THE MANAGEMENT OF CARCINOMA OF THE MOUTH*

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The surgical treatment of carcinoma of the mouth enjoyed a certain popularity between 1880 and 1905. During this period many of the hazards peculiar to operations in this area were discovered. Anaesthetic difficulties, the uncontrolled spread of infection, and the problems of maintaining proper nutrition after operation, led surgeons to abandon this form of treatment. The discovery of radium by Röntgen and Becquerel, and the personal experience by the latter of the caustic effects of radium and its salts, were quickly followed by investigation on the selective response of tumour cells to gamma rays. It was with great relief that the surgical world gave up its unrewarded efforts on carcinoma of the mouth, and the cases were gladly turned over to the radiotherapists for their attention.

During the last 45 years a large amount of work has been done, and an immense volume of evidence has accumulated. Unfortunately the universal hope that in radiotherapy we had a panacea for growths in the mouth has not been fulfilled and we are coming more and more to recognize the limitations and contra-indications of this form of treatment.

Within the last few years the tremendous strides made by anaesthesia have enabled the surgeon to attack areas which under earlier conditions were impossible to approach. A far better understanding of the fluid, electrolyte and protein requirements of the body has enabled us to deal with a fair degree of precision with the post-operative difficulties in patients to whom the ordinary methods of feeding are not available.

The immense benefits conferred by the development of antibiotics in preventing infection under the most difficult circumstances, and the solid and massive support of plastic surgery have also enabled the surgeon to tackle with resolution cases which were previously considered inoperable. He can now deal with carcinoma of the mouth in a radical way, confidently anticipating that, with the cooperation of the plastic surgeons, there would be very few surgical mutilations that could not be rendered comfortable and tolerable both to the patient and to his relations.

INDICATIONS FOR SURGERY

The limits of radiotherapy have long been recognized and it is now possible to define these limits with a fair degree of accuracy. It is well known that all tumours are not equally radio-sensitive and that some do not respond to radiotherapy in the ordinary way. Anatomical difficulties, which prevent uniform calculated doses from being given are often present. In addition, glandular metastases and bony involvement have long been rightly regarded as radio-resistant. The following are the indications for surgery:

1. Where the primary tumour is radio-resistant.
2. Where the anatomical situation is such that accurate radiation dosage is difficult.
3. Where radiotherapy has arrested the disease incompletely.
4. Where glandular involvement has occurred.
5. Where bone has become involved by carcinoma.
6. In Coloured and Native patients.

1. *The Primary Tumour is Radio-resistant*

Certain tumours in the mouth show greater radio-resistance than others. Why it should be so is not known, and the ordinary methods of histological examination do not give us any indication which tumour is going to be radio-resistant. In many instances, only the failure of an adequately planned dose of radiotherapy will show the nature of the individual malignancy. However, anaplasia which can be recognized histologically, is usually considered an indication that the cancer is radio-sensitive; anaplastic tumours form 7% of our series.

2. *Anatomical Difficulties*

Failure of radiotherapy is something that can often be anticipated. The anatomical position of the tumour may be such that it may be very difficult to arrange for the beams to be directed with accuracy; the extreme mobility of the parts make the calculation for radium or radon seed implantation, and the actual implantation itself, a very difficult and occasionally haphazard procedure.

Because of these difficulties, the dosage received by some tumours cannot be estimated with accuracy and the response is not expected to be satisfactory. As a result of bitter experience most radiotherapists are able to recognize those cases which will be difficult as soon as they encounter them.

3. *Recurrence after Radiotherapy*

The radiotherapist can have only one chance of curing the disease. Should cure not be complete—and by cure one means complete resolution of the process with the absence of any residual ulceration or nodularity—we must conclude that radiotherapy has not succeeded. A second course of treatment is extremely dangerous and will often lead to massive and unpredictable necrosis with the disease still uncontrolled. These cases are pre-eminently candidates for surgical intervention.

4. *Glandular Involvement*

Once glands have become invaded with squamous carcinoma, some alteration takes place either in the radio-sensitiveness of the tumour cell or in its environment and radiotherapy becomes less effective. This has long been recognized and surgical excision of secondary glands has been practised in some clinics for many years.

