

# Clinical evaluation of radiotherapy for advanced esophageal cancer after metallic stent placement

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**Received:** 2003-11-12 **Accepted:** 2004-01-08

## Abstract

**AIM:** To evaluate the therapeutic effect of radiotherapy for esophageal cancer after expandable metallic stent placement.

**METHODS:** Ten cases of advanced esophageal cancer were evaluated, 7 having complete obstruction and 3 with digestive-respiratory fistula. Ten nitinol stents were placed at the site of stenosis. Patients were treated with a total dose of 1 200 cGy divided into 3 fractions of 400 cGy 4-7 d after stents placement.

**RESULTS:** All the 10 stents were placed successfully at one time. After radiotherapy for advanced esophageal cancer, the survival period of the cases ranged from 14 to 22 mo, with a mean survival of 17 mo. No re-stenosis occurred among all the 10 cases.

**CONCLUSION:** Stent placement combined with radiotherapy for esophageal cancer is helpful to prolong patients' survival and reduce occurrence of re-stenosis.

Yu YT, Yang G, Liu Y, Shen BZ. Clinical evaluation of radiotherapy for advanced esophageal cancer after metallic stent placement. *World J Gastroenterol* 2004; 10(14): 2145-2146  
<http://www.wjgnet.com/1007-9327/10/2145.asp>

## INTRODUCTION

Radiotherapy for esophageal cancer is a relatively effective treatment. However, esophageal obstruction and esophageal stenosis due to inoperable cancer, as serious complications of esophageal cancer, are directly life-threatening and contraindicatory to radiotherapy for esophageal cancer. Inserting membrane-covered esophageal stents as an effective conservative and palliative treatment to expand the stent at the stenosis site due to cancer and obstruct the digestive fistulas is a currently widely-used therapy, which can dramatically alleviate obstruction and enhance patients' quality of life by enabling oral ingestion in patients with obstruction due to late cancer<sup>[1-4]</sup>. With radiotherapy after membrane-covered esophageal stents placement for advanced esophageal cancer, we successfully overcame the contraindication of radiotherapy for esophageal cancer and achieved a quite satisfactory short-term effect<sup>[5,6]</sup>.

## MATERIALS AND METHODS

### Materials

Ten cases of esophageal cancer (8 males, 2 females, aging from

58 to 85 years) were studied. Esophagoscopy examination indicated that 9 of the cases were squamous carcinoma and one was adenocarcinoma. Barium contrast radiography and meglucamine diatrizoate radiography showed that the site of stenosis due to cancer ranged from 6 to 12 cm in length, with an average length of 8 cm, and the width of the esophageal lumen at the site of stenosis was less than 2 mm, which had been hard for liquid diet to pass for more than 2 wk. Seven of the cases had complete obstruction and 3 had digestive-respiratory fistulas. Physical examination showed that 9 of them had no carcinomatous distant metastasis and 1 case had carcinomatous metastasis to unilateral lung.

## Methods

**Stent placement** Stents to be placed were homemade or imported silicone-covered nitinol memory alloy mesh stents, 2 cm in diameter and 8, 10, 12 cm in length, respectively, and bell-mouthed at one or both ends. Patients should take gentamicin orally, 160 000 units each time, 4-5 times per day before the therapy and stop eating and drinking 2 h before the placement. In accordance with the stenosis length shown by esophageal radiography, the stent of proper length was selected, placed and released along the site of stenosis by endoesophageal stent introducer under the guidance of the peroral guide wires, leaving both ends of the stent surpassing 1-2 cm respectively. After replacement, patient was advised to drink adequate warm water, making the stent expand properly. One week after the placement, a reexamination was carried out through upper digestive tract fluoroscopy with barium to see how unobstructed the stent was and an X-ray plane film was taken to locate the stent, measure its length and width, fix reference point, set irradiation dose and draw the related dose curve.

**Endoesophageal irradiation** Irradiation was performed 4-7 d after the stent was properly placed. First, the balloon catheter was inserted to the site of the lesion. Second, air was pumped into the sacculi to expand it and fix it inside the stent. Third, the location of the sacculi was confirmed through fluoroscopy and spot film. And finally, irradiation was performed according to the mark of the reference point fixed through measurement with the total dose of 1 200 cGy divided into three 400 cGy doses.

## RESULTS

In all the 10 cases, the stents were all placed successfully once and fixed properly. Of all the 10 stents, 7 (four 8 cm, two 10 cm and one 12 cm in length) were homemade and 3 (two 10 cm and one 8 cm in length) were imported and all could expand properly, through which contrast medium could pass smoothly after placement. Esophageal fistulas in three cases were obstructed immediately after insertion and the patients could begin to take semiliquid diet 4 h afterwards. Reexaminations were performed through radiography 4 d after insertion, and it indicated that the contrast medium could go through the stents smoothly, that the stents did not displace and the esophageal fistulas were obstructed. So, patients could take food normally without dysphagia. After stents placement, 3 cases had retrosternal

foreign body sensation and retrosternal pain, which disappeared within 4-6 d. After endoesophageal radiotherapy, the survival period of the cases ranged from 14 to 22 mo, with a mean survival period of 17 mo. Of all the 10 cases, no endogenous stenosis recurred during the survival period.

## DISCUSSION

Radiotherapy for esophageal cancer after esophageal stent placement effectively solved this contraindication of endoesophageal therapy and the problem of stenosis recurrence after stent placement. Esophageal stent insertion enhanced the life quality of patients with advanced esophageal cancer in a quick and effective way in that it remarkably improved the patients' nutrition absorption and constitution by enabling them to take food orally and it completely eliminated the symptoms such as coughing while eating or drinking by effectively obstructing the digestive-respiratory fistulas, which also alleviated the patients' psychological pressure and greatly comforted them. It enlarged the indication scope of radiotherapy for esophageal cancer by turning the former contraindication into indication. The stent inserted expanded the stenosis site and made it possible for brachytherapeutic treatment and radioactive source to pass easily and eventually dramatically prolonged the patients' survival period<sup>[7,9-18]</sup>. No stenosis recurred in the 10 cases under our treatment during their survival period, which, in contrast to the 5% stenosis reoccurrence rate in other patients under our treatment who had stents placement without radiotherapy, marked a great decrease in occurrence of re-stenosis<sup>[8]</sup>. Radiotherapy for esophageal cancer prevented the stents from being obstructed by the overgrowth of tumor, alleviated the patients' sufferings and raised their life quality. After the stents were properly placed, radiography was performed and film was spotted, through which the width of the stents expansion was measured. According to the width after calculation, the esophagus was expanded by the stents, the diameter of the balloon catheter and the reference point were fixed, and the optimal internal irradiation dose curve was designed. A comparison of the dose curves indicated that, after the expansion of the stents, the irradiation dosage over the esophageal mucosa was decreased, with the dose gradient homogeneous and small, which prevented the esophageal mucosa from being unnecessarily harmed while effectively inhibited the overgrowth of esophageal mucosa and the surface tumor, and insured the pathological center to receive therapeutic dose of irradiation. Experiments showed that the refraction and diffraction of the irradiation ray against the metallic stents could be neglected when the radioactive source was more than 5 mm away from the metallic stents. Our results of the clinical research seem to indicate that radiotherapy for esophageal cancer after esophageal stents placement is very helpful in treatment of advanced esophageal cancer.

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Edited by Chen WW Proofread by Zhu LH and Xu FM