

Carcinoma of the maxillary antrum treated by pre-operative radiotherapy or radical radiotherapy alone

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Abstract

The results of pre-operative radical radiotherapy and subsequent maxillary resection are reported in 54 consecutive patients with carcinoma of the maxillary antrum treated at The Royal London Hospital from 1965 to 1989. The actuarial two and five year survivals were 50.3 per cent and 38.5 per cent respectively. Patients with adenocarcinomas fared better when compared with squamous and undifferentiated carcinomas (log rank $p = <0.01$). Undifferentiated carcinoma and involved regional lymph nodes were both very poor prognostic factors. In those patients who were either unfit for or refused maxillary resection, radical radiotherapy alone was still an effective treatment, with only a slight disadvantage in terms of local control and survival.

Introduction

Carcinoma of the maxillary antrum is a rare disease accounting for less than one death per 100,000 persons per annum in England and Wales. Even in a busy radiotherapy centre with an oral and maxillo-facial surgery unit and affiliated school of dentistry, opportunities to become experienced in the management of this disease are limited. This report is a retrospective review of our results using a policy of pre-operative high dose irradiation followed by maxillary resection.

Method

During the period 1965 to 1989, 80 patients with histologically proven primary malignant tumours of the maxillary antrum received radiotherapy in our department. Over this period there was a policy of high dose pre-operative irradiation followed four to six weeks later by surgical resection of the hemi-maxilla or whole maxilla at the discretion of the referring surgeon. From this original group, the case notes of 54 patients were examined in detail as these patients had primary tumours of epithelial origin (squamous, adenocarcinoma or undifferentiated) and had received high doses of radiation (at least 50 Gray [Gy.] in 20 fractions over four weeks or its radiobiological equivalent). Thus patients with tumours other than carcinomas or those treated with lesser doses of radiation were excluded from further analysis. Radiotherapy was administered on a cobalt⁶⁰ unit or a linear accelerator (5–8 MEV) using either two fields (one anterior and one lateral) or three fields (one anterior and two opposing lateral fields) with wedge compensators to maximise dose homogeneity across the target volume (Fig. 1) and a plastic mask to immobilise the head during treatment. Prophylactic irradiation of clinically involved nodes was not under-

taken. A drainage antrostomy was not considered a prerequisite for radiotherapy. Four to six weeks after radiotherapy, partial or total maxillectomy was performed with orbital exenteration reserved for patients with involvement of the orbital contents on clinical or tomographic criteria.

Patient characteristics (Tables I and II)

Thirty-two patients were male, 22 female (M:F 1.5:1) aged from 38 to 98 years (mean 66 years). When patients were staged retrospectively according to the TNM classification (International Union Against Cancer, 1987) using available clinical and radiological findings prior to definitive therapy, 13 (24 per cent) were staged T₂, 30 (56 per cent) T₃ and 11 (20 per cent) T₄. There were no T₁ cases. There were 37 (69 per cent) squamous carcinomas, 12 (22 per cent) adenocarcinomas and five (9 per cent) undifferentiated carcinomas. Of the 54 patients, despite a policy of maxillary resection following radiotherapy, only 16 patients underwent the proposed surgery, the remaining 38 receiving radiotherapy alone. Only nine patients (17 per cent) had enlarged regional nodes at presentation consistent with malignant infiltration. Of these, two had a radical neck dissection after radical neck node irradiation, and seven had radical neck node irradiation alone.

Results

Overall actuarial survivals at two years and five years for the 54 patients reviewed were 50.3 per cent and 38.5 per cent respectively. Comparison of squamous and adenocarcinomas indicated more favourable actuarial survivals for the latter at both two years (83 per cent vs. 41 per cent) and five years (58 per cent vs. 35 per cent, log

