METALLOPROTEINASES AFTER ONE-LUNG VENTILATION. RELATIONSHIP WITH MECHANICAL VENTILATION AND POSTOPERATIVE PULMONARY COMPLICATIONS IN LUNG RESECTION SURGERY.

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BACKGROUND

- Some studies have related an exacerbated lung inflammatory response to the development of acute respiratory distress syndrome (ARDS) in lung resection surgery (LRS).
- The elevation of matrix metalloproteinases in bronchoalveolar lavage (BAL) fluid has been related with lung injury during mechanical ventilation, and therefore it could affect the outcome of LRS.
- The goal of the study was to evaluate the predictive value of MMP on postoperative pulmonary complications (PPC) in patients undergoing LRS.

MATERIALS AND METHODS

- We designed a prospective study, which was approved by the local Ethics Committee. Written informed consent was obtained from all patients scheduled for LRS.
- The exclusion criteria applied were as follows: treatment with immunosuppressant drugs within 3 months prior to surgery, blood products administration within 10 days before the surgery, relevant pulmonary disease (FEV1<50%).
- After intubation with a double-lumen tube, all patients were managed with volume-controlled ventilation (VCV), tidal volume (TV) 8 ml/kg, PEEP 5 cmH2O, FiO2 0.4-0.5 and respiratory rate to maintain end tidal CO2 30-35 mmHg.
- In one-lung ventilation (OLV), TV 6 ml/kg, PEEP 5 cmH2O, permissive hypercapnia and FiO2 0.6-1 to maintain SatO2>90% were applied. Fiberoptic BAL was performed in both lungs before and after OLV for analysis of MMP.
- BAL samples were centrifuged and the supernatant was stored at -40 °C until analysis. Expression of MMP was measured with Western Blot. We recorded the PPC defined following the Ariscat criteria (1). For statistical analysis we used Mann Whitney U test.

RESULTS AND DISCUSSION

- We found a relationship between high plateau pressure, driving pressure and low lung compliance with an increase in dependent lung MMP-9 BAL samples at the end of surgery.
- However, patients who developed PPC showed an increase in MMP-7 and MMP-9 in the non-dependent lung.

		Plateau pressure > 25 cmH2O					
		Yes (n=149)		No (n= 25)			
		Mean	SD	Mean	SD	Sig.	
MMP2	NDL	20.32	(21)	16.15	(14.2)	NS	
	DL	21.61	(21)	16.08	(13.2)	NS	
MMP7	NDL	0.51	(0.1)	0.51	(0.1)	NS	
	DL	0.56	(0.1)	0.54	(0.1)	NS	
MMP3	NDL	8.81	(1.8)	8.40	(2.0)	NS	
	DL	9.46	(2.4)	8.41	(1.8)	0.049	
MMP9	NDL	1458	(194)	1402	(114)	NS	
	DL	1448	(178)	1382	(129)	0.021	

		Lung Compliance> 20 cmH2O					
		Yes (n= 154)		No (n=20)			
		Mean	SD	Mean	SD	Sig.	
MMP2	NDL	16.24	(14.6)	20.68	(20.7)	NS	
	DL	16.24	(13.9)	21.83	(19.3)	NS	
MMP7	NDL	0.51	(0.1)	0.52	(0.1)	NS	
	DL	0.54	(0.1)	0.56	(0.1)	NS	
MMP3	NDL	8.40	(2.0)	8.97	(1.6)	NS	
	DL	8.44	(1.8)	9.50	(2.7)	NS	
MMP9	NDL	1410	(125)	1411	(160)	NS	
	DL	1382	(135)	1469	(146)	0.016	

		Driving pressure >15cm H2O					
		Yes (n=16)		No (n=158)			
		Mean	(SD)	Mean	(SD)	Sig.	
MMP2	NDL	13.15	(10.7)	17.11	(15.8)	NS	
	DL	14.17	(13.0)	17.14	(14.8)	NS	
MMP7	NDL	0.51	(0.1)	0.51	(0.1)	NS	
	DL	0.53	(0.1)	0.51	(0.1)	NS	
MMP3	NDL	8.07	(2.5)	8.50	(1.9)	NS	
	DL	7.62	(1.9)	8.65	(1.9)	NS	
MMP9	NDL	1390	(102)	1412	(131)	NS	
	DL	1278	(127)	1402	(135)	0.001	

		Postoperative pulmonary complications					
		Yes (n=37)		No (n=137)			
		Mean	(SD)	Mean	(SD)	Sig.	
MMP2	NDL	19.00	(17.1)	16.14	(14.9)	NS	
	DL	21.15	(19.4)	15.72	(12.9)	NS	
MMP7	NDL	0.50	(0.1)	0.52	(0.1)	0.031	
	DL	0.55	(0.0)	0.55	(0.1)	NS	
MMP3	NDL	9.00	(2.7)	8.31	(1.7)	NS	
	DL	9.11	(2.1)	8.41	(1.9)	NS	
MMP9	NDL	1427	(126)	1406	(130)	0.049	
	DL	1384	(175)	1393	(127)	NS	

CONCLUSIONS

- We conclude that the behavior of MMP in the BAL of patients undergoing LRS can play an important role in the postoperative course.