

Endoscopic Nd-YAG Laser Therapy as Palliative Treatment for Esophageal and Cardial Cancer

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Abstract

Background/Aim: Progressive dysphagia is the most important symptom in inoperable cases of carcinoma of the esophagus and cardia. Treatment for the relief of dysphagia is chosen based on the lowest mortality and morbidity. This paper describes a consecutive series of patients with esophageal or cardial cancer, without a documented tracheoesophageal fistula, who were referred for palliative laser therapy. Alternative palliative treatments are discussed, as well as factors involved in successful laser treatment.

Material and Methods: Over a five year period, 104 patients were treated endoscopically with the Nd-YAG laser for symptomatic improvement dysphagia caused by malignant tumors of the esophagus or cardia.

Results: After the initial laser therapy, good improvement was achieved in 78 patients (75%) and fair improvement in 17 patients (16%). Eighty-three patients with significant improvement were followed until death. In 42 of these 83 patients, the initial laser therapy was the only treatment given; the remaining 41 patients required either additional laser treatment or other palliative therapy.

Conclusion: Laser treatment for palliation in esophageal and cardial cancer is promising. Given the proper circumstances, it may lay the framework for many other important treatment modalities.

Key Words: Palliative Laser Therapy, Dysphagia

Abbreviations: neodymium yttrium aluminum garnet (Nd-YAG);

Introduction

Progressive dysphagia is the most important symptom in inoperable cases of carcinoma of the esophagus and cardia. The purpose of the palliation in these patients

is the effective relief of this symptom with the lowest possible mortality and morbidity. Several groups have reported good results from endoscopic palliation of esophageal and cardial tumors with the neodymium yttrium aluminum garnet (Nd-YAG) laser, reducing the dysphagia by intraluminal tumor destruction (1-5). This paper describes a consecutive series of 104 patients with esophageal or cardial cancer, without a documented tracheoesophageal fistula, who were referred for palliative laser therapy.

Materials and Methods

Over a five year period (1987-1992), 104 patients, 78 men and 26 women, were referred for endoscopic palliation with the Nd-YAG laser to relieve malignant dysphagia. Their mean age was 71 years (range, 36-91).

An arbitrary grading system was used to quantitate dysphagia prior to treatment: grade 1=no dysphagia (n=0); grade 2=patients could eat solids, but food would occasionally stick (n=12); grade 3=patients could only eat semi-liquid (n=20); grade 4=patients could only swallow liquids (n=44); and grade 5=patients unable to swallow solids or liquids (n=28).

All patients who received this treatment had been denied surgical resection. The contraindications for surgery were age in 13 patients, severe concomitant disease in 24, recurrent tumor after surgery in 6, patient refusal in 2 cases and advanced metastatic disease in 58 patients.

Biopsies were obtained from all tumors, and histology showed 45 patients with adenocarcinoma and 59 with squamous cell carcinoma. The upper ends of the tumors were located in the cervical esophagus in 18 patients, in the mid-esophagus in 41, and in the distal esophagus or gastric cardia in 45 cases. The mean tumor length was 6 cm (range 1-13). The tumors were exophytic in 65 patients and infiltrating in 39 patients.

All procedures were performed with an Nd-YAG laser (mediLAS MBB, Munich, power 100 watts, pulse duration 0.1-9.9 seconds). A flexible quartz fiber transmitted the invisible laser light and the visible red helium-neon aiming beam. Coaxial CO₂ with a flow of 0.8 liters/minute was used for cleaning and cooling the tip fiber. The Olympus

GIF 1 T, GIF XQ 10, and GIF P3 were used. The working distance between the tip of the light guide and the tumor focus was approximately 8-10 mm. The laser power employed was generally between 60 and 100 watts with a pulse duration of between 0.1 and 2 seconds.

In the case of strictures overcome endoscopically, we inserted the endoscope through the stenosis and then applied the laser beam, first to the distal margin of the tumor and then in the proximal direction. In the case of an endoscopically non-negotiable stenosis, we combined the laser treatment with prior bougienage using the Eder-Puestow instrument set. Immediately following this, or on the following day, a small-caliber endoscope was passed through the stenosis, and laser treatment began at the distal margin of the tumor.

The aim of the laser sessions was to destroy as much of the intraluminal tumor as was safely possible. During the initial laser treatment, patients were treated at three to seven day intervals until benefit was achieved. Patients were sedated with diazepam or midazolam. For initial treatment, an average of three laser sessions (range 2-7) proved necessary. An average of 3,100 joules (range 1,000-11,000) of energy was employed per session. The total energy applied during initial treatment varied considerably; on average 8,200 joules were applied (range 4,800-53,000 joules).

