DOI:10.16016/j.1000-5404.1989.01.018

应用肺水计算机动态测定血管外肺水量的方法

赵琢道 黎 鳌 杨宗城 陈发明 何保斌 姜坤元 魏矩菊 黄耀生 (西南医院烧伤研究所)

肺水肿的早期检测,尤其是活体内连续测定肺水容积的动态变化,对ARDS的诊断、治疗及预后均具有实用意义。本文着重介绍应用肺水计算机系统(Lung Water Computer System)进行快速自动分析测定方法。我们用此法测定了山羊烟雾吸入伤早期肺水容积的动态变化,取得了较好的结果。

材料与方法

一、材料

1. 肺水容量计算机 9310型(Model 9310, US)。

2. D-402A密度计(Model D-402A, U.S),连接比色杯收集染料指示剂信息。

3. SW-367型染料稀释泵,与动脉导管连接,定时、定速抽、注血液。

4. 心绿染料(Cardio-green Dye),用5%葡萄糖溶液(要求0℃,为热指示剂)稀释为2 mg/10ml浓度备用。

5. 备7-F肺动脉导管及5-F股动脉导管。

二、方法

1. 选用健康山羊15只,体重23.7±6.4 kg。依Stothert方法[1](稍有改进)建立山羊慢性淋巴瘘模型,照本所烟雾吸入伤模型致伤[2]。测定伤前和伤后1、2、4及6 h各时相点的肺水容积、淋巴流量(QL)及PaO_2的变化。

2. 由颈外静脉插入肺动脉导管,由此注入热-绿染料指示剂。由股动脉插入股动脉导管,其导管头部带有感应热指示剂的热敏电阻;并连接比色杯,藉染料稀释泵稳定而均匀地抽吸股动脉血,通过比色杯将染料指示剂信息输入密度计。

3. 每次测定后须间隔3-5 min,方可重复测定。测定三次,取其均值。

4. 干-湿重法血管外肺水(EVLW(W-D))及残留肺血水量(RPWV)采用改进的肺水测定法测定。

结果

1. 肺水容积的变化:如表1及图1所示,伤后该模型发生肺水肿。血管外肺水(EVLW)容积、肺血容积(LBV)与EVLW(W-D)、RPWV变化规律一致。

表1. 肺水容积变化

	伤前	伤后 30min	1h	2h	4h	6h
EVLW (ml/kg)	5.97 ±1.98		10.88* ±4.30	18.32** ±9.70	14.66** ±7.31	12.55** ±3.40
EVLW(W D) (ml/kg)	2.75 ±1.37	5.27** ±1.00	8.87** ±1.71	13.26** ±4.10	10.79** ±0.47	11.70** ±2.82
LBV (ml/kg)	13.43 ±2 84		17.10* ±3.89	11.82 ±3.12	11.53 ±4.16	10.32 ±2.40
RPWV (ml/kg)	1.90 ±0.04	3.91** ±1.00	3.53* ±0.46	2.70 ±1.12	2.33 ±1.85	1.84 ±0.48

2. 两种方法测定的EVLW与EV W(W-D)的比较:由图2示,EVLW(W-D)与EVLW在所测定的(5.97~18.32 ml/kg)范围内相关较好($r=0.94$, $P<0.05$)。

3. EVLW与QL间变化关系:同步测定QL与EVLW值,动态观察两者变化规律,如图3示,两者间相关显著($r=0.98$, $p<0.01$)。

4. EVLW与PaO_2间变化关系:如图4显示,随着EVLW增加,而PaO_2则呈幂函数关系下降。

讨论

1. 肺水计算机测定EVLW可靠性:EVLW与实际测定的EVLW(W-D)间有较好的相关(图2)。Lewis等[4]报导EVLW与EVLW(W-D)间相较好(表2)。

本法测定的EVLW能较好地反映肺内实际EVLW变化。本法可重复测定的变异系数为4.7%。示方法可靠性强、稳定、精确度高。

?1994-2016 China Academic Journal Electronic Publishing House. All rights reserved. http://www.cnki.net

反映肺损伤情况；QL 能直接反映肺水肿程度。两者与 EVLW 的变化相关关系可看出，此法测得的 EVLW 能较好地反映肺损伤、肺水肿的程度。

从上述可以看出，应用肺水计算机系统测定的肺水容积，虽不是实际肺水容积绝对值，但能动态反映实际肺水容积的变化趋势。在肺水肿的研究、诊断及预后判断等方面，具有重要的应用价值。

表 2. *EVLW* 测定的可靠性

作者	EVLW=ax EVLW(W−D)+b		
	(a)	(b)	(r)
Lewis[3]	0.87	42	0.96
Noble[5]	1.10	1.79	0.81
Oppenheimer[4]	0.92	24.6	0.95
Holcroft[6]	0.91	0.8	0.87
Calcagni[7]	1.10	4.7	0.93
Mihm[8]	1.15	2.1	0.97
Feeley[9]	1.10	74.0	0.97
本　文	1.049	2.54	0.94

