INCREASED CENTRAL VENOUS PRESSURE DECREASES URINARY OXYGEN TENSION IN PATIENTS WITH ROBOTIC ESOPHAGECTOMY USING ARTIFICIAL PNEUMOTHORAX

Yuri Hayashi, Naoya Iguchi, Yuji Fujino

Department of Anesthesiology and Intensive Care Medicine, Osaka University Graduate School of Medicine, Osaka, Japan

Background

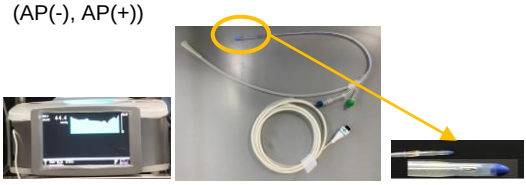
- There is clinical evidence that increased central venous pressure (CVP) contribute to the development of acute kidney injury.
- However, the impact of increased CVP on renal oxygenation in humans remains unknown.
- Renal medullary hypoxia can now be assessed by continuous measurement of urinary oxygen tension (UPO_2).

Objective

To investigate the correlation between CVP and UPO_2 during the surgery using artificial pneumothorax (AP) which increases CVP.

Methods

Design: Prospective observational study
Setting: Osaka University Hospital
Approval Number: 20536
Participants: Five adult patients undergoing robotic esophagectomy
Measurements: UPO_2, CVP, mean arterial pressure (MAP), Arterial oxygen content (CaO_2)
Comparison: With or without AP state for each patient (AP(-), AP(+))



Results

Table1: Crude analysis between with or without artificial pneumothorax

Pt	UPO_2			CVP*			MAP			CaO_2**	
	AP(-)	AP(+)	P	AP(-)	AP(+)	P	AP(-)	AP (+)	P	AP(-)	AP(+)
1	26.7 (9.0)	23.0 (4.2)	<0.001	NA	NA	NA	60 (12)	65 (16)	0.001	12.3	12.6
2	21.9 (20.8)	1.8 (2.1)	<0.001	7 (3)	13 (2)	<0.001	61 (7)	66 (6)	<0.001	12.5	11.7
3	50.0 (11.9)	30.8 (8.9)	<0.001	2 (2)	13 (2)	<0.001	80 (13)	76 (15)	0.003	16.0	14.8
4	45.0 (19.1)	34.9 (5.4)	<0.001	NA	NA	NA	63 (10)	68 (10)	<0.001	13.2	13.0
5	32.2 (24.4)	24.0 (8.3)	<0.001	7 (4)	15 (4)	<0.001	78 (12)	68 (14)	<0.001	15.8	16.2

Table2: PS matched analysis between with or without artificial pneumothorax

Pt	UPO_2			CVP*		
	AP(-)	AP(+)	P	AP(-)	AP(+)	P
1	26.7 (9.0)	22.8 (4.6)	<0.001	NA	NA	NA
2	24.8 (22.3)	1.8 (2.1)	<0.001	7 (3)	13 (2)	<0.001
3	50.0 (11.9)	32.6 (7.3)	<0.001	2 (2)	13 (2)	<0.001
4	45.0 (19.1)	34.4 (5.1)	<0.001	NA	NA	NA
5	40.6 (21.2)	24.0 (8.3)	<0.001	6 (5)	15 (4)	<0.001

*CVP was not available in 2 of 5 patients.
**CaO_2 was calculated using standard formula.

Statistical analysis:
The continuous data was presented as mean (standard deviation). T-test and PS matched analysis adjusted for MAP. All P-value less than 0.05 was considered statistically significant.

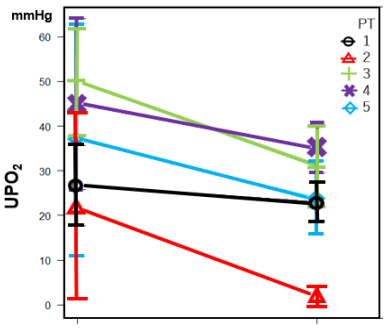


Figure 1, Comparison of UPO_2 (PS matched)

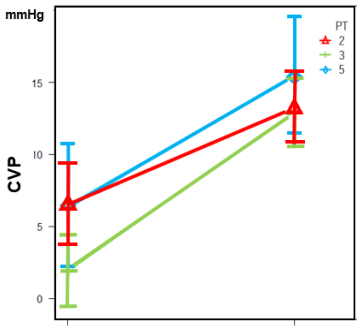


Figure 2, Comparison of CVP (PS matched)

Conclusion

- During artificial pneumothorax, UPO_2 was significantly decreased and CVP was significantly increased.
- To our knowledge, this is the first study in human to detect renal hypoxia due to renal congestion.