Preoperative airway obstruction as a cause of morbidity in patients undergoing mitral valve replacement

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Introduction: We aimed to investigate the relationship between preoperative pulmonary function tests detected by obstruction of the airway and postoperative intubation time with prolonged intensive care unit stay in patients undergoing mitral valve replacement.

Methods: The Ethics Committee of Istanbul Bilim University approved this study. A total of 62 consecutive patients undergoing mitral valve replacement surgery between January 2011 and December 2014 were included in the study. All patients' gender, presence of systemic disease, smoking history, pulmonary function tests, ejection fraction, pulmonary artery pressure, perioperative cardiopulmonary bypass and aortic clamp time, postoperative intubation time, length of stay in the intensive care unit, preoperative and postoperative aspartate aminotransferase, alanine aminotransferase, serum urea nitrogen, creatinine, arterial blood gas values were recorded. The relationship between these parameters and intensive care unit stay and the duration of tracheal intubation were evaluated. We aimed to investigate the affecting factors for prolonged intensive care unit and hospital stay.

Table 1: The relationship between duration of intubation and comorbidities

		Duration of Intubation			p
		min-max	median	mean±s.d.	
Gender	Female	4.0-50.0	9.0	10.4±7.5	0.636
	Male	3.0-86.0	8.5	11.7±15.7	
Number of operations	Single	3.0-86.0	9.0	10.9±12.4	0.826
	Multiple	4.0-50.0	9.0	11.1±9.7	
Respiratory disease	Yes	4.0-16.0	9.0	10.1±3.4	0.325
	No	3.0-86.0	8.5	11.1±12.8	
Smoking	Yes	3.0-86.0	9.0	13.6±19.0	0.924
	No	3.0-50.0	9.0	9.9±7.1	
Asthma	Yes	4.0-16.0	9.0	10.2±3.9	0.393
	No	3.0-86.0	9.0	11.1±12.4	
COPD	Yes	4.0-15.0	10.5	10.0±3.4	0.425
	No	3.0-86.0	9.0	11.1±12.3	
Drug use	Yes	4.0-16.0	9.0	10.2±3.6	0.327
	No	3.0-86.0	8.5	11.1±12.5	
Systemic disease	Yes	4.0-86.0	9.0	11.9±13.0	0.113
	No	3.0-17.0	7.0	8.0±4.2	

Table 2: The relationship between duration of intensive care unit stay and comorbidities

		Duration of ICU stay			p
		min-max	Median	mean±s.d.	
Gender	Female	24.0-240.0	45.0	50.9±44.3	0.946
	Male	24.0-120.0	37.5	49.8±32.2	
Number of operations	Single	24.0-120.0	42.5	45.3±26.5	0.619
	Multiple	24.0-240.0	42.5	61.2±57.3	
Respiratory disease	Yes	24.0-110.0	24.0	35.2±27.3	0.016
	No	24.0-240.0	48.0	54.1±41.1	
Smoking	Yes	24.0-120.0	34.0	42.4±25.7	0.466
	No	24.0-240.0	45.0	53.5±43.3	
Asthma	Yes	24.0-110.0	24.0	38.9±31.0	0.111
	No	24.0-240.0	48.0	52.4±40.5	
COPD	Yes	24.0-72.0	24.0	30.0±17.0	0.024
	No	24.0-240.0	48.0	53.5±40.9	
Drug use	Yes	24.0-110.0	24.0	32.6±27.2	0.009
	No	24.0-240.0	48.0	53.9±40.6	
Systemic disease	Yes	24.0-240.0	48.0	54.7±43.2	0.165
	No	24.0-95.0	24.0	37.1±19.4	

Results: Total of 62 patients, 36 were female and 26 were male. In 17 of the patients a history of smoking was detected. In 47 patients systemic concomitant diseases were diagnosed. Nine of them had asthma, 8 of them had chronic obstructive pulmonary disease. Length of stay in the intensive care unit was significantly lower in patients with respiratory disease under treatment than the patients without respiratory disease ($p<0.05$). Chronic Obstructive Pulmonary Disease patients stayed significantly shorter than non-Chronic Obstructive Pulmonary Disease patients ($p<0.05$). The length of stay in the intensive care unit was also significantly shorter in patients who are under respiratory medication ($p<0.05$). Significantly positive correlation existed between intensive care staying time and post-operative renal function indicators ($p<0.05$). Significantly negative correlation existed between intubation period and forced expiratory volume in the first second ($p<0.05$).

Conclusion: Patients who underwent mitral valve replacement with cardiopulmonary bypass, preoperative airway obstruction assessments may provide postoperative decreased mechanical ventilation requirement and decreased hospital stay.

Table 3: Correlation analyzes for Duration of Intubation and Length of stay in intensive care unit

		CPB time	ACC time	FEV1 %	FEV1	FVC %	FVC	FEV1/FVC
Duration of Intubation	r	0.258	0.208	-0.151	-0.262	-0.078	-0.199	0.239
	p	0.043	0.105	0.245	0.047	0.552	0.130	0.063
Length of stay in ICU	r	0.199	0.077	-0.052	-0.086	-0.043	-0.169	-0.203
	p	0.121	0.550	0.693	0.519	0.743	0.199	0.116

		MEF %	MEF	EF	PAP	MR	TR	pCO ₂
Duration of Intubation	r	-0.122	-0.240	-0.152	-0.096	-0.002	0.008	-0.131
	p	0.358	0.100	0.238	0.466	0.986	0.950	0.312
Length of stay in ICU	r	-0.029	-0.030	-0.146	-0.056	0.134	-0.004	-0.179
	p	0.828	0.838	0.258	0.670	0.298	0.975	0.163

		pO ₂	Glucose	Ph	Preoperative BUN	Postoperative BUN	Preoperative Creatinine	Postoperative Creatinine
Duration of Intubation	r	-0.033	0.145	0.232	0.298	0.313	0.133	0.335
	p	0.798	0.261	0.069	0.018	0.013	0.304	0.008
Length of stay in ICU	r	-0.109	0.102	0.141	0.248	0.485	0.222	0.429
	p	0.401	0.428	0.273	0.052	0.000	0.083	0.000

		Preoperative Htc	Postoperative Htc	Preoperative ALT	Postoperative ALT	Preoperative AST	Postoperative AST
Duration of Intubation	r	-0.112	-0.234	-0.166	-0.052	-0.104	0.069
	p	0.385	0.067	0.198	0.690	0.422	0.595
Length of stay in ICU	r	-0.122	-0.124	-0.111	0.045	0.028	0.178
	p	0.344	0.336	0.392	0.727	0.832	0.166

Table 4: The comparison of preoperative and postoperative Hematocrit values, hepatic and renal functions

		min-max	median	mean±s.d.	p
ALT	Preoperative	5.0-120.0	18.0	21.8±16.8	0.318
	Postoperative	6.0-64.0	17.0	19.4±11.1	
AST	Preoperative	10.0-74.0	20.0	23.9±14.1	0.000
	Postoperative	26.0-179.0	50.5	60.0±28.3	
BUN	Preoperative	7.0-73.0	16.0	18.9±9.9	0.904
	Postoperative	8.0-55.0	16.5	19.0±10.1	
Creatinine	Preoperative	0.5-12.2	0.9	1.1±1.5	0.003
	Postoperative	0.6-9.3	1.0	1.2±1.2	
Htc	Preoperative	27.2-48.0	37.8	38.0±4.5	0.000
	Postoperative	26.6-40.6	32.0	32.3±3.3	