5. *Involvement of Bone*

Certain cancers by virtue of their anatomical situation always involve bone by the time they are diagnosed. Of these tumours the alveolar carcinomata are the com-

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monest and, as they originate in the mucous membrane covering the mandible or maxilla, they invade the Haversian systems very quickly. Sometimes these tumours are observed when an extracted tooth fails to heal and it should be widely known that whenever unexplainable delay occurs in the healing of a socket a snip should be taken for biopsy. Tumours of the hard palate likewise rapidly invade the bone and for that reason it has become our practice to advise operation in these two forms of carcinoma of the mouth as soon as the diagnosis is established.

Involvement of the mandible by carcinoma extending from the floor of the mouth and from the side of the tongue often takes place. It is important to realise, however, that not all apparently fixed epitheliomata have actually invaded the bone; a large proportion are attached by an inflammatory reaction only. The differentiation between the two, though difficult, is occasionally possible and may permit a patient to avoid an operation and receive radiotherapy or, if an operation be mandatory, to save the bone.

6. *Coloured and Native Patients*

A careful study of the records at our disposal shows that, regardless of the state of the tumour, of its duration or of its histological character, the proportion of radiotherapeutic successes in non-European patients is so low that one can no longer justify this form of treatment in patients of these races.* On the other hand, our only long-term survivals in Coloured and Native patients have been those cases that have been subjected to extensive surgery at the earliest opportunity. The survival rates in patients treated in this way compares very well with those in Europeans similarly treated, and we have found that the non-Europeans stand up well to surgery and to the unavoidable mutilation that is occasionally necessary.

ETIOLOGY

In cancer of the lip we have found a very close relationship between exposure to sunlight and the disease, but cancer of the mouth has not, in our experience, been associated with any specific disease. It is significant, however, that most of our cases have neglected teeth and that the majority are heavy smokers. Syphilis is usually considered to be an etiological factor; but we have not found any greater frequency of syphilis in our group of patients than in the normal population. The food eaten is of the usual kind, not beng particularly spiced and having no irritating qualities.

One gets the impression that proper dental care and elimination of smoking would probably reduce the incidence of the disease.

DIAGNOSIS AND TREATMENT

Microscopy

Usually the pathologist reports a keratinizing squamous carcinoma and only 7% of our cases have been reported as anaplastic. In agreement with most other investigators we find that the immediate radiotherapeutic response is better in the anaplastic types though their later progress is less favourable. The keratinizing type offers better immediate prospects with surgery. On only two occasions has sarcoma of the mouth been encountered; in both instances in the upper jaw.

Diagnosis

Some of the earliest neoplastic lesions have been found in cases of *leukoplakia*. The localized heaped-up variety of this condition calls for excision and cancerous areas are discovered in about 60%. The diffuse, flatter variety of leukoplakia does not, in our experience, carry the same grave outlook and can be treated expectantly. Other early lesions are occasionally found when a tooth suddenly becomes loose or when there is unexplainable delay in the healing of a socket after an extraction.

The usual first complaint is that the patient feels as if a foreign body has penetrated the mucous membrane of the mouth. He points to a small pearly-white area; there is no pain. Very quickly the lesion ulcerates, infection takes place and pain develops. The pain is at first local, but as the lesion enlarges, the nerves supplying the tongue become involved and the pain is referred in the distribution of the trigeminal nerve, to the face and to the ear.

Difficulty in speech and in swallowing indicates that infiltration of the tongue or of the floor of the mouth has occurred, and as infection is constantly present, foetor is a pronounced feature. Occasionally blood-stained sputum or a brisk haemorrhage may draw attention to a cancerous ulcer at the back of the tongue. The protruded tongue deviates to the diseased side.

In the untreated case the tumour increases in size, the ulceration extends locally to involve adjacent portions, and very quickly the mandible is infiltrated. This infiltration takes place far quicker from a primary growth than from secondary glands.

Apart from local extension of the growth, spread by the lymphatics is very common and occurs early in the disease. The submental glands become invaded from lesions involving the floor of the mouth or the tip of the tongue, the submaxillary glands get attacked from growths of the alveoli, cheek, floor of mouth and side of the tongue and the deep cervical glands surrounding the internal jugular vein drain both submental and submaxillary glands. Owing to its anatomical proximity, the posterior part of the tongue drains almost directly into the tonsillar gland of the internal jugular chain and because of the free lymphatic anastomosis and extreme mobility of the parts, lymphatic spread occurs early and is not uncommonly bilateral.