When the initial laser therapy had been effective, follow-up endoscopy was done at monthly intervals until death to prevent or forestall recurrent dysphagia. The interval was longer if the endoscopic and clinical situations were satisfactory. The patients were admitted to the hospital overnight for each laser session. They remained in the hospital if several sessions proved necessary in the following days, or if the medical circumstances prevented early discharge.

Results

Initial laser treatment results:

To evaluate the effectiveness of the initial laser treatment, we took improvement of dysphagia the major endpoint. Symptomatic improvement achieved by laser therapy is shown in Figure 1. In 78 patients, improvement of the dysphagia was considered good, with patients eating every kind of food ($n=66$) or most foods ($n=12$); in 17 patients, improvement was considered fair, with patients able to eat semi-liquid foods ($n=10$) or liquids ($n=7$); in nine patients, no improvement was seen, the patients being unable to eat anything. Seven of these nine patients had high cervical infiltrating growths, or luminal narrowing by extrinsic

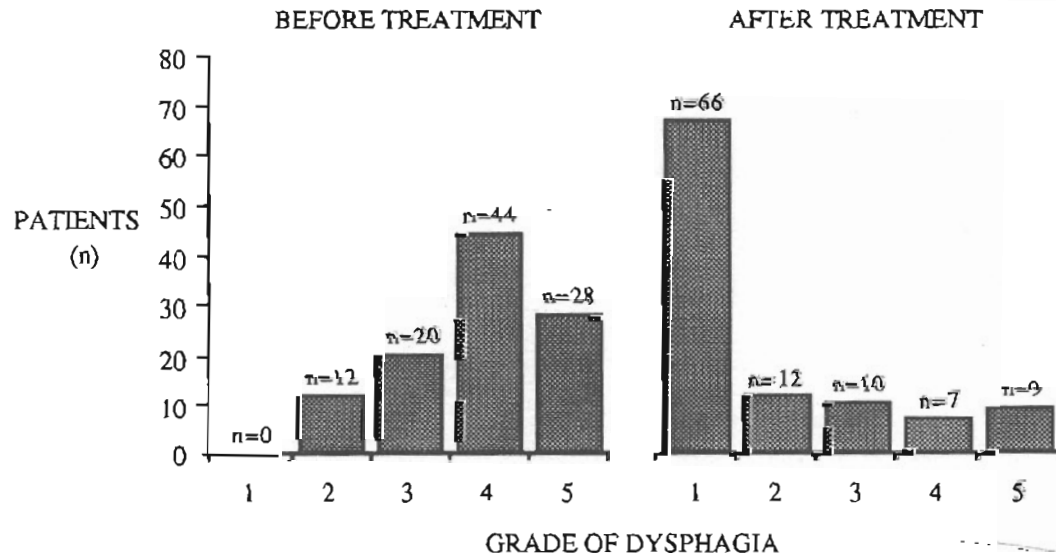


Figure 1 Improvement in dysphagia after initial laser treatment in 104 patients.

Dysphagia grade: description

1 no dysphagia

2 patients able to eat solids, food occasionally sticks

3 patients could only eat semi-liquid foods

4 patients able to swallow liquids

5 patients unable to swallow solids or liquids

tumor, and in the remaining two, a complication appeared during the initial laser treatment.

Long Term Results:

Twelve of 95 patients with good or fair results following initial laser treatment were lost to follow-up. It was possible to follow 83 patients until death.

In 42 of these 83 patients, the initial laser treatment was the only therapy until death. Recurrent dysphagia occurred in the remaining 41 patients, five of who were treated by the insertion of a Celestin stent. The remaining 35 patients could be treated by further laser therapy: 15 received one more laser course, and 20 patients received three or more laser courses until death. Seven of this last group of 20 patients required insertion of a prosthetic tube, and two underwent gastronomy. The treatment level of the 83 patients, at the end of the study, is shown in Table 1. The mean survival in the group of 83 patients followed until death was 30 weeks (range 2-53).

Table 1 Treatment level of 83 patients followed until death.

Treatment	Patients (n)
One laser course	42
Two laser courses	15
Three or more laser courses	11
One laser course, subsequent Celestin	6
Three or more laser courses, subsequent Celestin	7
Three or more laser courses, subsequent gastronomy	2

Complications:

We have performed 310 sessions in the initial treatment of 104 patients referred for Nd-YAG laser therapy and 228 sessions during the follow-up of 83 patients. In these 538 laser sessions, we got some complications. During and immediately after the procedure, some patients did complain of mild retrosternal chest discomfort. Some patients developed mild pyrexia. Three patients had perforations related to laser treatment alone: one of these patients died. Three esophagotracheal fistulas occurred, which required intubation. It is difficult to know if these fistulas were related to the laser or the cancer.

