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不同液体复苏在腹部多发伤导致失血性休克救治中的效果对比研究*

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摘要 目的:比较不同液体复苏在腹部多发伤导致的失血性休克救治中的临床效果及安全性。**方法:**选取2017年7月至2019年12月我院救治的因高处坠落、交通事故等意外事件导致腹部多发伤且失血性休克的患者83例,根据入院时间分为2组,对照组(于2017年7月至2018年7月入院治疗)和研究组(于2018年8月至2019年12月入院治疗)。在治疗过程中,对照组采用常规充分液体复苏;研究组采用限制性液体复苏。观察和比较两组患者临床治疗效果、血液酸度及其他相关指标。**结果:**复苏后,两组动脉血氧分压(Partial arterial oxygen pressure, PaO₂)均较复苏前显著下降($P<0.05$),对照组 PaO₂较研究组更明显,在复苏后90 min、120 min,对照组 PaO₂明显低于研究组($P<0.05$)。两组复苏后动脉血二氧化碳分压(Partial pressure of blood carbon dioxide, PaCO₂)均呈现先下降后上升的变化趋势,对照组 PaCO₂均显著高于研究组($P<0.05$)。从复苏前到复苏后,两组 pH 值均呈现先降后升的变化趋势,同时在复苏后90 min、120 min 研究组 pH 值均显著高于对照组($P<0.05$)。与复苏前相比,两组复苏后 PT 值均显著上升($P<0.05$),研究组复苏后90 min、120 min PT 值明显低于对照组($P<0.05$),复苏后谷丙转氨酶(Alanine aminotransferase, ALT)、谷草转氨酶(Aspartate aminotransferase, AST)及肌酐水平均明显低于对照组($P<0.05$)。对照组共有9例(22.50%)患者出现并发症或死亡,研究组共有5例(11.62%)患者出现并发症,无死亡;不良预后发生率明显低于对照组($P<0.05$)。**结论:**对腹部多发伤失血性休克患者而言,采用早期限制性液体复苏可有效恢复患者血容量,对血液携氧能力、肝肾功能影响较小,安全性高,有利于患者预后恢复。

关键词:液体复苏;腹部多发伤;失血性休克

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A Comparative Study on Different Fluid Resuscitation in the Treatment of Hemorrhagic Shock Caused by Multiple Abdominal Injuries*

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ABSTRACT Objective: To compare the clinical effect and safety of different fluid resuscitation in the treatment of hemorrhagic shock caused by multiple abdominal injuries. **Methods:** From July 2017 to December 2019, 83 patients with multiple abdominal injury and hemorrhagic shock due to accidents such as falling from height, accident were selected in our hospital. According to the time of admission were divided into two groups, the control group (admitted from July 2017 to July 2018), and the study group (admitted from August 2018 to December 2019). During the course of treatment, the control group used conventional adequate fluid resuscitation, and the study group used restricted fluid resuscitation. Clinical efficacy, blood acidity and other related indexes were observed and compared between the two groups. **Results:** The PaO₂ decreased significantly in the two groups after resuscitation ($P<0.05$), and the decrease trend of PaO₂ in the control group was more obvious in the study group. At 90 min, 120 min PaO₂ in the control group was significantly lower than that in the study group ($P<0.05$). After resuscitation, PaCO₂ in the two groups showed a trend of first decline and then increase, and PaCO₂ in the control group was significantly higher than that in the study group ($P<0.05$). From the pre-resuscitation to the post-resuscitation, the pH of the two groups showed a change trend of first descending and then rising, and the pH of the study group was significantly higher than the control group at 90 min and 120 min after resuscitation ($P<0.05$). Compared with the pre-resuscitation, the PT values increased significantly after resuscitation in the two groups ($P<0.05$), while the PT values after resuscitation in the study group were significantly lower than those of the control group at 90 min and 120 min ($P<0.05$). After resuscitation, the levels of ALT, AST and creatinine in the study group were significantly lower than those in the control group ($P<0.05$). In the control group, 9 cases (22.50%) had complications or death, in the study group, 5 cases (11.62%) had complications without death, and the incidence of adverse prognosis was significantly lower than that in the control group ($P<0.05$). **Conclusion:** For patients with multiple abdominal hemorrhagic shock, early restricted fluid resuscitation can effectively restore the patient's blood volume, have a small effect on blood oxygen carrying capacity.

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ty, liver and kidney function, and have high safety, which is conducive to recovery of patients' prognosis.