Clinically, the glands are reconigzed as involved when they enlarge and become palpable. It is very difficult, however, to differentiate between an inflammatory gland and a neoplastic one and for this reason it is necessary to keep a careful watch and to take appropriate action as soon as any glandular enlargement is felt. Left alone, the glands enlarge, become adherent and ulcerate through the skin; they grow inwards and erode the carotid arteries.

Blood spread is a rare complication because in the past, few patients survived the disease long enough to

* Dr. Ralston Paterson has pointed out that owing to the lack of comparable in-patient facilities, radiotherapy cannot be given under as good conditions to non-Europeans as to Europeans. This is true and is acknowledged with regret; it probably partly accounts for the fact that we have still to meet our first successful radio therapeutic result in a non-European.

enable such a spread to be observed. However, it is now possible to report several cases in which the primary disease and its glandular metastases were kept under control for a sufficiently long time for blood-borne metastases to become apparent.

If the disease is untreated, or if treatment has not been successful, death occurs inevitably and very soon (Fig. 2) and is due to 3 main causes.

1. Inanition from inability to swallow and from the absorption of the foul discharges in the mouth.

2. Septic broncho-pneumonia from inhaled infected material.

3. Secondary haemorrhage from the primary growth eroding into the lingual artery or from the secondary glands ulcerating on to the surface and later eroding one of the carotid arteries.

Examination

As cancer of the mouth is in most cases visible and is at all times palpable, the examination of the patient should be performed in a good light. The mouth is opened as far as possible and the interior carefully inspected with mirror or torch. Careful palpation will indicate the site and size of the disease, its mobility, and whether it is attached to the mandible or not. Sometimes a woody indurated area is found with no ulceration present; this should be recognized as a possible infiltrating carcinoma. Standing behind the seated patient, it is possible to palpate the glands in the submaxillary region and the jugular chain from below the ear to the supraclavicular area, especially if one uses Lahey's manoeuvre of pushing the larynx first to one side and then to the other; the glands then become very apparent.

A piece of tissue should now be obtained for examination; any condition which arouses the slightest suspicion should be given the benefit of biopsy. It is most important to take a generous piece, which should include not only the malignant, but also a portion of the adjacent normal tissue. Several such snips should be taken, avoiding the necrotic loose area in the middle of the growth. No greater tragedy can befall a patient suffering from cancer than to have a biopsy report returned negative. If the condition appears malignant and the pathological report does not confirm the clinical impression, it is essential to take a second specimen and finally, to excise the affected area completely under a general anaesthetic. On several occasions we have had a positive report come back on the third time of asking. Since early treatment is of vital importance, it is necessary to make the pathologist aware of the position and that his reports be expedited.

Treatment

Many cases, under proper conditions and with careful and regular follow-ups can be kept under control by X-ray therapy or radium treatment. The radiotherapist aims at delivering about 6,000 Röntgen units to the tumour in a uniform dose. It has been the usual procedure where absolute indications for surgery have not been present, to give every case such a course of radiotherapy and if unsuccessful, to pass the failures on for surgery. As it takes about 6 weeks for the maximum effects of radiotherapy to develop and a further few weeks before the tissues return to a sufficiently normal state to permit an operation, at least 2 months are lost before surgery can be undertaken with comfort. While radium therapy does not usually cause excessive fibrosis, a course of deep X-ray treatment as a rule adds to the technical difficulties of the operation. Although we do not usually advocate this, a strong argument could be put forward for immediate surgery in many cases, with radiotherapy to follow in those where complete eradication has not been achieved.

TABLE I. ANALYSIS OF TREATMENT GIVEN TO 120 OF THE 144 CASES. 24 (16·6%) WERE TOO ADVANCED OR REFUSED ALL THERAPY

	Radiotherapy	*Radiotherapy plus surgery*	*Surgery*
Tongue, Anterior 2/3rds	19	10	9
Tongue, Posterior 1/3rd	12	3	—
Floor of Mouth	11	6	—
Alveolus	11	7	—
Cheek	4	3	—
Tonsil	9	3	—
Palate	8	4	1

The operation which we perform consists of the complete removal of the primary in the mouth and of the glands in the neck in one continuous piece. This approximates very closely to the modern idea of a proper cancer operation. The glandular removal has now become reasonably standardized; in common with most surgeons we have given up suprahyoid clearances or other local removal of the glands. For these glandular excisions we follow a technique which involves clearing the anterior and the posterior triangles together with removal of the sternomastoid and the jugular vein with the associated deep cervical group.