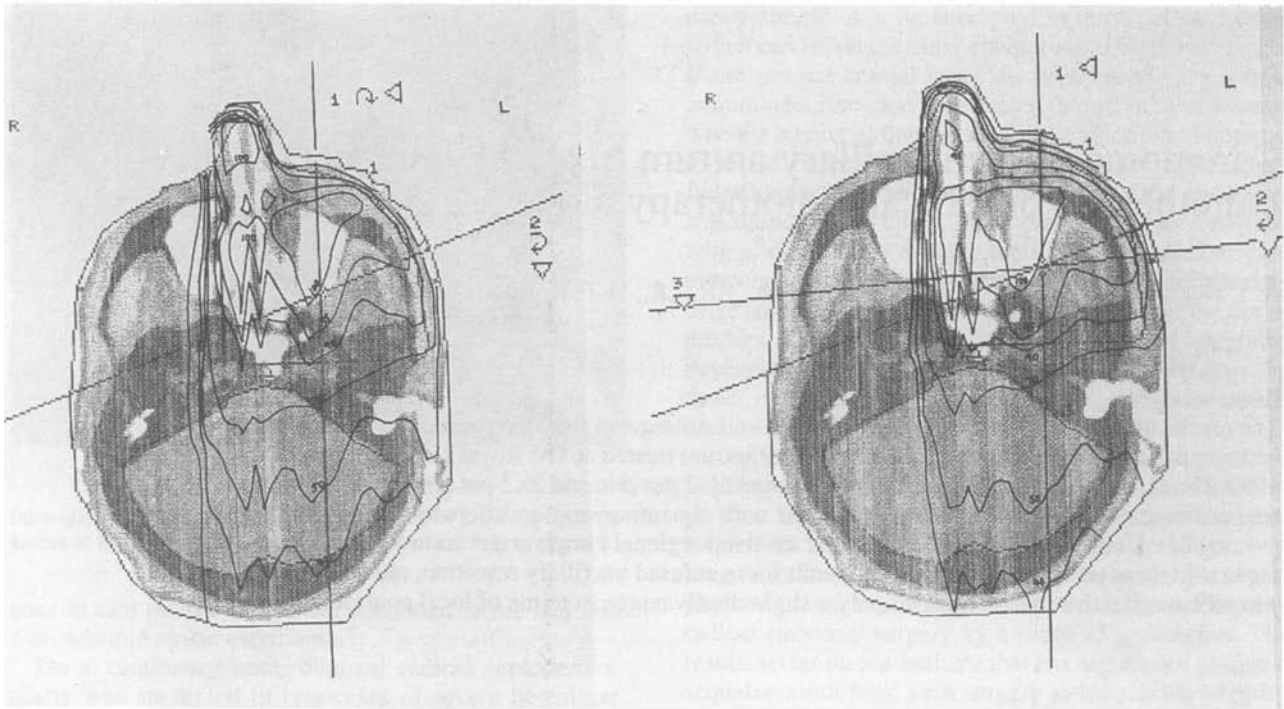


FIG. 1

Typical isodose distributions obtained using 2- and 3 field arrangements for carcinoma of the maxillary antrum.

rank $p = <0.01$) (Fig. 2) despite comparable proportions of advanced (T_3/T_4) cases. Thirty-eight patients were treated by radiotherapy alone with an actuarial local recurrence free survival of 47 per cent at two years and 30 per cent at five years, and actuarial survival of 55 per cent at two years and 38 per cent at five years. Once again, patients with adenocarcinoma survived longer than comparable patients with squamous carcinoma both at two years (86 per cent vs. 53 per cent) and at five years (69 per cent vs. 32 per cent, log rank $p = <0.01$). Radical radiotherapy was well tolerated even in the oldest patients. Despite acute cutaneous, mucosal and conjunctival reactions, in no cases was it necessary to curtail the proposed radiotherapy schedule. In the case of the 16 patients undergoing maxillary resection, no excess morbidity or mortality could be detected attributable to the preceding radiotherapy. Actuarial two and five year recurrence free survival was similar in the combined modality treatment group at 52 per cent and 36 per cent respectively, and actu-

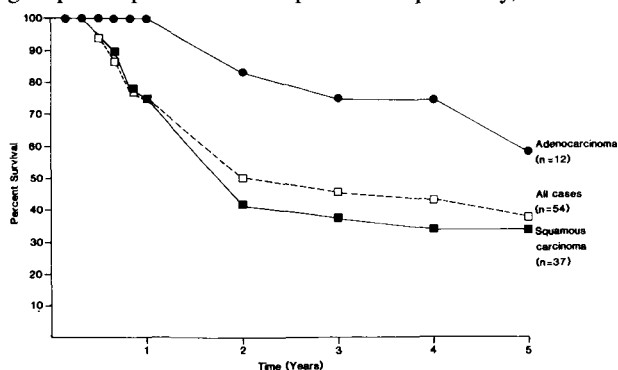


FIG. 2

Actuarial life table for patients treated by radical radiotherapy alone or pre-operative radiotherapy followed by maxillary resection according to histological type.

arial survival was little different at 60 per cent at two years and 42 per cent at five years. None of the five patients with undifferentiated carcinoma survived 12 months. None of the node positive patients survived to two years irrespective of whether they were treated by radiotherapy alone or combined radiotherapy/surgery, most (six of nine) dying with distant metastases.

Discussion

Carcinoma of the maxillary antrum provides a therapeutic challenge to both the radiotherapist and surgeon. Due to a presentation with the insidious onset of non-specific symptoms resembling chronic sinusitis, the disease is often locally advanced at presentation, 90 per cent showing destruction of one or more bony walls of the antrum. This likelihood of tumour extending into the surrounding tissues makes surgical clearance of the primary tumour difficult, increasing the risk of post-operative morbidity and mortality. Similarly, it is recognized that bone invasion limits the radiocurability of tumours and predisposes to radionecrosis. It is therefore logical to use a combination of the two treatment modalities (Harrison, 1973; Lederman, 1969). Pre-operative radiotherapy thus eradicates viable tumour cells in the surrounding tissues and lymphatics which may be inaccessible to the surgeon and not easily sacrificed, and also has the potential to downstage the disease making surgical extirpation more likely.