Key words: Fluid recovery; Multiple abdominal injuries; Blood loss shock

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前言

近年来,随着我国经济 - 社会的发展,高处坠落、交通事故,意外伤害等意外事件频发;严重多发伤发生率逐渐上升,严重多发伤创伤失血性休克是临床急救过程中常出现的现象^[1-3]。多发伤患者在发生创伤后失血性休克后,可导致一系列严重并发症(例如急性呼吸窘迫综合征、败血症、多器官衰竭组织功能不全综合征),甚至发生死亡^[4-6]。

液体复苏是多发伤创伤失血性休克抢救的关键,在失血性休克早期进行液体复苏可使人体有效循环血容量短时间内快速恢复,尽量升高并维持血压至正常范围,以保证人体各组织器官的有效灌注^[7,8]。传统的液体复苏方法虽然可以达到短时间内使机体有效循环血容量恢复,但并不利于患者预后,患者并发症及病死率较高。近年来,国内外学者提出限制性液体复苏的处理方法,旨在在救治过程中寻求一个复苏的平衡点,既可以减少对患者机体代偿机制及内环境的干扰,又可以适当恢复各组织器官的血流灌注^[9-11]。本研究主要比较了常规液体复苏及限制性液体复苏在腹部多发伤导致失血性休克救治过程中

的临床效果及安全性,现将结果报道如下。

1 资料与方法

1.1 研究对象

选取 2017 年 7 月至 2019 年 12 月在我院治疗的 83 例腹部多发伤患者,患者受伤到就诊时间不超过 2 h,同时所有患者入院前未接受输液治疗或输血量 < 500 mL。患者年龄分布在 16~50 岁,平均年龄为 37.22 ± 9.16 岁;男 51 例,女 32 例;致伤原因为四大类,分别为高处坠落伤 12 例,交通事故伤 41 例,锐器伤 17 例,挤压伤 13 例。另有 22 例患者伴有肋骨骨折,11 例四肢骨折,10 例盆骨骨折。所有患者均伴有不同程度的休克,其中轻度休克 38 例;中度休克 27 例,重度休克 18 例。排除标准:经临床检查存在肝、肾或免疫功能障碍;精神疾病;年龄小于 16 岁或大于 50 岁;患者及家属不知情或拒绝参加本研究者。根据患者入院时间,将患者分为两组,其中,采用常规液体复苏的 40 例作为对照组;而采用限制性液体复苏的 43 例患者为研究组,两组患者在年龄、性别、休克程度、合并骨折情况等临床基本资料方面差异无统计学意义($P > 0.05$),见表 1。具有可比性。

表 1 两组患者一般资料比较

Table 1 Comparison of the general data between the two groups

Groups	Age (years)	Sex (male/female)	Degree of shock			Fractures	
			Mild shock	Moderate shock	Severe shock	Combined fracture	No fractures
Control group	36.83± 10.02	26/14	15	16	9	23	17
Study Group	37.93± 8.55	25/18	23	11	9	20	23

1.2 研究方法

两组患者在入院第一时间建立静脉通道,同时根据其呼吸、意识状态、体温、颈动脉搏动、出血量及外周血循环情况,进行吸氧、抗活动性出血手术,补充血容量,另外,合并骨折患者,行骨折复位固定术,并给予对症药物治疗。均进行早期液体复苏。

对照组:实施常规液体复苏,以快速、足量补液为原则,将平均动脉压维持在 90~95 mmHg;在输血前,复苏液体以平衡液为主。在液体复苏的同时完善常规检查尽早手术。

研究组:采用限制性液体复苏,输液和输血先快后慢,在未行手术彻底止血前,维持控制平均动脉压在 60 ± 5 mmHg;中心静脉压 > 2.18 mmHg;收缩压维持在 80 ± 10 mmHg;控制输液、输血速度,限制复苏液体输入量。

两组在手术控制出血后,均给予纠正休克及贫血状态。

1.3 观察指标

观察统计两组患者在复苏前及复苏后 (90 min、120 min), 血气分析、凝血功能、血液酸度、肝肾功能。观察分析患者预后情况,包括其并发症发生(弥散性血管内凝血、呼吸窘迫综合

征、多器官功能衰竭综合征)及死亡。

1.4 统计学分析

应用 SPSS 22.0 统计软件进行数据统计分析,计数资料以例数 n 或百分比 (%) 表示,组间比较用 χ^2 检验;计量资料以平均数 $\pm$ 标准差表示,组间比较行 t 检验;以 $P < 0.05$ 为差异具有统计学意义。