The operations that are needed in the mouth are not standardized but must be varied to suit the individual case according to the variations in the site and extent of the primary disease. In many cases it is possible to save the jaw, but frequently a portion of the mandible, of variable size, requires removal either for access or because the bone has become directly infiltrated by the neoplasm. With this form of operation a very wide exposure is obtained, which allows us to make a radical sweep of the primary disease and prevents local recurrences. The operation is a big one but the patients tolerate the procedure very well.

As is usual in surgery of the head and neck, there is very little shock and blood transfusions can be kept down to a minimum. However, it is important that the patients, usually elderly men with cardiac disease, should be under adequate therapy to prevent decompensation. We have lost only one patient as a result of operation—a sudden death 12 hours after operation in an elderly man with cardiac decompensation.

Pneumonia has not been encountered in our series, but fistula formation was common until we insisted on nasal feeding for the first 10 post-operative days. It is our practice to do a temporary tracheotomy in all cases where the posterior part of the tongue or pharynx has been excised. This tube is removed on the 3rd or 4th

day except in those cases where the anterior part of the mandible or genio-hyoglossus has been divided, when the tracheotomy must be left in for a few days longer.

With careful management, complete healing after surgery takes place early, and 14 days after the operation X-ray treatment can be started if necessary. The wounds do not break down under this post-operative radiotherapy.

After the definitive treatment is over, the patient must be observed at regular weekly intervals for about 2 months. These intervals are gradually lengthened and at the end of a year the patients are asked to return every 6 months. On each occasion both the site of the original primary and the glands in the neck are carefully examined and instructions are given to report immediately should any lump or ulceration develop.

Prophylactic Clearance of the Glands

If it is possible to keep the patient under careful and frequent observation, we do not consider that routine prophylactic clearance of the glands is justified. Many of our cases however come from the more remote parts of the country and not a few lack sufficient intelligence to return for regular follow-ups; in these cases we do not hesitate to advise a prophylactic clearance on the same side as the disease.

Palliation

Where it is obvious that a radical cure will not be achieved by operation, a palliative procedure will still afford the patient relief. A hemiglossectomy will often allow the primary condition to be kept under control even though the secondary glands prove to be irremovable. As the lingual and the inferior alveolar nerves are usually excised with the primary tumour, there is often considerable relief of pain after the operation. Palliative radiotherapy is then given to the glands as well as to the operated area after healing has taken place. In those patients where local recurrence has occured after surgery, more radiotherapy may be safely given in normal doses because, the previously irradiated area having been removed, the site of local recurrence is, from the radiotherapeutic point of view, virgin soil.

Where this second course of radiotherapy fails and pain is a prominent feature, we have referred the patients to the neuro-surgeons for glosso-pharyngeal and Gasserian neurectomies, Gasserian injections and, in some cases, pre-frontal lobotomy.

We have not found local cauterization by any method, or incomplete local excision with the diathermy, to be of any lasting value in the relief of pain.

Results

An analysis is presented of 144 cases of carcinoma of the mouth treated over the last 6 years. The analysis by race and sex is shown in Table II. Ten per cent of our patients are over 80 and a further 27% are over 70 (Fig 1), so that 5-year cures in the accepted sense is, in these patients at any rate, often of academic importance only. The elderly patient will accept a certain amount of deformity with equanimity as long as he can be promised freedom from pain and a reasonable chance of local non-recurrence. We have found that division and removal of portions of the mandible has not interfered with the normal diet of our patients, and these operations, from the functional point of view, permit the patients to lead a normal and comfortable life. Speech and swallowing return very soon and the patients pick up condition remarkably quickly.

TABLE II. ANALYSIS OF 144 CASES BY RACE AND SEX

	E.M.	*E.F.*	*C.M.*	*C.F.*	*N.*
Tongue, Anterior 2/3rds ..	20	5	16	3	1
Tongue, Posterior 1/3rd ..	9	0	4	0	2
Floor of Mouth	14	2	5	0	2
Alveolus	6	0	6	9	3
Cheek	4	0	2	2	0
Tonsil	7	0	6	1	0
Palate	6	2	4	0	3

E=European. C=Coloured. *N*=Native. *M*=Male. *F*=Female.