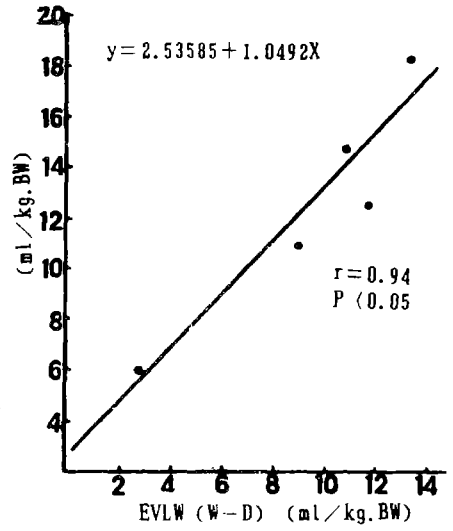


图 2　*EVLW* 与 *EVLW(W−D)* 变化关系

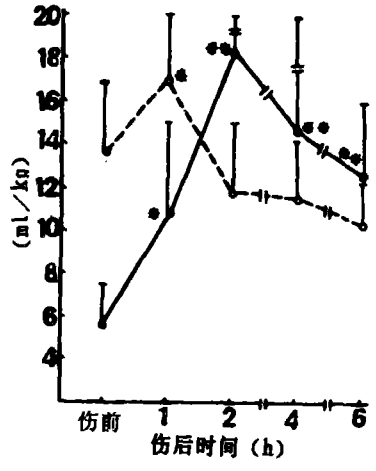


图 1　*EVTV* 与 *LBV* 的变化

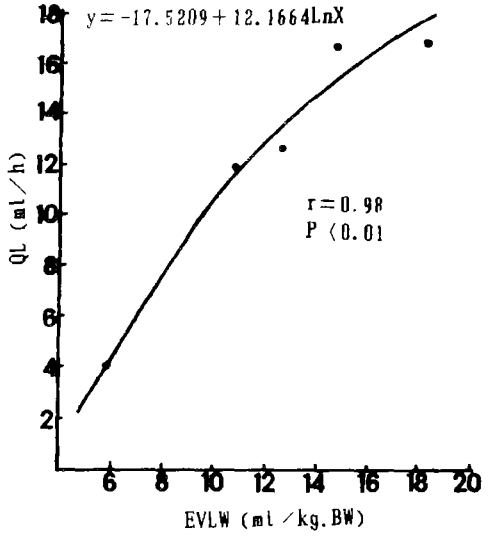


图 3　*EVLW* 与 *QL* 的关系

?1994-2016 China Academic Journal Electronic Publishing House. All rights reserved.　http://www.cnki.net

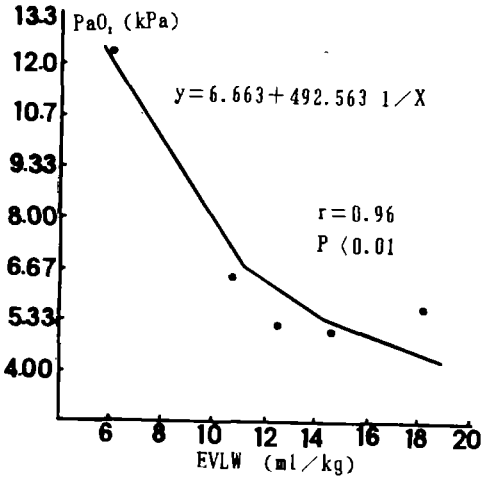


图 4 *EVLW* 与 *Pa* O_2 变化关系

参 考 文 献

1. Stothert JC, et al. Modified chronic lung lymph fistular in goats via thoracic duct. J Apple Physiol 1981; 5(1): 226
2. 朱佩芳,等。重度烟雾吸入性损伤(狗)模型的制作。第三军医大学《烧伤整形》专辑 1986: 136
3. Lewis FR, et al. Microcessor determination of lung water using thermal-green dye double indicator dilution. Surg Forum 1978; 29: 182
4. Oppenheimer F, et al. Termal-dye lung water measurements: Effects of edema and embolization. J Surg Res 1978; 26: 504
5. Noble WH, et al. A new technique for measuring pulmonary edema. J Appl Physiol 1973; 34: 508
6. Holcroft JW, et al. Excesive fluid administration in resuscitating baboons hemorrhagic shock, and an assessment of the thermal-dye technic for measuring extravascular lung water. Am J Surg 1978; 135: 412
7. Calcagni DE, et al. The thermal-dye method of lung water measurement is reliable at a 100 cardiac output. Anesthesiol 1983; 59: A138
8. Mihm FG, et al. Measurement of extravascular lung water in dogs using the thermal-green dye indicator dilution method. Anesthesiol 1982; 57: 116
9. Feeley TW, et al. Extravascular thermal volume as an method. Anesthesiol 1982; 57: 116

(收稿: 1987. 9. 25; 修回: 1988. 11. 4)

(上接 38 页)

Inquirmg into the Diagnosis and Treatment of Central Diabetes Insipidus

— *a clinical analysis of 41 patients*

Ye Shaozhen and Wang Fuhua

(*Department of Endocrinology, Southwest Hospital, Third Military Medical College*)

Reports 41 cases of central diabetes insipidus (CDI) admited and treated during the l st 12 years. Some of the special clinical features, associated diseases, diagnosis and treatment are discussed. The clinical features of DI may be varied, the diagnosis of DI complicated with other dndocrine diseases may be difficult, pospond diagnosis and treatment may lead to a serious sequel. Owing to using CT scan the morbidity of primary DI may decrease. The drugs often used in treating DI are evaluated. In conclusion these drugs not only are lf no dffect but also have some serious adverse effects. Desmoprsin is nearly without appreciate-pressure-action especialy administrated orally. Desmopresin is proposed to be the best agent in treating DI up till now.

Key words Diabetes insipidus/DI; Tomography, X-ray computed/ME; Desmopresin/TU; Morbidity

?1994-2016 China Academic Journal Electronic Publishing House. All rights reserved. http://www.cnki.net