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Analysis of recurrence after surgical treatment of advanced laryngeal carcinoma

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Abstract

The pattern of recurrences after surgical treatment of 276 patients with stage T₃ and T₄ laryngeal carcinoma was reviewed. Nodal recurrence was the commonest site and occurred mainly in patients with supraglottic and transglottic carcinoma. Distant metastasis was the second commonest site of recurrence, and the most distant metastases developed without locoregional recurrence. Local recurrence alone was uncommon in patients treated with primary surgery.

Key words: Laryngeal neoplasms; Carcinoma, squamous cell; Surgery

Introduction

The incidence of new cases of laryngeal carcinoma in Hong Kong is 4.5 per 100 000 population per year (Hong Kong Cancer Registry, 1989). The management of advanced laryngeal carcinoma is controversial. Chemotherapy, radiotherapy (RT) and surgery are used in various combinations with similar long-term results in different centres (Woodhouse *et al.*, 1981; Bogaert *et al.*, 1983; De Santo, 1984; Mendenhall *et al.*, 1984; Yuen *et al.*, 1984; Croll *et al.*, 1989; The Department of Veterans Affairs Laryngeal Cancer Study Group, 1991). In our department, surgery with or without post-operative radiotherapy is our preferred initial treatment option for the advanced disease. Surgery is also required for the salvage of radiotherapy failure. The present study aimed at analysis of the pattern of tumour recurrences for the advanced stage T₃ and T₄ laryngeal carcinomas so that our future management strategy could be targeted.

Patients and methods

All patients undergoing surgical treatment for laryngeal squamous cell carcinoma between January 1977 and December 1990 in the Department of Surgery, The University of Hong Kong, Queen Mary Hospital were reviewed. All patients of clinical stage T₃ and T₄ without distant metastasis (UICC, 1982) were included. Patients who died of surgical complications were excluded from this analysis. Radiotherapy (RT) failures that had been up-staged to T₃ and T₄ before the salvage operation were included in

the present study irrespective of the pre-radiotherapy stage.

Wide-field total laryngectomy was performed for all patients with advanced T₃ and T₄ carcinoma. More extensive tumours with extralaryngeal spread to the pharynx, tongue and oesophagus were treated with more extensive resection accordingly. Before 1981, a pharyngectomy defect which could not be closed was primarily dealt with by pharyngolaryngoesophagectomy and pharyngogastric anastomosis (PLO). Since 1981, partial pharyngeal defects have been repaired by the patch pectoralis major myocutaneous flap (PMF) and circumferential pharyngeal defects by the tubed PMF. PLO was performed mainly for tumours with oesophageal involvement. Elective radical neck dissection was not carried out for a clinically node-negative (N₀) neck unless PMF was used for repair of a pharyngeal defect.

The mean follow-up time for these patients after their operation was 47 months (range one to 172 months).

Results

A total of 303 patients were operated on between January 1977 and December 1990. There were 27 hospital deaths which were excluded from the present analysis. Of the remaining 276 patients (who were included in the present analysis) 168 patients were radiotherapy failures with surgical salvage, 38 patients had primary surgical treatment alone and 70 patients had the combined therapy of surgery with post-operative radiotherapy. Their clinical data are shown in Table I.

The pattern of recurrences are shown in Table II.

TABLE I
PATIENTS' DATA

	Salvage surgery for RT failure	Surgery alone	Combined surgery and post-operative RT	Total
Number of patients	168	38	70	276
Male/female ratio	5.3/1	5.4/1	5.4/1	7.4/1
Age range in years (median)	33-77 (62)	46-73 (62)	36-81 (62)	33-81 (62)
Sites: transglottic	103 (61%)	17 (45%)	29 (41%)	149 (49%)
supraglottic	43 (26%)	14 (37%)	35 (50%)	92 (30%)
infraglottic	22 (13%)	7 (18%)	6 (9%)	35 (11%)
Stage: T ₃	88 (52%)	23 (60%)	30 (43%)	141 (51%)
T ₄	80 (48%)	15 (40%)	40 (57%)	135 (49%)
N ₀	132 (78%)	24 (63%)	40 (57%)	196 (71%)
N ₁	15 (9%)	9 (23%)	13 (19%)	37 (13%)
N ₂	3 (2%)	4 (11%)	8 (11%)	15 (6%)
N ₃	18 (11%)	1 (3%)	9 (13%)	28 (10%)

Of the 276 patients, 133 (48 per cent) developed tumour recurrences after surgical treatment. The actuarial local control rates of laryngeal carcinoma are shown in Figure 1. The radiotherapy failure group had a significantly lower local control rate when compared with the combined therapy group and surgery alone group (Wilcoxon: $p < 0.05$). The five-year actuarial local control rates for the radiotherapy failure group was 75 per cent, while the rate for the combined therapy group and surgery alone group was 88 per cent.

