Title: PREOPERATIVE PULMONARY EVALUATION AND RESPIRATORY COMPLICATIONS
AFTER ABDOMINAL SURGERY.

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INTRODUCTION: Pulmonary complications (PC) are frequent after abdominal surgery . These complications include: bronchitis, atelectasis on chest X-ray, hypoxemia and restrictive pulmonary function studies. The risk factors include age, sex, smoking, obesity, history of respiratory disease and upper abdominal surgery. The incidence varies, from one study to another, dependent on different methods and different definitions of what constitutes a respiratory complication. Preoperative pulmonary function testing (PFT) with arterial blood gases (ABG) has been reported to be useful in the identification and therapy of early and often asymptomatic lung disease (1). Other authors concluded that prior to one type of surgery which is an important predictive factor, routine quantification of clinically apparent pulmonary dysfunction may be of little value in predicting postoperative morbidity and much less important than careful clinical evaluation (2). The aim of this prospective study is to quantitate the incidence of PC with precise definitions: clinical pulmonary complications (CPC), chest X-ray changes (RPC), spirometry changes (SPC) and arterial blood gas changes (HYP). We wanted to find predictive factors for respiratory complications.

METHODS: The study was approved by the local scientific ethical committee and informed consent was obtained from each patient. 150 patients scheduled for major abdominal cancer surgery through a midline incision were included. Preoperatively, patients were subjected to clinical evaluation: history of respiratory disease or bronchitis, smoking habits and nutritional status were recorded. FVC , FEV1 and ABG on ambient air were measured. Postoperatively, the different complications were recorded: A/ Each day, two independant physicians scored CPC (CPC1, CPC2). Clinical signs were graded as follows: fever=1, cough=2, sputum=2, ronchi=3, signs of localized consolidation=2. A score greater than or equal to 3 on 2 consecutive days, defined a clinical complication. B/ Chest X-rays were obtained preoperatively and on day 1, 3 and 5 after surgery. Chest X-rays were interpreted by the same radiologist at the end of the study without information on the patient's treatment and clinical status. Radiological complications (RCP) were divided into 3 groups: lamellar atelectasis or small infiltrates, segmental atelectasis or large infiltrates, major pleural effusion. C/ ABG were performed on days 1, 3 and 5 after surgery. Hypoxemia (HYP) was defined as an arterial oxygen tension less than 70 torr (ambient air). D/ FVC, FEV1 were measured each day in the sitting position using a dry spirometer Vitalograph. Spirometric complications (SCP) were defined as: FVC or FEV1 < 40% of preoperative value. The incidence of these complications may be related to the technique of analgesia. Therefore, the patients were randomly allocated to one of two treatment groups: general anesthesia (flunitrazepam + vecuronium + fentanyl IV as required) followed by parenteral morphine

(10mg/4hours as required) for postoperative pain allievation, or combined general (flunitrazepam + vecuronium) and epidural anesthesia (bupivacaine .25%) followed by epidural morphine (4mg/24hours). Statistical analysis was performed using chi-square test and linear regression. To assess agreement between the 2 independant investigators, coefficient Kappa was computed and tested using the usual method (3).

RESULTS: Overall, 146 patients were included in the study. The mean age was 59+/-11 years, 83 were men and 15 patients had a history of respiratory disease. There was no statistical difference between the 2 groups of patients receiving different analgesia. The incidence of pulmonary complications was: 1/ CPC=23% 2/ RPC=57% 3/ HYP=31% 4/ SPC=20%. The relationship between the complications are shown in table 1. The CPC only correlated with the SPC and there is a correlation between the observations of the 2 independant physicians. The RPC correlated with HYP and SPC. The predictive factors of pulmonary complications change with the complications studied: CPC are predicted by preoperative PaO2 (p<0.001), sex (male, p<0.002), preoperative FEV1 (p<0.004) (table 2). There is a statistical relationship between SPC and males. We did not find predictive factors for radiological complications nor for hypoxemia.

DISCUSSION: The rate of postoperative pulmonary complications found depends on the criteria used. We can define 2 types of complications: clinical complications (fever, sputum, ronchi), which are more frequent when patients have a previous history of respiratory disease; and mechanical complications (atelectasis) with hypoxemia, which do not have predictive factors.

Table 1: Relationship between the different types of respiratory complications.

	CPC1	RPC	HYP	SPC
CPC2	p<0.05	NS	NS	p<0.05
RPC			p<0.05	p=0.05
HYP				NS

Table 2: Preoperative predictive factors of postoperative clinical complications. Values are means +/- (SD).

Predictive factors	No CPC	CPC	All patients	p values
Sex (male)	51%	87%	60%	p<0.002
FEV1 (liters)	2.7(.8)	2.1(.9)	2.5(.8)	p<0.004
PaO2 (mmHg)	86(10)	77(9)	84(10)	p<0.001
Number of patients	95	31	126	

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