

## PROPHYLAXIS AND TREATMENT OF COMPLICATIONS IN LUNG CANCER PATIENTS AFTER COMBINED TREATMENT (OPERATION + IORT)

O.V. Cheremisina, V.A. Evtushenko, and A.N. Soldatov

*Scientific-Research Institute of Oncology,  
Tomsk Scientific Center,  
Siberian Branch of the Russian Academy of Medical Sciences, Tomsk  
Received April 26, 1995*

*We present here some results on preoperative low-energy laser irradiation of lung cancer patients as well as the results of treating the postoperative complications using a copper vapor laser radiation.*

Lung cancer remains one of the most urgent problems in oncology. Taking into consideration unsatisfactory results of existing treatment methods, search, development, and practical introduction of new methods for a combined treatment of operable lung cancer are being continued.

In the clinics of the Scientific-Research Institute of Oncology at Tomsk Scientific Center, Siberian Branch of the Russian Academy of Medical Sciences, the method of intraoperative radiotherapy (IORT) is studied as applied to patients with malignant neoplasms of different localizations including lung cancer. To perform IORT, a small-size MIB-6E betatron with maximum electron energy of 6 MeV is used. It is mounted directly in the operation hall. The betatron has no analogs among the accelerators used for intraoperative irradiation of malignant tumors.

After ablation of a lung or its lobe (depending on the stage of the tumor process), a root of lung with inclusion of the bed of ablated lymphadens is subjected to intraoperative irradiation with the dose of 10–15 GR that corresponds to 34 GR of remote irradiation in isoeffect. To prevent post-radiation complications, the stump of the bronchus is screened by aluminum nozzles. The IORT method is also being developed in China and Spain since 1991–1992. The data obtained in our institute and that of foreign authors allow some positive conclusions to be drawn about the method developed.<sup>4–6</sup> But, the radiotherapy is an additional aggravating factor leading to disorder in the reparative processes and suppression of drainage function of the bronchial epithelium under this kind of a combined treatment.

Endoscopic laser therapy of erosion, stomach ulcer, duodenal bulb, esophagitis, postoperative anastomosis is being developed and employed at the clinic of the Scientific-Research Institute of Oncology during several years. So the endobronchial laser therapy in the preoperative period was used as a method preventing suppurative septic complications in the postoperative period in lung cancer patients who underwent a combined treatment considered.<sup>3</sup>

The positive results obtained and data of numerous authors on the antineoplastic, antimetastatic, and pronounced anti-inflammatory action of laser radiation of the yellow-green spectral range enable one to try it in the preoperative correction of endobronchitis.

To sanitize the bronchial tree, a low-intensity radiation of a copper vapor laser was used. We used Malakhit device generating two laser radiation waves at 510 and 578 nm wavelength in the pulsed mode of power 150 mW. Seances were conducted every other day with 1 min duration, their number averaged from 3 to 6 depending on the endobronchitis expression.

Fiberbronchoscopy (FBS) involves two stages:

– phlegm aspiration from the bronchial tree, ablation of fibrin deposits, lavage of the bronchial tree by antiseptic solutions;

– the laser irradiation: a waveguide was introduced through the biopsy channel of the bronchoscope, the end of a waveguide was put at the distance of 0.5 cm from inflamed mucosa or fistulose aperture.

56 patients have been operated for lung cancer using IORT. The patients underwent 19 pneumonectomies, 34 lobectomies, 3 bilobectomies. 34 patients suffered from the central form of lung cancer, 22 from the peripheral form. Dermoid cancer of various differentiation was registered in 44 cases, adenocarcinoma in 12.

In the preoperative period 12 patients (group I) got preoperative laser sanitation of the bronchial tree in combination with the traditional anti-inflammatory measures, the others (group II) got the standard anti-inflammatory therapy. The traditional anti-inflammatory measures include broad-spectrum antibiotics with regard to the sensitivity of microflora, bronchodilators, inhalations, oxygen therapy, therapeutic physical training. In group I postoperative complications were observed in one patient (endobronchitis) what made up 8.3%; in group II the complications have developed in 6 patients (13.8%) including 5 bronchial fistulas with empyema of the

pleural cavity, 1 double endobronchitis; 3 fistulas arose after pneumonectomy, 2 after lung resection.

Although, according to the data available, the frequency of bronchial fistulas decreased, it still remains rather high. M.F. Karpov (1982) observed bronchial fistulas after different lung resections in 2.6%, Y. Laurence (1982) in 2.6%, A.S. Bartusevichene in 1.5% (Refs. 1 and 2).

Preoperative endoscopic laser correction of endobronchitis was also done in a group of patients (16) who got only surgical treatment for their prior disease. In this group a complication arose in one patient (bronchial fistula after pulmonectomy) or 6.2%.

After pneumonectomy the fistulas were diagnosed on the average within 4 months after the operative intervention, and 10 days after lobectomy. The size of the fistulas averaged 0.4–0.8 cm. The endoscopic pattern in the region was as following: a defect was diagnosed in the region of the bronchus stump; oedema and hyperemia of the mucosa, fibrin deposits, elasticity reduction of the bronchus walls, contact bleeding were observed around it.

A group of patients (6) with developed complications got a course of the postoperative endobronchial laser therapy by Malakhit device. The seances, like in the preoperative period, took place every other day, but their average number was greater, namely 6–11. As in the course of the preoperative preparation, every seance consisted of two parts:

- the sanitation of the bronchial tree,
- laser irradiation of the bronchial fistula and the near-stump cavity.

The results of the treatment were as follows. The fistulas were completely liquidated in two cases, the size of the fistula decreased one third in two patients, a persistent fistula with liquidation of all inflammatory changes was formed in one patient. The bronchial fistula coexisted with development of pleural

cavity empyema in three patients who underwent pneumonectomy. In the given cases, sanitation of both the fistula and the empyema cavity was performed.

The analysis of the results revealed that the preoperative endobronchial laser sanitation, both in combination with traditional methods and in an independent form, considerably reduces the number of complications from the side of the bronchial tree after radical operations for lung cancer: 8.3% in patients who underwent laser therapy before the operation and 19.2% in patients under only the traditional treatment.

A course of endoscopic laser therapy performed in patients with developed bronchial complications permitted them to be completely cured in three cases (2 bronchial fistulas and 1 endobronchitis) and shortened the terms of performing plastic operations to be shortened by 2 months in comparison with the patients who underwent only the traditional treatment.

## REFERENCES

1. A.S. Bartusevichene, *Operated Lung* (Meditsina, Moscow, 1989), 324 pp.
2. E.N. Vantsyan, ed., *External and Internal Fistulas* (Meditsina, Moscow, 1990), 226 pp.
3. B.N. Zyryanov, I.Ya Tsukerman, and I.F. Udalyi, in: *Proceedings of the International Symposium*, Samarkand (1989), pp. 45–46.
4. B.S. Khodkevich, A.A. Zav'yalov, N.A. Makarkin, and S.G. Afanas'ev, in: *Abstracts of Papers at the Yubilee Conference of Siberian Phthitisiologists*, Tomsk (1994), pp.191–193.
5. B. Guibert, P. Mussant, P. Romestaing, M. Chambon, C. Rochette, and G. P. Gerard, *Hepatogastroenterology* **41**, 15 (1995).
6. F.A. Calvo, D.O. Urbina, and I. Herreros, *Strahlenther. Oncol.* **8**, 43–50 (1992).