The pattern of nodal recurrences of N₀ neck without elective radical neck dissections are shown in Table III. Patients with supraglottic involvement (both supraglottic and transglottic tumour) had a higher nodal recurrence rate of 19 per cent (27/140) compared with 11 per cent (3/28) for infraglottic tumour, but it is not statistically significant (odds ratio = 1.99; 95 per cent CI; 0.52-8.96). Of those patients with supraglottic involvement without prior radiotherapy, patients with post-operative radiotherapy to the neck in the combined therapy group had a lower nodal recurrence rate of 24 per cent (7/29) compared with the 40 per cent (6/15) of the surgery alone group, but it is not statistically significant (odds ratio = 2.1; 95 per cent CI; 0.45-9.84).

Thirty-eight patients had elective radical neck dissections for N₀ neck. Two (five per cent) patients developed ipsilateral neck nodal recurrence and six (16 per cent) patients developed contralateral neck nodal recurrence.

Of all 36 patients who developed nodal recurrences alone without local and distant recurrence, 13 (36 per cent) patients subsequently underwent

salvage radical neck dissections and six of them developed nodal recurrences again. Only seven (19 per cent) patients survived without nodal disease.

Distant metastasis was found in 58 (21 per cent) patients, and 76 per cent (44/58) of them developed distant metastasis alone without locoregional recurrence. The node-positive group had a significantly higher five-year actuarial distant recurrence rate of 42 per cent compared with 20 per cent for the node-negative group (Wilcoxon: $p < 0.001$).

The tumour-free actuarial survival rates of the three groups are shown in Figure 2. There was no significant difference in the actuarial survival rates between the three groups (Wilcoxon: $p > 0.05$). The five-year actuarial survival rates were 55 per cent for the radiotherapy failure group, 61 per cent for the surgery alone group and 56 per cent for the combined therapy group.

Discussion

The treatment of advanced laryngeal carcinoma is controversial. Surgery, radiotherapy, and chemotherapy either as a single therapy or a combination therapy have been used as initial treatment. Unfortunately, there has not been much improvement over the years in the cure of the disease irrespective of the mode of treatment. Surgery is still the main type of treatment because of better local control of the tumour when compared to radiotherapy and chemotherapy (De Santo, 1984). Surgery is also necessary for the salvage of radiotherapy failures after primary radiotherapy (Lam *et al.*, 1983).

The present study showed that pharyngeal and tracheostomal recurrence alone were uncommon in

TABLE II
PATTERN OF RECURRENCES

Sites of recurrence	Salvage surgery for RT failure	Surgery alone	Combined surgery and post-operative RT	Total
Pharyngeal	16 (10%)	0 (0%)	0 (0%)	16 (6%)
Tracheostomal	6 (4%)	0 (0%)	3 (4%)	9 (3%)
Nodal	18 (11%)	6 (16%)	12 (17%)	36 (13%)
Distant	27 (16%)	8 (21%)	9 (13%)	44 (16%)
Local and nodal	8 (5%)	1 (3%)	5 (7%)	14 (5%)
Locoregional and distant	9 (5%)	1 (3%)	4 (6%)	14 (5%)
Total	84 (50%)	16 (42%)	33 (47%)	133 (48%)

