

Effect of preoperative physiotherapy on Surgery for lung cancer with limited respiratory function

Hideko URATA, Toshio MIURA

The school of Allied Medical Sciences, Nagasaki University

Received for publication, June 16, 1988

ABSTRACT : Surgical outcome of lung cancer for the aged was evaluated, in particular, in the patients with obstructive ventilatory failure of less than 49 of FEV_{1.0}.

The survival rates in the patients with obstructive ventilatory failure after surgery was satisfactory as compared with non-obstructive ventilatory failure. Furthermore, postoperative hypoxemia and hypercapnia did not correlate with the degrees of obstructive ventilatory failure.

The preoperative physiotherapy greatly contributed to improvement of preoperative obstructive ventilatory failure, which may help reduce postoperative pulmonary complications. Great enthusiasm has developed regarding cooperation of nursing care and patient's volition for resuming their health to improve surgical result for the aged.

INTRODUCTION

Great strides in the treatment of lung cancer have been achieved with advances in thoracic surgery. With this progress, the surgical therapy has been applied to the aged patients with obstructive ventilatory failure. It is accepted that the grades of obstructive ventilatory failure. It is accepted that the grades of obstructive ventilatory failure are clinically estimated by forced expiratory volume in 1 second (FEV_{1.0}).

It goes without saying that obstructive ventilatory failure closely relates to provoke a failure of postoperative expectoration, which may cause postoperative pneumonia, one of serious postoperative pulmonary complications. For this reason, preoperative ventilatory function is a most important factor influencing surgical results.

The purpose of this study is to certify as to how the severity of preoperative ventilatory failure influences on surgical outcome.

PATIENTS

During the period from January 1972 to December 1982, 316 patients with lung cancer were operated upon in the First Department of Surgery, Nagasaki University School of Medicine. The ages ranged from 54 to 77 (a mean of 65 years).

Among them, FEV_{1.0} of less than 50 was present in 17 patients (5.4%).

The relation between %VC and FEV_{1.0} was shown in Fig. 1. A decrease in FEV_{1.0} correlated with a decrease of %VC. The relation between age and FEV_{1.0} was indicated in Fig. 2. With advancing age of more than 50, there was a tendency to increase the patients with less than 49 of FEV_{1.0}.

However, in patients over 70 years, low FEV_{1.0} values were not necessarily increasing. It is a reflection of low standard values of FEV_{1.0} in the far old aged. According to preoperative FEV_{1.0} values, the survival rates were shown in Fig. 3. There was no difference in the survival rates between the grades of FEV_{1.0} values