2 结果

2.1 两组复苏前后血气分析指标的比较

复苏前,两组动脉血氧分压 (PaO_2) 及血二氧化碳分压 (PaCO_2) 相比差异无统计学意义 ($P > 0.05$)。复苏后,两组 PaO_2 均较复苏前显著下降 ($P < 0.05$),对照组复苏后的 PaO_2 下降趋势更为明显,复苏后 90 min、120 min PaO_2 明显低于研究组 ($P < 0.05$)。从复苏前到复苏后 90 min、120 min,两组 PaCO_2 均呈现先下降后上升的变化趋势,对照组复苏后 90 min、120 min 的 PaCO_2 均显著高于研究组 ($P < 0.05$),见表 2。

2.2 两组复苏前后血液酸度及凝血功能比较

复苏前,两组血液 pH 值及凝血酶原时间(PT)值相比差异无统计学意义($P>0.05$)。从复苏前到复苏后,两组 pH 值均呈现先降后升的变化趋势,研究组复苏后 90 min、120 min pH 值均显著高于对照组($P<0.05$);与复苏前相比,两组复苏后 PT 值均显著上升($P<0.05$),研究组复苏后 90 min、120 min PT 值明显低于对照组($P<0.05$),见表 3。

表 2 两组复苏前后血气分析指标的比较

Table 2 Comparison of the blood gas analysis index before and after resuscitation between two groups

Groups	PaO ₂ (mmHg)			PaCO ₂ (mmHg)		
	Before resuscitation	At 90 min after resuscitation	At 120 min after resuscitation	Before resuscitation	At 90 min after resuscitation	At 120 min after resuscitation
Control group	96.33± 2.06	73.29± 4.57*	70.58± 5.11*	35.08± 1.20	33.29± 2.83*	37.55± 3.05*
Study Group	96.85± 1.66	92.71± 2.06**	90.07± 4.88**	34.61± 1.89	29.53± 3.17**	31.46± 2.94**

Note: Compared with the same group before, * $P<0.05$; compared with the control group at the same time, ** $P<0.05$.

表 3 两组复苏前后血液酸度及凝血功能比较

Table 3 Comparison of blood acidity and coagulation function before and after resuscitation between the two groups

Groups	pH			PT(s)		
	Before resuscitation	At 90 min after resuscitation	At 120 min after resuscitation	Before resuscitation	At 90 min after resuscitation	At 120 min after resuscitation
Control group	7.43± 0.06	6.88± 0.10*	7.08± 0.11*	10.08± 1.20	11.29± 0.83*	12.05± 1.01*
Study Group	7.41± 0.08	7.21± 0.16**	7.27± 0.09**	10.51± 1.58	10.73± 0.97**	10.97± 0.94**

Note: Compared with the same group before, * $P<0.05$; compared with the control group at the same time, ** $P<0.05$.

2.3 两组复苏后肝肾功能指标比较

组,差异有统计学意义($P<0.05$),见表 4。

复苏后,研究组 ALT、AST 及肌酐水平均明显低于对照

表 4 两组复苏后肝肾功能相关指标比较

Table 4 Comparison of relevant indexes of liver and kidney function between the two groups after resuscitation

Groups	ALT (U/L)	AST (U/L)	Creatinine (μmol/L)
Control group	239.43± 22.15	207.21± 26.57	158.63± 10.66
Study Group	166.59± 20.04*	139.79± 23.98*	149.37± 10.31*

Note: Compared with the control group, * $P<0.05$.

2.4 两组并发症及死亡情况比较

对照组共有 9 例(22.50%)患者出现并发症或死亡,其中弥散性血管内凝血 3 例;呼吸窘迫综合征 3 例,多器官功能衰竭综合征 1 例,死亡 2 例;研究组共有 5 例(11.62%)患者出现

并发症或死亡,其中弥散性血管内凝血 2 例;呼吸窘迫综合征 2 例,多器官功能衰竭综合征 1 例,无死亡;不良预后发生率明显低于对照组($P<0.05$),见表 5。

表 5 两组并发症及死亡情况比较

Table 5 Comparison of the incidence of complications and deaths between the two groups

Groups	DIC	RDS	MODS	Death	Rate
Control group	3	3	1	2	9 (22.50)
Study Group	2	2	1	0	5 (11.62)

Note: DIC: disseminated intravascular coagulation; RDS: respiratory distress syndrome; MODS: Multiple organ failure syndrome.