TABLE I
DISTRIBUTION OF PATIENTS BY TNM STAGE

Histology	T ₁	T ₂	T ₃	T ₄	Total
Squamous cell	0	11	22	4	37
Adenocarcinoma	0	2	6	4	12
Undifferentiated	0	0	2	3	5
Total	0	13	30	11	54

TABLE II
DISTRIBUTION OF PATIENTS BY NODE STATUS AND TREATMENT OF
PRIMARY TUMOUR

Histology	N-	N+	RT alone	RT + Surgery
Squamous cell	30	7	27	10
Adenocarcinoma	10	2	7	5
Undifferentiated	5	0	4	1
Total	45	9	38	16

Subsequent surgery removes the central core of potentially hypoxic tumour cells which are least likely to be eradicated by a course of radiotherapy as well as the involved bone most likely to be the site of subsequent radionecrosis. Such an approach maximizes the chance of local tumour control while minimizing the functional defect in the longer term. Up to 72 per cent of maxillectomy specimens harbour residual tumour following radical radiotherapy (Lindeman *et al.*, 1987). Maxillary resection also has the advantage of permitting a detailed inspection of the antral cavity at subsequent follow up visits, thus aiding early detection of local recurrence. Controversy exists as to the relative merits of pre-operative versus post-operative irradiation. This issue has been difficult to resolve due to the paucity of prospective and retrospective trials. However, there is sufficient evidence to suggest that pre-operative radiotherapy is superior (Tabb and Barranco, 1971; Cheng and Wang, 1977; Yu-Hua *et al.*, 1982). Some authors (Kurohara *et al.*, 1972) advocate drainage antrostomy prior to radiotherapy to permit drainage of antral contents, preventing discomfort due to a build up of pressure and thus increasing patient tolerance to high doses of radiation. Antrostomy also facilitates insertion of radioactive sources (Barley *et al.*, 1976), intranasal curettage and cryotherapy (Sakai *et al.*, 1983). However, using our treatment protocol, antrostomy was performed only to obtain a tissue diagnosis prior to definitive treatment and was not obviously advantageous with regard to the radiotherapy.

Despite a policy of combined modality treatment, a surprisingly small proportion (16 of 54) of our patients underwent surgery following their radiotherapy. When a reason for this was recorded it was due either to them being medically unfit for surgery or due to patient refusal. Unfortunately, this makes it difficult to draw definite conclusions regarding any additional effect of maxillary resection on local tumour control or survival compared with radiotherapy alone as this may have introduced an element of bias when comparing the two groups. Despite this, there was an advantage for combined modality treatment both in terms of local control and survival. With regard to radical radiotherapy as sole treatment, our actuarial five year survival of 38 per cent is comparable with that reported in other series where a figure of greater than 30 per cent is attainable (Boone *et al.*, 1968; Sakai *et al.*, 1976; Ahmad *et al.*, 1981; Frich, 1982; Shibuya *et al.*, 1984; Knegt *et al.*, 1985; Logue and Slevin, 1991). Patients with adenocarcinoma fared better than those with squamous carcinoma despite a greater proportion of T₃ and T₄ tumours in the former group. Other authors have noted a more favourable prognosis with adenocarcinomas, showing a tendency to local recurrence with death often resulting from intracranial infiltration rather than systemic metastases (Saunders and Ruff, 1976).

The percentage of node positive patients in this series

(17 per cent) is comparable to that reported in much larger series addressing this aspect of the disease (Robin and Powell, 1980). Similarly, when prognostic factors are examined in detail (Weymuller *et al.*, 1980), cervical lymphadenopathy carries a 100 per cent probability of dying from the disease. With regard to our patients, the number with involved nodes was considered too small for a meaningful analysis. Other authors have concluded that there is no role for prophylactic neck node irradiation (Pezner and Moss, 1979; Kondo *et al.*, 1985) due to lack of impact on survival, the possibility of increasing the severity of acute radiation reactions, and success of salvage treatment.

Conclusions

Carcinoma of the maxillary antrum is optimally treated by high dose radiotherapy followed by maxillary resection. However, there is a group of patients curable by radiotherapy alone. These patients could potentially be spared the trauma and functional morbidity of surgery unless it becomes necessary as a salvage procedure. It would be advantageous to identify such patients using a prognostic score although a much greater amount of prospectively collected data is required. Adenocarcinomas appear to have a more favourable prognosis both in terms of local control and survival. Undifferentiated carcinoma and nodal involvement are indicative that the patients will inevitably succumb to their disease.

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