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TELEGAMMA THERAPY OF LARYNGEAL CARCINOMA

by

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It is now generally agreed that high energy radiation is the most convenient means of treating laryngeal carcinoma (GOLDMAN & SILVERSTONE 1960, MORRISON & DEELEY 1962, and FLETCHER & KLEIN 1964). Various treatment units and techniques may then be advantageously applied.

Gamma radiation has been used for this purpose at Radiumhemmet for about thirty years. Teleradium units were employed until 1954. JACOBSSON (1951, 1952) reported and analysed the 1935 to 1945 material of 178 patients with carcinoma of the larynx. An intensified and more detailed individual dose planning was started in 1953. Decacurie cobalt 60 units were installed in 1954 and 1956 (LINDELL & WALSTAM 1956, DAHL, LINDELL & WALSTAM 1956); these offer better possibilities to adapt the dose distribution to the position and size of the tumour and to the anatomical conditions. From 1955, decacurie cobalt 60 was mainly used for this treatment, and in recent years the simpler ordinary telecobalt therapy. The short distance gamma beam irradiation technique is suitable chiefly for small tumours; larger carcinomas or wide spread demand other techniques.

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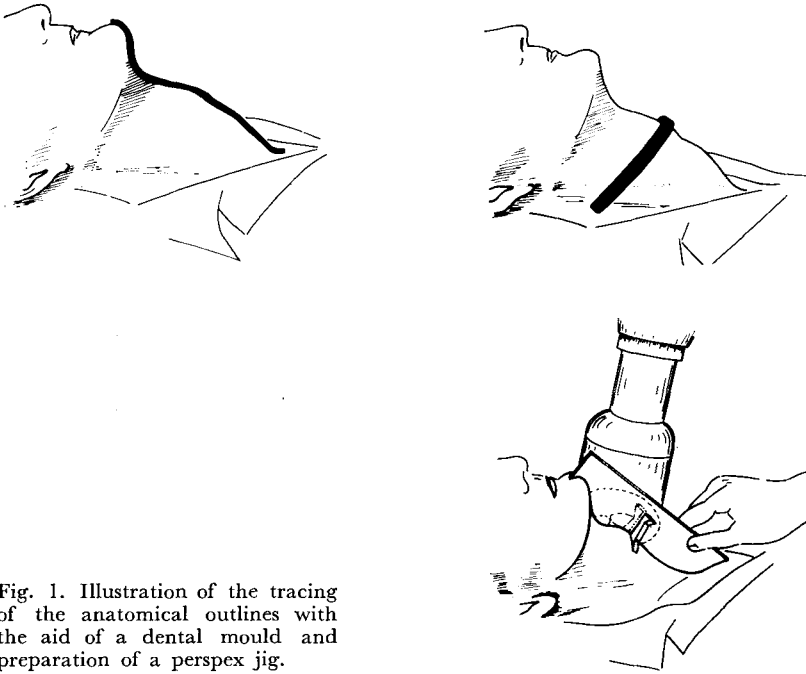


Fig. 1. Illustration of the tracing of the anatomical outlines with the aid of a dental mould and preparation of a perspex jig.

The main purpose of this paper is to present a material treated almost entirely with high energy radiation rather than to argue in favour of a special irradiation technique. Preliminary reports were given by DAHL & WALSTAM (1957) and DAHL, JACOBSSON & WALSTAM (1964). The authors feel it necessary first to give a brief summary of the technique.

The use of narrow beams from short-distance gamma units with their rapid dose fall-off necessitates a careful planning of the irradiation. The first step in the preparation before irradiation is illustrated in Fig. 1. With the patient placed in a suitable position, the anatomical outlines of two body sections are traced with the aid of dental moulds. An individual perspex jig is prepared from these so that it is possible to bring the patient into the correct position at every treatment and also to secure accurate positioning of the beam nozzle.

A roentgenogram of the treatment area, with the flexible magnification indicator applied to the patient's skin and produced in the treatment position prescribed, is shown in Fig. 2. This film is used for determination of the distance from the skin to the anterior and posterior borders of the larynx and to the spinal cord.



Fig. 2. Roentgenogram of the treatment area with magnification indicator applied to the patient's skin.