Discussion

Most patients with esophageal carcinoma have disease advanced beyond hope of curative treatment at the time

of presentation. Palliation of incurable carcinoma is important, because radical ablation carries a high mortality and because the unpleasant alternative of terminal complete esophageal obstruction needs to be avoided.

There are a number of palliative treatments available, each with advantages and disadvantages (6,7). Surgery probably provides the best palliation if the patient is fit enough, but the mortality and morbidity can be high even in the hands of a skilled surgeon (8). Radiotherapy with current techniques has a low mortality, but prolonged morbidity, and slow relief of dysphagia (9). Repeated bougienage becomes an increasing burden and, as the disease progresses, is more difficult, more painful, and provides less benefit for shorter intervals each time (10). Endoscopic intubation has many attractive features, especially for the frail and elderly. The single procedure (usually without general anesthesia), short hospital stay, and an immediate improvement in swallowing are considerable gains; however, the tube existence that forbids solid food, the care required to keep the tube patent and the risk of subsequent tube migration detract from it. The operator's expertise is vital and frail patients may still do poorly. Reported mortality varies from 2% (11) to 27% (12).

Treatment with a laser avoids some of the shortcomings of tubes, and could offer better relief from dysphagia. Preliminary experience from the Nd-YAG laser suggested that endoscopic laser re-canalization may be effective for the palliation of dysphagia. The endoscopic Nd-YAG laser therapy for the palliative treatment of esophageal and cardial carcinoma improved the dysphagia in 70-100% of patients, after a mean of 1.5-3.2 sessions (13-24); luminal patency allowing easy passing of the endoscope was achieved in 93-100% of patients, after a mean of 2.5-7.3 sessions (25). Tracheoesophageal fistula has been reported to occur in 1.3-7% of patients (17,18,20,25), and perforation in 2-6% of patients (7,20,24,25).

Our results were comparable to the previous studies. After initial laser treatment, dysphagia was improved in 91%. Only in 9% of our consecutive series of 104 patients were we unable to relieve dysphagia. Seven patients had high cervical infiltrating growths, or luminal narrowing by extrinsic tumor.

The value of palliation for malignant dysphagia does not depend only on the results after the initial laser treatment, but also on the long term results. It is important to know the length of time that symptomatic improvement persists with a minimum of disturbances in these seriously ill patients. Reports to date have

dealt primarily with the results of the first laser course with few reports about the long term follow-up (7,17,24-27). According to these studies, following a successful initial course of treatment, about half the patients in each series were able to swallow satisfactorily up to the time of their death from disseminated disease. The other half had recurrent dysphagia requiring further local treatment. In some of these cases, the laser treatment was repeated and in others a prosthetic tube was inserted.

The results in our series confirm these findings. In our experience, about 50% of patients who did benefit with the first laser course, had recurrent dysphagia that required further laser therapy or another type of palliation. According to our experience, there are several factors which favor a successful outcome from laser therapy. The appearance and location of the tumor are important. Exophytic tumor lesions are more easily treated with a laser because the borders are better defined. This makes aiming of the laser beam more precise. On the other hand, submucosal or extrinsic lesions not well treated. Their margins are difficult to define, making aiming more difficult. The laser beam is not parallel to the axis of the lumen, making perforation more likely. Also, one must burn through normal mucosal tissue, causing pain. In addition, re-stenosis is more likely after treating such lesions.

Location is also important in determining the outcome of laser treatment. Straight segments of the esophagus such as those found in the mid and distal esophagus are easiest to treat and have the best outcomes. Lesions less than 2 cm from the upper esophageal sphincter and horizontal segments are technically difficult because of the small amount of maneuvering room for the endoscope. These lesions often do not respond favorably to laser therapy. Short segments are easiest to treat and require fewer laser treatments to achieve an open lumen. In summary, the lesions most amenable to laser therapy are exophytic, short segments (<5 cm long) in the distal or mid esophagus. The mean survival in our series of 83 patients followed until death was 30 weeks (range 2-53). Laser treatment does not prolong life significantly, although there is a trend toward this, possibly because of better relief of dysphagia is followed by a more sufficient caloric intake and smaller risk of aspiration (23,27).

Conclusion

In conclusion, laser treatment is promising for palliation in esophageal and cardiac cancer. As all other palliative treatments, the Nd-YAG laser has some limita-

tions. Multiple treatments are required, and the duration of benefit is shorter than would be ideal. In addition, the initial cost outlay is not insignificant. Nevertheless, laser therapy to date has been an important addition to therapeutic endoscopy and has provided the ground work for many other important treatment modalities (28).

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