ligament, two relapses were found.

Margin biopsies were taken in 13 patients and were found to be free of disease in 12 patients, four of whom later developed a recurrence.

Of the 15 disease-free patients, five were followed for five years, six are still being followed and four have died from non-disease related causes (two cases of heart failure, one of pancreatic cancer and one of lung cancer). The median follow-up time was 39 months for all 15 disease-free patients and 48 months for the 11 patients still alive.

Of the nine patients with relapse, one has died of a non-disease related cause (liver failure). One patient had a relapse after radiotherapy and a laryngectomy was performed. After 48 months of follow-up, he is disease-free at the primary site, but has recently developed a primary oro-pharyngeal cancer on the posterior wall. The remaining seven irradiated patients are also disease-free after a median follow-up time of 29 months.

The quality of the voice was not examined objectively. Based on the patient charts, 12 patients were estimated to have normal voices, eight to have moderate hoarseness, three to be severely hoarse while one was laryngectomized. No consistent reports on pre-treatment voice were available.

DISCUSSION

More than half of a variety of T1a-glottic cancers were removed by "cold steel" phonosurgical excision biopsies in this selected group of patients. This is far from the 95-

FIGURE 1

Small, superficial tumour anteriorly on right vocal fold before (**A**) and two months after (**B**) phonosurgery without recurrence (> 5 years) (patient no. 2 in Table 1).

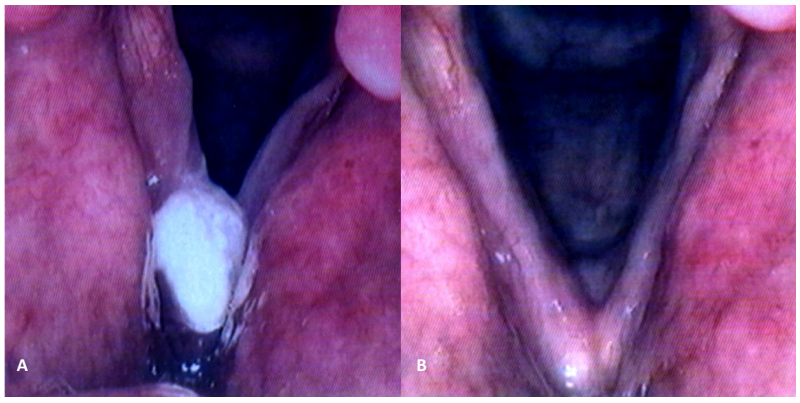
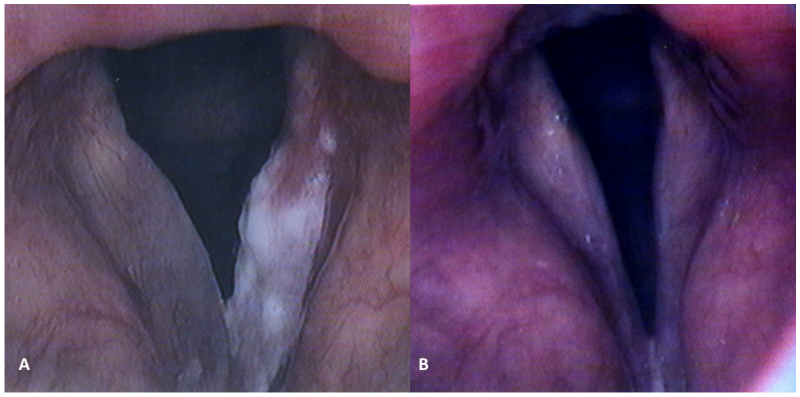


FIGURE 2

Large tumour on the majority of the left vocal fold assessed to be adhering to the vocal ligament before (**A**) and ten months after (**B**) phonosurgery without recurrence (> 5 years) (patient no. 13 in Table 1).



98% success rates obtained by radiotherapy [4], or laser excision going beyond a type 1 cordectomy [5].

As a relapse was observed in five of the 14 patients evaluated as being resectable by a type 1 cordectomy during operation and as margin biopsies were negative in all but one of the cases with relapse, these observations were not useful as guidelines for further treatment. This is well known [6] and form the basis for the current national guidelines for primary radiotherapy [7] and for the use of aggressive laser resections aiming at primary surgical control of glottic cancers [8-10]. Moreover, the size of the tumour or the use of secondary or primary excision did not influence the results in this selected patient group.

There was no cancer-related mortality. Eight of the nine relapsing patients treated with radiotherapy have so far had disease courses comparable to those of patients irradiated immediately after diagnosis. The patient who relapsed after radiotherapy requiring a laryngectomy later developed an additional oropharyngeal cancer. This disease course indicates an increased potential for malignancy for this specific patient. Thus, the delay in irradiation in our nine relapsing patients does not presently appear to be associated with an increased risk of relapse.

The two relapsing patients with tumours progressing from high to moderate differentiation have not had any relapse after radiotherapy after ten and 36 months of follow-up, respectively. The two patients with poorly differentiated tumours did not relapse. The level or change of level of differentiation of the tumours therefore does not seem to be related to relapse in the present selected patient group.

Voice preservation could not be evaluated as pretreatment data and information on other causes for hoarseness were not available. However, nine of 15 patients without relapse and radiotherapy were evaluated to have normal voices.

The present observations confirm that the bioptic procedure – even as an excisional biopsy – is not sufficient to remove all T1a glottis cancers. However, based on patient comorbidity, preferences and the opinions of the surgeon and the radiotherapist, the present results imply that in selected cases where all visible pathology is removed, it may be acceptable to apply the post-operative strategy of frequent controls used in the present material in order to save radiotherapy or more aggressive laser therapy for those who relapse.

CONCLUSION

T1a glottic cancers may be removed by "cold steel" phonosurgical excision biopsies (type 1 cordectomy), but this treatment is insufficient compared with treatment of T1a glottic cancers with radiotherapy or laser-assisted phonosurgery. "Cold steel" phonosurgical excision biopsies may be accepted in selected cases as the only treatment if further treatment is undesirable and close follow-up with videostroboscopy for the first year after surgery is performed.

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