



Article Name **Nd-YAG Laser in Management of Endobronchial Lesions, a Five - Year Report**

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Introduction

Having introduced the laser therapy in 1976 (1), a revolution happened in the management of airways obstruction among patients who were at risk for other methods of management like surgery or radiation therapy. This method can be applied in several conditions that were resulted in tracheobronchial obstruction, with less contraindications and side effects compare to other conventional therapeutic approaches. Capability of tissue coagulation, vaporization, necrosis, and hemostasis has made it as a very suitable method of palliative treatment for endobronchial malignant lesions as well as obstructive granulation tissue, strictures due to inflammation, amyloidosis, and benign tumors. Pulmonologists usually prefer to use Neodymium: Yttrium?Aluminum? Garnet (Nd- YAG) laser, which provides a desired penetration in tissues and good photocoagulation and homeostasis (2).

Material & Method

In this study, we evaluated patients with endobronchial obstructive lesions who underwent Nd- YAG laser therapy in our center during a five-year-period from the year 1994 to1999, retrospectively. Because of the wide variation of the laser therapy sessions among these patients, we used median for showing the number of these sessions. All of the patients had the obvious signs and symptoms of airway obstruction. The patients were categorized into five groups according to the cause of airway obstruction, 3 patients had more than one specific cause of airway obstruction that were included in the category with dominant pathology. The improvement of each patient was evaluated during the first 24-48 hours after laser therapy mainly according to their clinical signs and symptoms before and after treatment and also by bronchoscopic examination. All of the patients received Nd- YAG laser with power of 25-35 watt by a rigid or flexible fiberoptic bronchoscope.

A total of 210 patients with tracheobronchial obstructive lesions were included in our study. The total number of obstructive sites in the respiratory system the patients was 263. Trachea was the most common site of obstruction, reported in 46.2 % of the patients followed by right main bronchus (28.1%) and left main bronchus (15.2%) (Table 1). Regardless of non-tumoral lesions, malignant tumors were the most common cause (37.7%), reported in 66 males with a mean age of 53.4 years and 11 females with a mean age of 54.3 years. As shown in figure 1, squamous cell carcinoma (SCC) was the most frequent finding (Figure 1). All of these malignant patients had experienced cough; however, dyspnea (87%), hemoptysis (54.5%),

fever (35%), obstructive pneumonitis (3.8%), and atelectasis (2.5%) were also frequent signs and symptoms. The frequency of signs and symptoms of all patients and their related improvement following the intervention are shown in table 3. Among these patients, 23 prescribed chemotherapy, 11 received radiation therapy, and one underwent surgical resection before Nd-YAG laser treatment. Significant improvement in the obstruction was achieved in 75 (97.4%) patients during the first 24 hours following Nd-YAG laser therapy; however, 2 cases (2.5%), experienced complete relief. Median of laser therapy sessions among these patients was 3. Metastatic lesions accounted for 5.3% of airway obstruction (in 5 males and 6 females). Thyroid (5 cases), breast (2 cases), kidney, colon, endometrium, and larynx (each one case) were the original sites of metastasis. The patients frequently complained of dyspnea (90%), cough (73%), hemoptysis (36%), and fever (27%). For all of these patients, relative improvement of obstruction sites was observed during the first 48 hours after the first attempt of laser therapy, and in one case complete relief was seen. The median of laser therapy sessions was 3 among the patients with obstructive metastatic lesions. Among these patients, 8 were given chemotherapy, 3 received radiation therapy and 4 were candidates for surgical resection earlier (Figure 2). Nine patients with carcinoid tumor and 5 adenoid cystic tumor were categorized as patients with undefined prognosis for whom slow growing tumor and low metastasis rate were supposed. They received Nd-YAG laser irradiation therapy with a median of 3 sessions. None of these were subjected for chemotherapy; however, one received radiation therapy and 6 cases underwent surgical resection. Like other subgroups, cough (93%), dyspnea (71.5%), hemoptysis (64.5%), obstructive pneumonitis (21.5%) and fever (14.2%) were the most complaints. Although all of these patients showed improvements in their obstruction during the first 48 hours after Nd-YAG laser application, none of them experienced complete relief of the obstruction. Benign tumors as the cause of airway obstruction were seen in 14 patients (6.8%) of whom 9 were male with mean age of 43.3 years and 5 were female with mean age of 31.25 years old. These tumors include papilloma (7 cases), myoblastoma (4 cases), adenoma (one case), hamartoma (one case) and angioma (one case). They received nothing except laser therapy (median; 3 sessions). The common signs and symptoms among this group were cough (92.8%), dyspnea (85.7%), fever (38.5%), hemoptysis (28.5%), and obstructive pneumonitis (7%). All of them showed immediate improvement following the first laser therapy; however, in 11 patients (78%), airway obstruction completely relieved. Ninety-four patients underwent Nd-YAG laser therapy because of non-tumoral lesions. Of these, 55 had granulation tissues in their trachea, 13 had vocal cord nodules, 16 had fibrosis in their tracheobronchial tree, 2 treated by Nd-YAG laser because of the hemorrhage, and 7 had stenosis due to tuberculosis (3 cases), dysplasia (2 cases), and Wegener's granulomatosis (2 cases). From 55 patients with tracheal granulation tissue 39 were male with mean age of 30 years old and 16 were female with mean age of 11.1 years old. Most of the obstructions among these patients were caused by intubations due to accident and few of them had undergone tracheostomy. The minimum of intubation period was 1 hour and the maximum of this period in these patients was 14 hours. In most of these patients, the length of lumen was 2 centimeters and the diameter of trachea was more than 5 millimeters. The median of laser therapy sessions in this group was 3. The most common signs and symptoms in the group with non-tumoral lesions of airway obstruction were dyspnea (88%), cough (86%), hemoptysis (18%), fever (17%), obstructive pneumonitis (8.5%), and atelectasis

Result

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(1%). Most of them (98.9%) showed significant relief of obstruction immediately after laser therapy and in 75 patients (79.9%) the sites of obstruction completely removed. In general, the most common site of obstruction was trachea (47.5%). For all of these cases the improvement of airway obstruction was observed immediately after the first attempt of laser therapy; however, complete relief occurred only in 48 out of 97 patients with tracheal stenosis (47.5%). 96% of patients with obstruction in right and left main bronchus showed the immediate improvement after laser therapy. Totally, 675 sessions of Nd-YAG laser therapy were achieved, 26 of these sessions complicated by bleeding; however, it was controlled by photocoagulation and supportive care except in one patient, who was a 56-year-old man with advanced large cell carcinoma that occluded the trachea and invaded the carina. An intractable tracheal bleeding happened during the laser therapy that led to death. Severe dyspnea and respiratory failure occurred in one case that was successfully managed by intubation and medical treatment. In general, the signs and symptoms due to the airway obstruction improved significantly in nearly all the patients after laser therapy. (Table 3) In addition restructurin