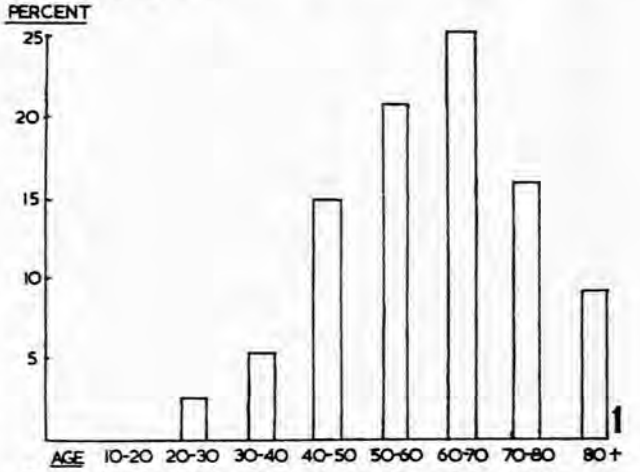


Fig. 1. Age incidence of 144 cases of C.A. of the mouth.

We have excised portions of the mandible for malignant disease on 37 occasions and done a complete gland clearance (Bloodgood) in 26 cases. Our mortality has been the one case mentioned above. We have carried out 27 cases of suprahyoid and submaxillary clearance before we went on to the more radical operation, and 21 glossectomies; all without mortality.

In contrast to the average survival time of untreated cases and of those who have failed to respond to therapy, we are able to present not a few individual results which are relatively satisfactory by comparison (Fig. 2). These

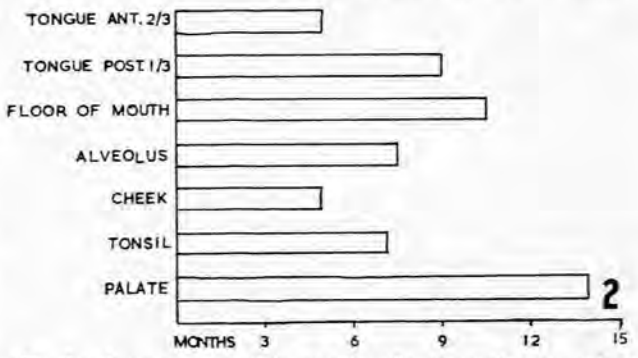
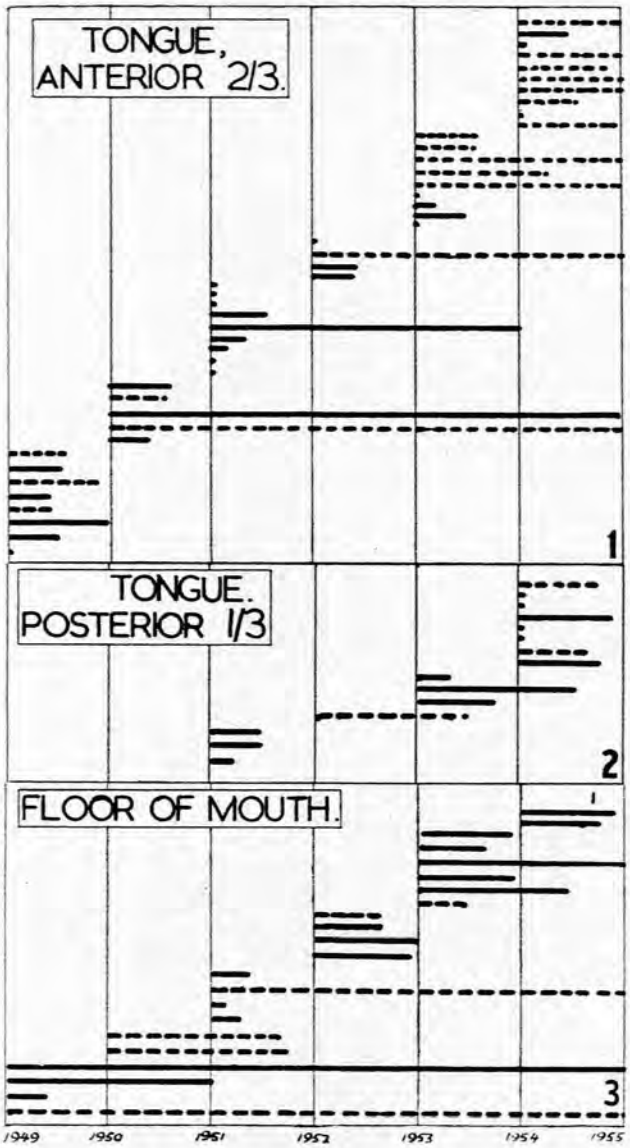