3 讨论

失血性休克是一种低血容量性休克;其主要的病理生理变化是有效循环血容量急剧减少,导致多组织低灌注,机体无氧代谢增加,引起乳酸性酸中毒,出现再灌注损伤,最终导致多器

官组织功能衰竭,甚至死亡^[12-14]。临床数据表明失血性休克患者在从发病到死亡的中位时间为 2 h,因此早期认识诊断失血性休克,及时恢复患者血管内容量和携氧能力是十分重要的^[15-17]。

常规液体复苏在早期补液过程中液体输入量过多,致使患者的血管壁通透性增加,稀释患者血液,影响血液的携氧能力,

更易增加患者的再出血、或加重出血程度^[18-21]。大量研究评估表明对于外伤或严重多发伤患者,早期的限制性液体复苏可减少对血管的影响,利于患者内环境循环稳定,有助于患者预后,提高患者生存率^[22-26]。在本研究中,采用限制性液体复苏的研究组患者复苏后 PaO_2 明显高于对照组;且 PaCO_2 低于对照组,同时变化幅度小于对照组,与 Xie WS^[27]等学者的研究结果类似。这些结果表明通过给予限制液体复苏治疗多发伤并失血性休克患者,能改善患者复苏指标,改善凝血指标,并减少并发症发生。刘凯^[28]发现在创伤后失血患者进行限制性液体复苏治疗其 PaO_2 、pH 测定值显著的高于常规液体复苏,同时动脉血二氧化碳分压(PaCO_2)显著的低于常规液体复苏,其结果也与本研究一致。上述的结果均表明多发伤并失血性休克患者早期限制性液体复苏对血液携氧能力的影响较小,患者凝血功能良好,并发症及死亡发生率较低,有利于患者预后恢复。主要原因与限制性液体复苏在复苏后对患者的携氧能力及血液内环境的影响较小,可减少对组织器官的再损伤^[29,30]。

同时,我们发现复苏后 90 min、120 min 研究组 pH 值均显著高于对照组。PT 值明显低于对照组,表明研究组患者血液 pH 较为稳定,且凝血功能高于对照组。我们推测限制性液体复苏可能避免了稀释性凝血功能障碍的发生^[31]。另外,复苏后,研究组 ALT、AST、肌酐水平及不良预后发生率均明显低于对照组,与王浩等^[32]的研究结果类似。这些结果表明多发伤失血性休克患者在限制性液体复苏后的血清乳酸、凝血功能及动脉氧分压水平改善情况优于传统液体复苏。另外,与本研究不同,限制性液体复苏除了用于严重多发伤失血性休克患者,还可以用于产科失血性休克早期治疗中,可以改善产妇的血流动力学水平^[33]。

蔡青云等^[34]人发现限制性液体复苏在大失血致休克患者急诊救治中患者的多器官功能障碍综合征发生率、急性呼吸窘迫综合征发生率、病死率分别显著低于传统液体复苏,并提出可以避免输液过量造成的机体内环境紊乱,为后续治疗创造良好的条件,与本研究结果相似。目前,限制性液体复苏在失血性休克治疗中已逐渐推广应用,本研究立足于腹部多发伤患者多因意外事故,研究对象的复杂性和多样性对本研究的结果有部分影响,此后需要更大样本量,更全面的观察指标来评估液体复苏临床效果。

综上所述,对腹部多发伤失血性休克患者而言,采用早期限制性液体复苏可有效恢复患者血容量,对血液携氧能力、肝肾功能影响较小,安全性高,有利于患者预后恢复。不过本研究也存在一定的不足,样本量少,同时没有对限制性液体复苏治疗多发伤失血性休克的具体机制进行深入探究,后续需要加大样本量,进一步研究。

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• 重要信息 •

《现代生物医学进展》2021 年封面设计说明

2019 年底爆发的新冠肺炎疫情肆虐全球,对全球政治、经济、贸易和社会各层次造成了巨大冲击,到目前为止,全球新冠病毒感染人数累计达 81715247 人,死亡人数达 1778294 人。因此,本年度封面形象的以新冠病毒肆虐地球,人类重拳出击抵抗新冠疫情为主题设计了封面,旨在倡导生物医学工作者思考和研究更有效的预防和治疗措施以应对新冠病毒。当前,隔离仍然是遏制新冠病毒快速传播的有效手段,新冠疫苗研发与接种是克制新冠疫情的内生动力,而环境消杀是彻底消灭新冠病毒的有力保障。相信通过人类共同努力,各国携手合作,众志成城,一定能够消灭新冠疫情,开创人类命运共同体的美好明天。

《现代生物医学进展》编辑部