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（收稿：1992-10-17；修回：1993-04-20）

A quantitative study of pulmonary bleeding after blast, burn and combined burn-blast injuries in rats

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Abstract The amount of pulmonary bleeding after blast, burn and combined burn-blast injuries was determined in rats with image analysis. It was found that the average amount of pulmonary bleeding was much larger in the rats of immediate death after blast injury than in those surviving ($P < 0.01$). The pulmonary bleeding in blast or combined burn-blast injured rats could be seen in the 2nd to 12th hour after injury, increased in amount in the 24th hour and obviously absorbed in the 72nd hour. No pulmonary bleeding occurred in burned rats.

The findings suggest that pulmonary bleeding is the main cause of immediate death after blast overpressure injury; pulmonary bleeding usually continues for 24 hours after injury in the surviving rats; and the coexistence of burn injury retards the absorption of pulmonary bleeding induced by blast injury. A preliminary set of criteria of blast overpressure traumatic severity on the basis of the volume and weight of the pulmonary bleeding is proposed.

Key words blast injuries; hemorrhage; lung/IN; image analysis; combined burn-blast injury

早期肠道营养对严重烧伤后肠源性感染的防治——动物实验和临床研究

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严重烧伤后，由于肠粘膜屏障功能受损，肠腔中的微生物和内毒素可侵入体循环及其它脏器，进而形成肠源性感染。肠源性感染可能与严重烧伤后引起的顽固性休克，难以控制的早期暴发性败血症的发生和发展相关，而且还可在多脏器功能衰竭的发病机制中起重要作用。近年来国内不少学者关注这个问题，并在发生机理方面做了研究，其中肠粘膜屏障功能削弱，包括肠粘膜通透性增高，被认为是发生肠源性感染的重要因素之一；烧伤后早期肠道营养能否达到保护肠粘膜的结构和功能，是临床关注的一个问题。本研究试图通过动物和临床实验两个方面来阐明早期肠道营养在严重烧伤后肠源性感染的防治中所起的作用。

动物实验部分以 Wistar 大鼠为研究对象，制作大鼠肠淋巴瘘模型，用于烧伤后肠源性感染防治的研究。随机分为烧伤早期肠道营养组，烧伤对照组和单纯手术对照组，致伤前和伤后 3、6、12、24 h 收集肠淋巴液，分别检测肠淋巴液流量，内毒素含量及清除量，淋巴液菌量，丙二醛（MDA）和超氧化物歧化酶（SOD）含量及清除量，肿瘤坏死因子（TNF）含量及清除量，光镜、超薄切片电镜和冰冻蚀刻复型观察回肠粘膜。结果表明：烧伤后肠淋巴液流量和 SOD 含量及清除量明显下降；肠淋巴液 MDA、TNF 和内毒素含量及清除量明显升高；肠淋巴液细菌检出率及菌量也明显升高；光镜观察，回肠绒毛中央乳糜管明显扩张，肠上皮细胞坏死脱落；超薄切片电镜观察，肠上皮细胞间囊性扩张，微绒毛坏死脱落，线粒体空化、嵴断裂，核周间隙扩张；冰冻蚀刻复型观察，紧密连接的嵴状突起排列紊乱，数量减少，融合或脱节。早期肠道营养组，肠淋巴液流量和 SOD 含量及清除量显著高于烧伤对照组；肠淋巴液 MDA、TNF 和内毒素含量及清除量明显低于烧伤对照组；肠淋巴液细菌检出率及菌量也明显低于烧伤对照组；光镜、超薄切片电镜和冰冻蚀刻复型观察，回肠粘膜病理改变有不同程度的减轻。

（下转 353 页）

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(收稿:1992-06-27;修回:1993-03-18)

A study on the relationship between prognosis and debridement time in rats with phosphorus burns

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Abstract Male Wistar rats were randomized into 3 groups: The rats of group Ⅰ received sham burning to serve as the control and those of groups and Ⅱ were inflicted with 20% and 30% TBSA third degree phosphorus burns respectively. No treatment was given to group Ⅰ. Group Ⅱ was further divided into 2: The rats of subgroup Ⅰ were debrided immediately and those of subgroup Ⅱ in the 6th hour postburn. The findings were as follows: (1)The tissue content of phosphorus was more significantly decreased in subgroup Ⅰ than in subgroup Ⅱ. (2)Twenty-eight rats of subgroup Ⅰ all survived while 9 of the 44 rats of subgroup Ⅱ died with a mortality rate of 20.5%. The mortality rate of group Ⅱ was 37.5%(3/8). (3)The recovery of serum electrolytes and other biochemical parameters occurred earlier in subgroup Ⅰ. Our findings suggest that debridement as early as possible after phosphorus burns contributes significantly to the decrease of the victims mortality.

Key words burns,chemical/phosphorus; debridement; prognosis

(上接 316 页)

临床研究以 22 例严重烧伤病人(50%～80% TBSA,16～46 岁)为研究对象,随机分为两组,早期肠道营养组 13 例,伤后 6 h 内喂养 7 例,伤后 12～18 h 喂养 6 例;延迟喂养组 9 例。所有病人入院后均按本所常规治疗。伤后 1、3、5 d 给患者口服非代谢性的乳果糖和甘露醇,通过测定尿中乳果糖和甘露醇来评价肠粘膜通透性,伤后 6、12、24、36、48 h,3 d 和 5 d 分别测定血浆内毒素,血细菌培养,血清 TNF,伤后 1、3、5 d 测定血清游离白介素-2 受体,伤后 5 d 内如果手术,取痂下组织做细菌定量培养。结果表明:早期肠道营养组在多数时相点,尿乳果糖与甘露醇比值显著低于延迟喂养组,提示肠粘膜通透性有所改善;血浆内毒素和血清 TNF 水平均显著低于延迟喂养组;烧伤后血清白介素-2 受体明显增加;尿乳果糖和甘露醇比值与血浆内毒素含量呈显著正相关。

结论:肠淋巴循环是肠源性感染的重要途径;早期肠道营养对肠粘膜屏障具有保护作用;早期肠道营养能够减轻肠源性感染的发生;烧伤患者给予早期肠道营养是安全可行的。

关键词 烧伤;肠源性感染;肠淋巴瘘;肠道营养

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