Two-dimensional dose planning is performed on an anatomical plan of the cross-section through the tumour centre, as illustrated in Fig. 3. The choice of beam nozzles and of the distance between, and angulation of, the central axes of the beams, is made with due regard to the size and position of the tumour and to the possible compression of soft tissues. In most patients, a two-field technique with beam nozzles provided with special wedge filters has usually supplied a satisfactory dose distribution for small tumours. The height of the field has been 3, 4 or 6 cm. However, where regional metastases have been present, other techniques have been used. The aim has been to deliver a calculated dose of 5 600 rad in approx. 2 to 3 weeks to small tumours and 6 000 rad in about 3 to 4 weeks to larger neoplasms. The error of method in these dose figures has been estimated to be within + 5 and — 10 per cent. The corresponding dose distribution in a sagittal section with a field height of 6 cm is given in Fig. 4.

In comparison with conventional roentgen rays the hard gamma radiation gives a diminished absorption and reaction in calcified cartilage and a skin-sparing effect, which may also be obtained with the closed-end treatment applicators that we have used (WALSTAM 1965).

Among the special advantages of the decacurie technique may be mentioned that both the overall treatment time and the duration of the tissue reactions are relatively short. To avoid undue reactions it is of course necessary to base the dosage in the individual case on repeated clinical investigations during treatment.

Optimal results with the decacurie technique demand that the whole staff be familiar with the technique and that the setting up for each treatment is care-

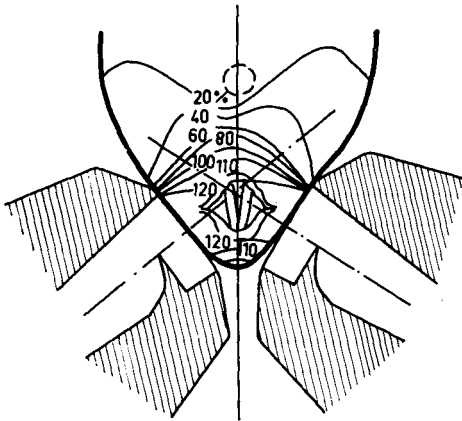


Fig. 3. Dose distribution with a two-field short-distance cobalt technique with special wedge filters.

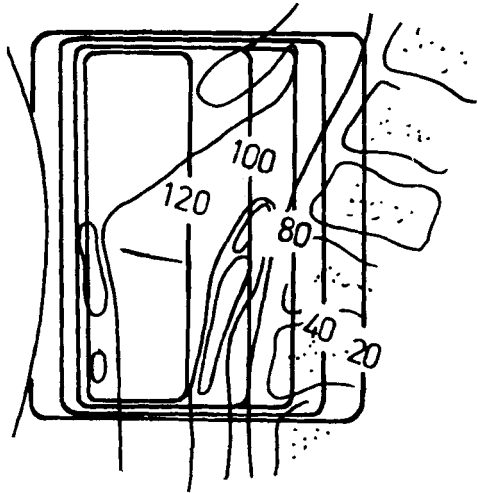


Fig. 4. Dose distribution in the sagittal section with a 6 cm high field.

fully controlled. It is wise in general to choose a field height of 6 cm in order to avoid subglottic recurrences. If larger tumour dimensions, more deep growth, or regional metastases are present or suspected it is advisable, when radiotherapy is chosen, always to use the kilocurie cobalt treatment techniques.

The present material dates from the year 1953 when detailed individual treatment plannings and dose calculations in carcinoma of the larynx began to be performed. It consists of 123 patients treated in the years 1953 to 1958, 114 being men (93 %) and 9 being women (7 %). Only primary cases with a histologically proven, infiltrating squamous cell carcinoma have been included. No patients have been lost to follow-up. The material has been classified according to the T-categories, proposed for malignant tumours of the larynx by the Committee on Clinical Stage Classification and Applied Statistics of the International Union Against Cancer in 1963. It may be mentioned that group T—I consists of tumours confined to one anatomical site within the larynx, T—II of tumours confined to one anatomical region within the larynx, T—III of tumours extending beyond one anatomical region but confined to the larynx, and T—IV, lastly, of tumours extending beyond the larynx.