Fig. 2. Average survival in months of untreated cases and of cases that have failed to respond to therapy.

figures are not statistically significant because the work has not been in progress long enough to allow us to establish 5-year survivals, but the results have shown that with careful team-work and cooperation between radiotherapist and surgeon, a considerable amelioration of symptoms can be achieved in most patients and that many can be completely cured. The results of treatment according to the site of the primary carcinoma are shown in Fig. 3.



It must be emphasized that in contrast to the cases appearing at overseas clinics, at least 50% of our cases present themselves for the first time with fixed glands or with adjacent parts deeply invaded with neoplasm; for such cases nothing can be offered apart from sedatives. One cannot help feeling that, with more intensive propaganda and improved education, more patients will present themselves in the earlier curable states. The extensive mutilations can then to a great extent be avoided and the ultimate results very much improved.

SUMMARY

1. The management of carcinoma of the mouth is discussed.

2. A plea is made for earlier diagnosis and for more radical surgical methods in certain types of cases.

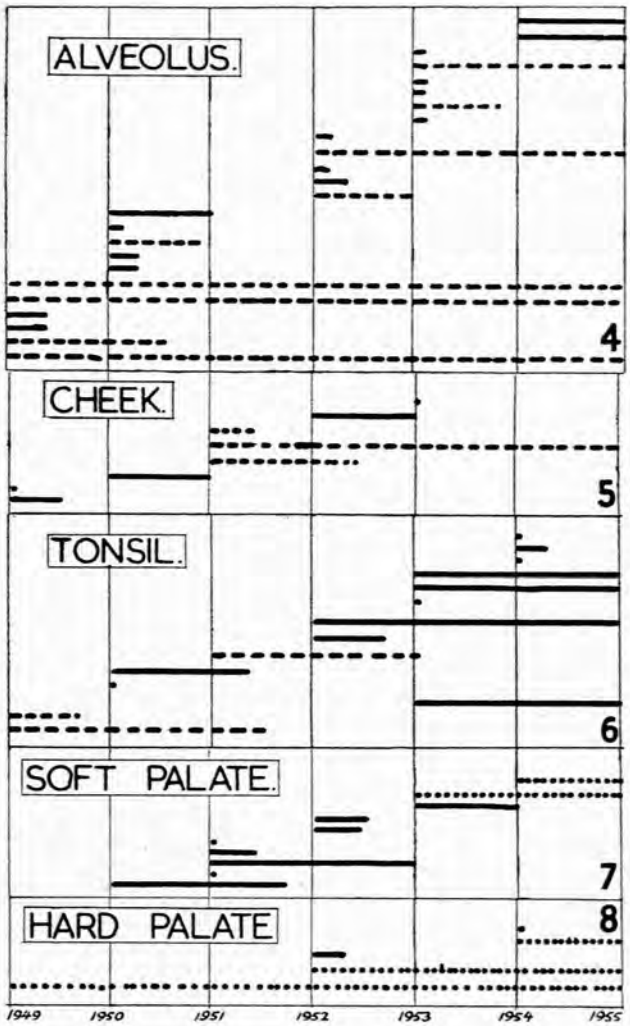


Fig. 3. Results of treatment. Continuous lines—radiotherapy. Broken lines—surgery performed.

3. An analysis of 144 cases treated over the last 6 years is presented.

4. The results show that with carefully selected cases and with proper team-work, much can be offered to individual patients.

I should like to thank Dr. J. M. Grieve, Head of the Department of Radiology and Radiotherapeutics at Groot Schuur Hospital, Cape Town, for his kindly interest in this work and the radiotherapists Dr. R. D. Tucker and Dr. M. B. Bennett for their enthusiastic assistance and cooperation.