Title: A ONE YEAR PROSPECTIVE STUDY OF POSTOPERATIVE PULMONARY COMPLICATIONS AFTER NEUROMUSCULAR BLOCKADE BY PANCURONIUM AND ATRACURIUM

Authors: T. Pedersen, M.D., J. Viby-Mogensen, M.D., Ph.D., K. Eliasen, M.D., C. Ringsted, M.D., E.Henriksen, M.S.E.E.

Affiliation: Departments of Anesthesia and Medical Statistics, Herlev Hospital, University of Copenhagen, DK-2730 Herlev, Denmark

Introduction. Evidence is accumulating that the use of intermediate acting muscle relaxants decreases the incidence of postoperative residual curarization[1,2]. The clinical significance of this is not clear. However, the possibility exists that patients with residual neuromuscular blockade are more prone to develop postoperative pulmonary complications (POPC). The purpose of this prospective study was to compare the incidence of POPC following anesthesia involving pancuronium or atracurium.

Methods. After approval from the Human Subjects' Committee of the hospital, 2616 consecutive patients (ASA class I-IV), who were to undergo abdominal, urological, gynecological or orthopedic surgery, were included in the study. The choice of anesthesia technique was left to the discretion of the anesthetist. About 80% of the patients were given a modified NLA anesthesia, 20% received either halothane, enflurane or isoflurane. Of the 2616 patients 1559 (59.6%) received pancuronium and 1057 (40.4%) atracurium. As is routine in our department the response to TOF nerve stimulation was evaluated manually during anesthesia. For each patient a special record sheet was used. The sheet included 1) descriptive information about the patient prior to admission, 2) anesthetic technique, and 3) the postoperative course until discharge from the hospital. All data were collected by observers (anesthetists) who did not participate in any aspect of patient care and who did not know the relaxant given. The patients were classified as having POPC if one or more of the following criteria were met: 1) postoperative respiratory insufficiency in the recovery room necessitating intervention, 2) prolonged respiratory insufficiency with need of mechanical ventilation for more than 24 hours, and 3) postoperative pneumonia and/or atelectasis confirmed by X-ray and requiring treatment. Data were analyzed using the Chi-square test and stepwise logistic regression analysis. $P < 0.05$ was considered significant.

Results. A total of 205 patients (7.8%) developed POPC as defined above. Of these, 172 patients had been given pancuronium and 33 patients atracurium, i.e. 11% of patients given pancuronium and only 3% of patients given atracurium developed POPC ($p < 0.05$). Table 1 summarizes some of the most important characteristics of the patients, the type of surgery and the anesthesia in relation to POPC in the two groups of patients. Also, odds ratios are given. Odds ratio represents how many times more (or less) likely complications are in the pancuronium group compared to the atracurium group. Using the information contained in the table, the stepwise logistic regression analyses also showed that the use of pancuronium was connected with a statistical significant increased risk of POPC compared to atracurium ($p < 0.0001$).

Table 1

Variables		POPC PAN (%)	POPC ATR (%)	Odds ratio
Age (yr)	< 50	6.8	3.8	1.9
	50-70	12.7	6.9	2.0
	> 70	16.6*	6.5	2.8
COLD	yes	28.6*	6.3	6.0
	no	10.5*	3.0	3.8
Type of surgery				
Upper abdominal		22.6	12.7	1.9
Lower abdominal		22.8	14.3	1.8
Minor surgery		5.8*	1.3	4.6
Anesthetic time (min)				
	30-179	7.1*	2.6	2.9
	180-299	17.5*	7.8	2.5
	≥ 300	35.2	17.6	2.5
Type of anesthesia				
Inhalational anesthesia		17.2*	6.3	2.8
NLA		7.3*	2.3	3.2
NLA + a potent inhalational anesthetic agent		15.1*	3.7	7.2
Total population		11.0* 172/1559	3.1 33/1057	4.0

* $p < 0.05$. PAN = pancuronium and ATR = atracurium.

Discussion. In our study, a statistical significant higher incidence of POPC was found in patients given pancuronium than in patients given atracurium. This difference was especially marked in geriatric patients, in patients with chronic obstructive lung disease (COLD), in long lasting procedures, and in abdominal and gynecological surgery.

Conclusion. Our data indicate 1) that the choice of muscle relaxant may play a greater role in the development of POPC than so far appreciated, and 2) that in respect to POPC atracurium may be a superior agent to pancuronium.

References.

1. Hutton P et al.: Comparison of recovery after neuromuscular blockade by atracurium or pancuronium. Br J Anaesth 60:36-42, 1988

2. Andersen BN et al.: Residual curarization: a comparative study of atracurium and pancuronium. Acta Anaesthesiol Scand 32:79-81, 1988