The 5-year results by irradiation alone, giving the rates of cure, are presented in the Table below. Thus, patients with recurrence after irradiation, who were

Table

Five-year results of treatment of carcinoma of the larynx at Radiumhemmet during 1953—1958

Category	Patients treated	Deaths free of cancer	Determinate cases	Symptom-free	Corrected cure rate
<i>Supraglottic</i>					
T-I	3	—	3	2	2/3
T-II	1	—	1	—	0/1
T-III	4	1	3	2	2/3
T-IV	9	—	9	3	3/9
Total	17	1	16	7	7/16 (44 %)
<i>Glottic</i>					
T-I	60	11	49	45	45/49
T-II	24	5	19	13	13/19
T-III	21	4	17	14	14/17
T-IV	1	—	1	—	0/1
Total	106	20	86	72	72/86 (84 %)
<i>Total material</i>					
T-I	63	11	52	47	47/52
T-II	25	5	20	13	13/20
T-III	25	5	20	16	16/20
T-IV	10	—	10	3	3/10
Grand total	123	21	102	79	79/102 (77 %)

symptom-free after 5 years because of surgery, have been counted as not symptom-free after 5 years. Patients who died within 6 months have been counted as dead from cancer.

The glottic carcinomas represent the largest group, as there were no primary subglottic and only few supraglottic tumours in the material.

The above-mentioned 1963 recommendations on clinical stage classification of malignant tumours of the larynx, given by the International Union Against Cancer, define only the different T, N, and M categories. No proposition is made as to their combination into stages, as did the corresponding 1958 recommendations. We have therefore used the T-categories alone for the classification of the present material and feel that this mode of classification offers better possibilities of drawing conclusions as to the suitability of a certain treatment method for tumours differing in position and size. We further believe that it would be of value if the classification in T-categories took the mobility of the cords into

consideration, as was the case in the 1956 recommendations. The glottic T—II group ought especially to be divided into patients with full mobility retained and patients with mobility impaired or lost, since such sub-groups have a very different prognosis. We have not, however, employed any such sub-division in the present case material, since the number of patients treated was considered too small. On the other hand, the presence of patients with impaired or lost mobility of the vocal cords among the glottic T—II material apparently considerably influenced the corresponding cure rate.

The 5-year cure rate for glottic carcinomas, corrected for intercurrent deaths, is 45/49 (92 %), 13/19 (68 %), and 14/17 (82 %) in groups T—I, T—II, and T—III, respectively (see table).

It appears that recurrences in patients without metastases seem to occur almost exclusively within the first three years. This fact emphasizes the importance of frequent follow-up examinations during the first years after treatment.

SUMMARY

Teleradium units and from 1955 decacurie cobalt 60 units have been used for the treatment of laryngeal carcinomas. The material consists of 123 cases of primary proven infiltrating squamous cell carcinoma, supraglottic in 17 and glottic in 106 patients. The 5-year irradiation cure rate for glottic carcinoma, corrected for intercurrent deaths, was 92, 68, and 82 per cent in groups T-I, T-II, and T-III, respectively.

ZUSAMMENFASSUNG

Die Behandlung des Kehlkopfkarzinoms wurde mit Teleradium-Bestrahlung und seit 1955 mit Decacurie Kobalt 60 Bestrahlung vorgenommen. Im Ganzen handelte es sich um ein Material von 123 Fällen von primären infiltrierenden Schuppenzellenkarzinom, supraglottisch in 17 Fällen und intraglottisch in 106 Fällen. Nach Korrektur für dazwischenkommendes Tod zeigten die Resultate eine 5jährige Heilung in 92, 68, und 82 Prozent für die Gruppen T-I, T-II, und T-III.

RÉSUMÉ

Des appareils de téléradiumthérapie, et à partir de 1955 des appareils de cobalt-thérapie de 10—30 curie, ont été utilisés pour le traitement des cancers du larynx. Le matériel des auteurs comprend 123 cas de carcinome épidermoïde infiltrant vérifié, sus-glottique dans 17 cas et glottique dans 106 cas. Les taux de guérison de 5 ans, corrigés pour tenir compte des morts intercurrentes, sont respectivement de 92, 68 et 82 pour cent dans les groupes T-I, T-II, et T-III.

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