Vertebral height as the measure of lesion length in carcinoma of the oesophagus — is it accurate?

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Abstract

The majority of patients with carcinoma of the oesophagus present with advanced disease and difficulty in swallowing as their main symptom. These patients receive intraluminal radiation therapy for quick relief of dysphagia as one of the main palliative options. Presently lesion length is estimated depending on the filling defect seen on Hexabrix swallow, which is measured against the number of vertebrae the lesion spans (each vertebra is taken to measure 2.5 cm). We have devised a modification of the technique for the intraluminal procedure, with patients having a localisation film with Hexabrix at the simulator using a magnification graticule, with the grid projecting at 1 cm intervals at the isocentre. Ten consecutive patients underwent the procedure and the lesion length was calculated using the modified as well as the earlier technique. The mean and median differences in lengths calculated were 1.72 cm and 1.5 cm respectively (range 1.25 - 2.50 cm). The length of the lesion was longer when the number of vertebrae was used for an estimation of the length. With the modified technique it was possible to decrease treatment length and the number of normal oesophageal mucosa in the treatment volume, thereby reducing the chance of treatment-related complications such as strictures and ulceration.

Introduction

The majority of patients with carcinoma of the oesophagus present with advanced stage disease and poor prognosis, with difficulty in swallowing as the major presenting symptom.[1] Intraluminal radiation therapy is useful for controlling the endoluminal disease and this treatment modality leads to rapid improvement in swallowing. Various authors have published on the use of low and high dose rate intraluminal brachytherapy alone or in combination with external beam radiation therapy for the palliation of advanced oesophageal cancer.[2-5] Ideally, the palliative treatment should not aggravate the patient's symptoms by causing treatment-related toxicity or complications. The purpose of the modified technique is: (*i*) accurate assessment of the length of the lesion on Hexabrix swallow; and (*ii*) to decrease the fluoroscopy time during the procedure, thereby reducing staff exposure to radiation.

Methods and materials

Ten consecutive patients due for intraluminal radiation therapy for carcinoma of the oesophagus underwent the modified technique of simulation with Hexabrix using the magnification graticule with the grid projecting at 1 cm interval at the isocentre prior to the procedure (Fig. 1). The length of the lesion and the centre of

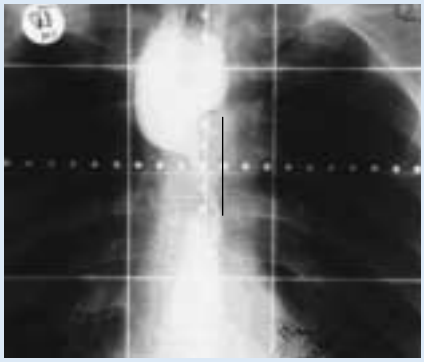

Fig. 1. Simulator film with grid (vertebral length = 2.5 vertebrae = 6.25 cm, grid length = 5 cm).

field for treatment were localised and marked. The localised centre was tattooed and a lead wire placed at the centre. This procedure facilitated the positioning of the high dose rate (HDR) treatment catheter and assessment of the treatment length. Patients received premedication with pethidine and Buscopan 30 minutes before the procedure. The pharynx was anaesthetised with a topical spray using xylocaine 4%. The brachytherapy tube was inserted under fluoroscopic guidance[6] and fixed in position using a face mask.

In the present procedure, insertion of the catheter is done under fluoroscopic guidance after giving Hexabrix to demarcate the proximal end of the lesion. Most of the time, the distal end of the lesion cannot be delineated without giving Hexabrix 3 - 4 times with repeated fluoroscopy. The length of the lesion is therefore estimated by correlating with the number of vertebrae from the Hexabrix swallow performed in the radiology department (each vertebra is taken to measure 2.5 cm). [7,8]

Table I shows the estimated length of the lesion using the number of vertebrae, the length as measured using a simulation film with grid and the difference between the two.