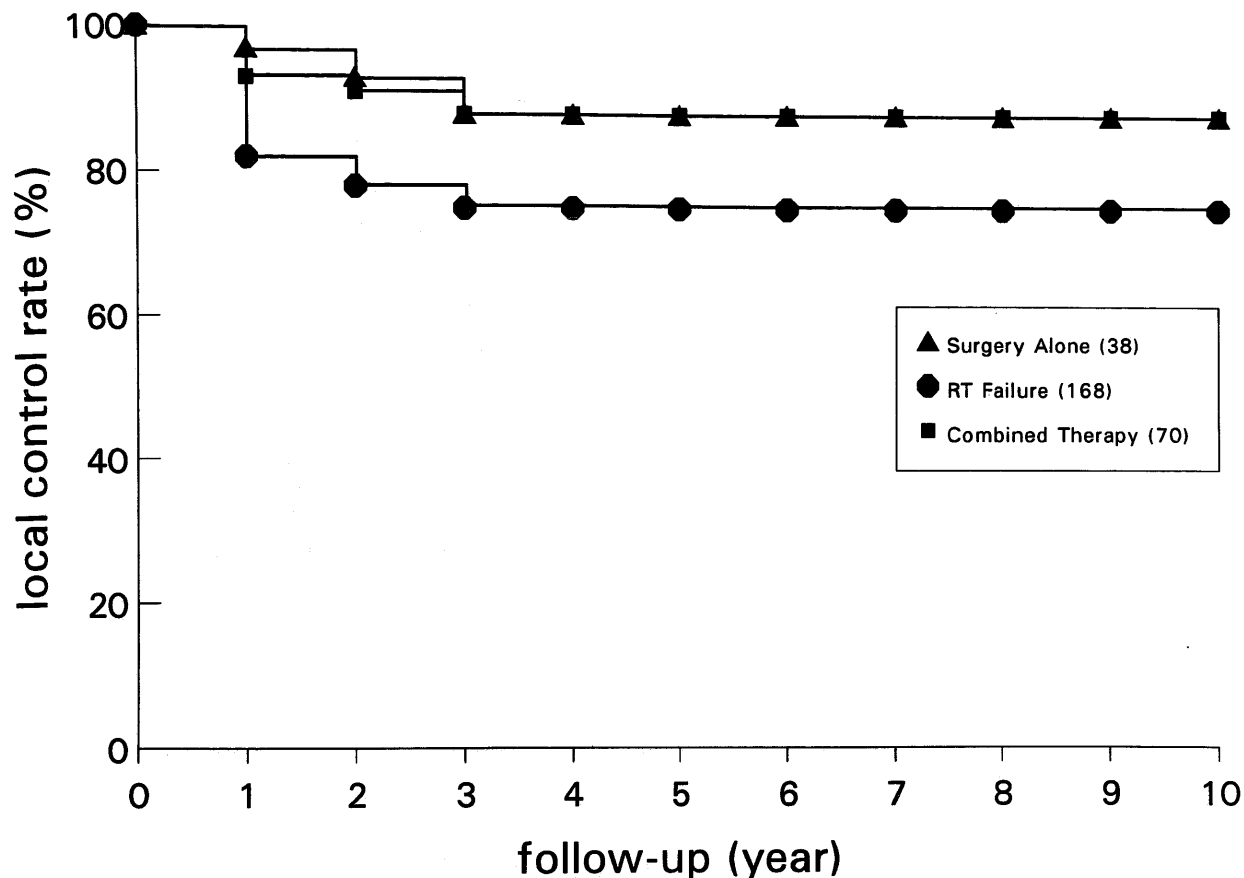


FIG. 1

Actuarial local control rate.

patients treated with primary surgery. The low incidence of local recurrence in patients treated with surgery alone indicated that post-operative adjuvant radiotherapy was not essential to achieve local control when adequate resection of the tumour was accomplished in properly selected patients. The higher local recurrence rate (17 per cent) for patients treated with combined surgery and post-operative radiotherapy compared with the surgery alone group was probably related to the selection of patients with a more extensive tumour for post-operative radiotherapy, and it indicated that post-operative radiotherapy should be given to patients with a large tumour and close resection margin. However, post-operative radiotherapy was unable to achieve satisfactory eradication of subclinical residual local tumour, thus adequate resection of the primary tumour is still more essential to achieve local control. The higher local recurrence rate in the radiotherapy failure group reflected the difficulty in intraoperative

assessment of the tumour margin for patients after radiotherapy. All tumour involved areas before radiotherapy should always be included in the resection, and all oedematous tissue should be resected.

Nodal recurrence was the commonest site of tumour recurrence in N_0 neck patients. The nodal recurrence rate remained high despite post-operative radiotherapy to the neck. Elective radical neck dissection was found to be able to reduce nodal recurrence to five per cent. On the other hand, only 36 per cent nodal recurrences were feasible for surgical salvage, and eventually only 19 per cent could be successfully salvaged by subsequent radical neck dissection. In view of the high nodal recurrence rate of supraglottic and transglottic tumours and their low salvage rate upon nodal recurrence, elective neck dissection is recommended for supraglottic and transglottic N_0 patients. It is known that lymph node metastasis tends to spread to the level II,

TABLE III
NODAL RECURRENCE OF N_0 NECK WITHOUT ELECTIVE RADICAL NECK DISSECTION

Tumour sites	Salvage surgery for RT failure	Surgery alone	Combined surgery and post-operative RT	Total
Transglottic	11/76 (15%)	3/7 (43%)	5/16 (31%)	19/99 (19%)
Supraglottic	3/20 (15%)	3/8 (38%)	2/13 (15%)	8/41 (20%)
Infraglottic	3/19 (16%)	0/4 (0%)	0/5 (0%)	3/28 (11%)
Total	17/115 (15%)	6/19 (32%)	7/34 (21%)	30/168 (18%)