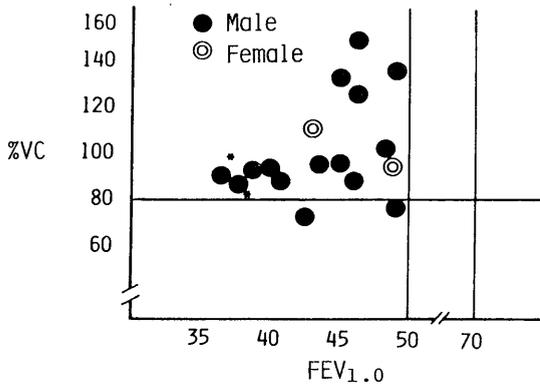


Fig. 1. Relationship between %VC and FEV_{1.0}

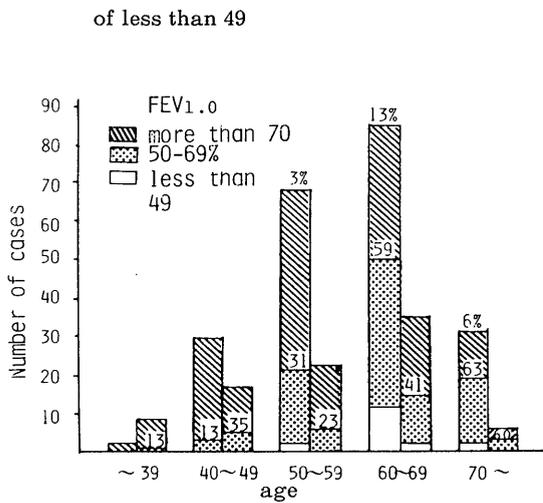


Fig. 2. Relationship between the patient's age and FEV_{1.0}

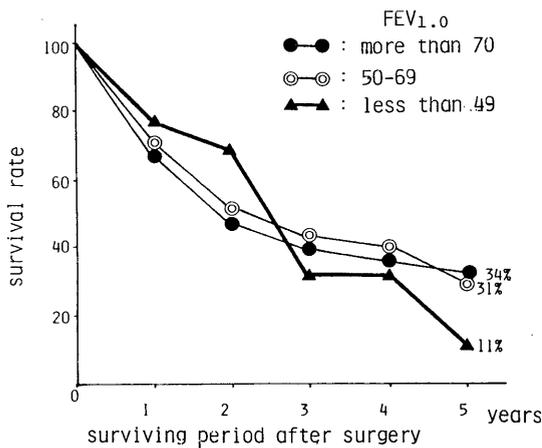


Fig. 3. The survival rates following surgery according to the preoperative FEV_{1.0} values

during a four year duration. However, with elapsing four years, the survival rate in the patients with preoperatively low FEV_{1.0} of less than 49 somewhat declined rather than that with high FEV_{1.0}. These patients underwent lobectomy in 11 (65%), bilobectomy in 10 (29%) and left pneumonectomy in one (6%) respectively.

Postoperative arterial PaO₂ and PaCO₂ levels are shown in Fig. 4. PaO₂ levels were low to some extent. These were not serious, but PaCO₂ values were slightly high. The lower FEV_{1.0} values, the more pronounced and severe hypoxemia and hypercapnia were not induced.

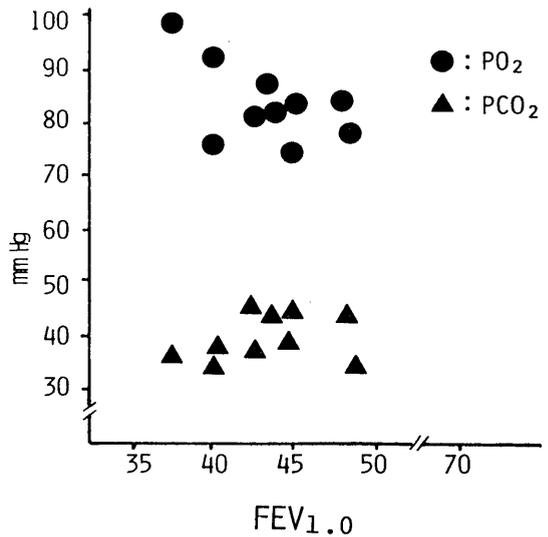


Fig. 4. Relationship between preoperative FEV_{1.0} and arterial PO₂ · PCO₂ levels

Difficulty in expectoration and postoperative atelectasis is not infrequently shown. These complications did not correlate with FEV_{1.0} values. Even those patients with higher FEV_{1.0} complained from difficulty in expectoration and occurrence of postoperative atelectasis.

Physiotherapy of incentive spirometry including inflating a toy balloon in the preoperative care was forced these patients to improve ventilatory failure during a two week preoperative period. The results of ventilatory function test is shown in Fig. 5. Each fraction of ventilatory function test was apparently improved. This