Table 1. Lesion length on Hexabrix swallow

Patient number	Vertebral height (cm)	Simulator magnification grid length (cm)	Difference (cm)
1.	12.00	10.00	2.00
2.	8.00	6.00	2.00
3.	8.50	6.00	2.50
4.	7.50	6.00	1.50
5.	9.50	8.00	1.50
6.	7.50	6.00	1.50
7.	6.50	5.00	1.50
8.	6.25	5.00	1.25
9.	6.50	5.00	1.50
10.	8.00	6.00	2.00
Mean (cm)	8.02	6.30	1.72
Median (cm)	7.75	6.00	1.50
Minimum (cm)	6.25	5.00	1.25
Maximum (cm)	12.00	10.00	2.50

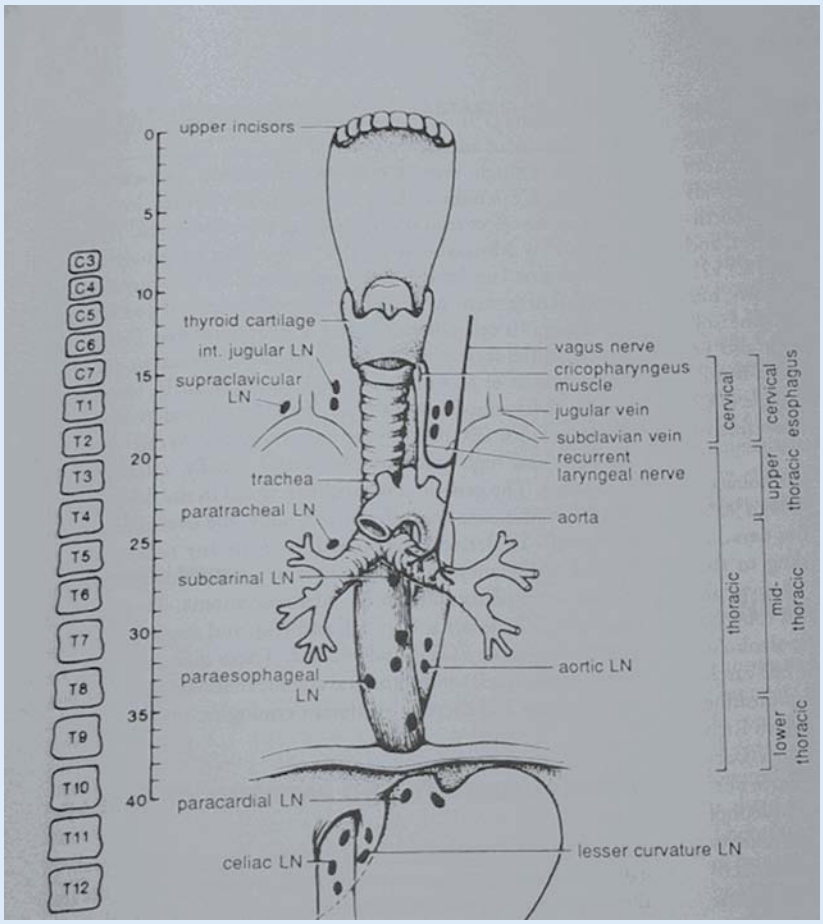

Fig. 2. Basic anatomy of the oesophagus showing four vertebrae = 10 cm.

ference between these two lengths. The lengths according to vertebrae height were 6.25 - 12.0 cm (i.e. 2.5 vertebrae to 5 vertebrae), whereas the lengths according to the magnification graticule with grid were 5 - 10 cm, the difference being 1.25 - 2.50 cm (mean 1.72 cm, median 1.5 cm).

Discussion

Most patients with carcinoma of the oesophagus present with difficulty in swallowing as their main symptom. The role of intraluminal brachytherapy is to relieve the dysphagia without increasing the side-effects by treating minimal normal oesophageal mucosa. The present procedure of estimation of the length of the lesion by estimating the vertebral length is recommended by Potter and Limbergen[7] and is depicted by Denittis[8] (Fig. 2). The modified technique of doing prior simulation has already been published by us.[6]

The advantages of the modified technique are: (*i*) accurate assessment of the length of the lesion; (*ii*) reduction in treatment length as well as normal mucosa treated, thereby decreasing the morbidity of treatment -related strictures and ulceration; (*iii*) reduced staff exposure as repeated fluoroscopy is eliminated; and (*iv*) reduced chance of Hexabrix aspiration in patients as the modified technique is performed before sedation and topical anaesthesia.

Conclusion

Accurate assessment of the lesion length on Hexabrix will reduce normal mucosa irradiation and decrease the toxicity of the treatment. It is recommended that the change in clinical practice done at our centre be evaluated by other groups.

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