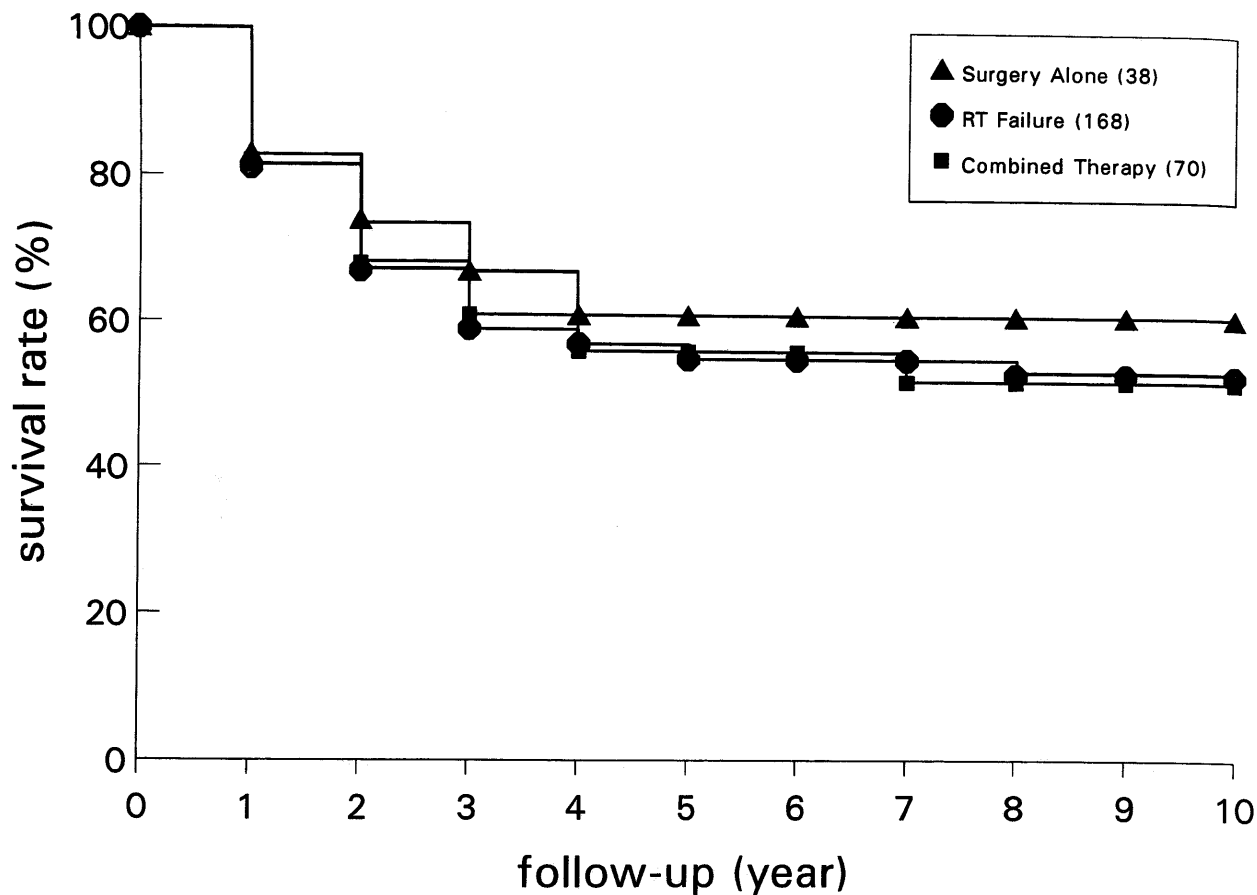


FIG. 2

Actuarial survival rate.

III, IV along the internal jugular vein (Candela *et al.*, 1990). Selective neck dissection of level II, III, IV is recommended (Spiro *et al.*, 1993).

Distant metastasis was the second commonest site of recurrence. Fifty-eight (21 per cent) patients developed distant metastasis, and 76 per cent of them developed distant metastasis despite loco-regional control of tumour. The incidence of distant metastasis was significantly higher in node-positive patients. Unfortunately, distant metastasis can not be reduced by the best surgery and radiotherapy, and the advent of effective systemic cancer therapy will have to be relied upon.

Conclusions

The main sites of recurrence are nodal and distant metastasis. Future improvement of long-term treatment results depend mainly on the reduction of recurrences at the neck node and distant sites. Nodal recurrence is common in supraglottic and transglottic tumours, but radiotherapy is not adequate for the eradication of subclinical nodal metastasis, and elective neck dissection is recommended to improve nodal control. Distant metastasis is the second commonest site of recurrence despite locoregional control of the tumour. Reduction of distant recurrence however has to wait for the advent of effective systemic cancer therapy.

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