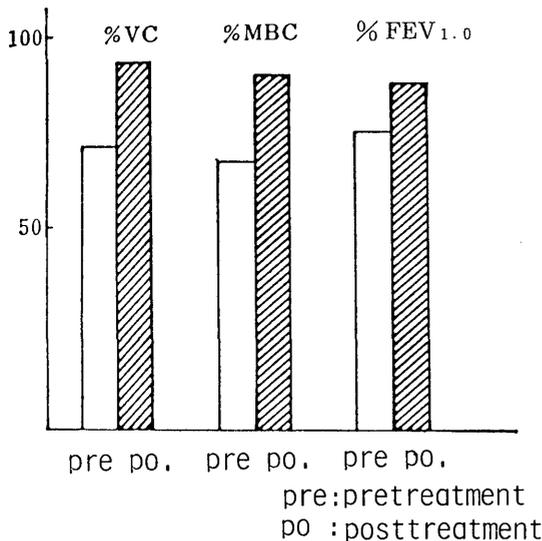


Fig. 5. Changes in the respiratory fraction of % VC, %MBC and FEV_{1.0} before and after physiotherapy for older patients

care contributed to alleviation of air way obstruction.

Capacity of exercise in the majority of the patients increased and running up and down stairs, for example, has become accommodated without symptoms.

DISCUSSION

The incidence of postoperative pulmonary complication was reported as being six to 60%.^{1) 2)} The lesions of small air way obstruction is the contributing factor to postoperative pulmonary complications. It causes gas trapping which induces poor gas exchange and difficulty in expectoration. Furthermore, occurrence of postoperative pulmonary complication relates to the operation site, approach and the duration of operation and so on. The longer the operation time, the higher the incidence of postoperative pulmonary complications.¹⁾

Recently surgery has become widely indicated for the aged suffering from small air way obstruction.

It is well known that the incidence of postoperative pulmonary complication closely relates to FEV_{1.0} values. Surgeons and nurses

should bear in mind that low FEV_{1.0} of less than 50 is the warning and risk sign of postoperative pulmonary complications and of limited pulmonary reserve for recovery from such an accident.³⁾

Therefore, preoperative physiotherapy is required to make their operative course uneventful, and also adequate nutritional care is necessary to recover from surgical stress.⁴⁾ There is a report that postoperative atelectasis occurs in frequency of 90%.⁵⁾ Recently incentive spirometry has been used widely for preoperatively respiratory care.⁶⁾ Undoubtedly it is helpful to improve preoperative respiratory failure and to prevent postoperative respiratory complication, and the good nursing care participates in improving the surgical results.

However, it is generally accepted that postoperative pneumonia greatly contributes to difficulty in expectoration. In such a case the bedside use of flexible bronchofiberscope is effective to relieve postoperative pneumonia.⁷⁾ Furthermore, we would like to emphasize the necessity and significance of the nursing care to improve preoperative respiratory failure through physiotherapy and to facilitate the patient's volition to smoothly and quickly recovery.

Particular emphasis is placed on the cooperation of patient's volition and nursing care to extend the surgical indication as well as to success the surgical treatment for the aged of lung cancer.

REFERENCES

- 1) GARIBALDI RA *et al.* : Risk factors for postoperative pneumonia. *Am J. Med.* 70 : 677, 1981.
- 2) LUCE JM : CLINICAL RISK factors for postoperative pulmonary complications. *Resp. Care* 29 : 484, 1984.
- 3) MARCH H. M : Anesthesia for patients with chronic pulmonary disease. ASA Refresher courses in Anesthesiology, ed by Hershey, SG p.133-149, 1984.
- 4) ASKANAZI J *et al.* : Nutrition and the respiratory system. *Crit. Care Med.* 10 : 163, 1982.
- 5) O'DONOHUE WJ Jr : Prevention and treatment of postoperative atelectasis - Can it and will

it be adequately studied ? -. *Chest* 87 : 1, 1985.

- 6) GOLDEN MD : Intensive care of the surgical patient 2 nd Ed. Year Book Medical Publishers, Chicago. London, 1981.
- 7) Eickhoff TC : Pulmonary infections in surgical patients. *Surg. Clin. North Am.* 60 : 175, 1980.