

doi: 10.13241/j.cnki.pmb.2017.09.021

CO₂气腹对老年急性阑尾炎患者术后炎症反应及免疫应激反应的影响

余洪涛¹ 陈宁波¹ 李 伟¹ 龚晓波¹ 张良权²

(1 四川省医学科学院 / 四川省人民医院急诊外科 四川 成都 610072; 2 四川省郫县第二人民医院普外科 四川 郫县 611733)

摘要 目的:研究 CO₂ 气腹对老年急性阑尾炎患者术后炎症反应及免疫应激反应的影响,为临床治疗提供依据。**方法:**选取 2015 年 1 月到 2016 年 3 月我院收治的老年急性阑尾炎患者 130 例,按照随机数字表法将患者分为研究组和对照组,每组 65 例,对照组给予常规开腹阑尾炎切除术,研究组应用 CO₂ 气腹下腹腔镜下阑尾炎切除术,比较两组术前、术后 1 天、3 天和 5 天白细胞计数、中性粒细胞计数、白细胞介素-10(IL-10)、肿瘤坏死因子- α (TNF- α)水平。**结果:**术后 1 天两组白细胞计数、中性粒细胞计数、IL-10 和 TNF- α 水平均明显升高,比较差异具有统计学意义($P < 0.05$),研究组术后 1 天白细胞计数和中性粒细胞计数与对照组比较,差异无统计学意义($P > 0.05$),研究组术后 1 天 TNF- α 和 IL-10 水平显著低于对照组,比较差异具有统计学意义($P < 0.05$);术后 3 天、5 天与术后 1 天相比,两组白细胞计数、中性粒细胞计数、IL-10 和 TNF- α 水平均明显降低,术后 3 天与术前比较差异无统计学意义($P > 0.05$),术后 5 天与术前比较差异具有统计学意义($P < 0.05$),术后 3 天和 5 天研究组白细胞计数、中性粒细胞计数、IL-10 和 TNF- α 均显著低于对照组,比较差异具有统计学意义($P < 0.05$)。**结论:**CO₂ 气腹能有效降低急性阑尾炎患者术后炎症反应和免疫应激反应,改善患者预后。

关键词:急性阑尾炎;炎症反应;应激反应;CO₂ 气腹

中图分类号:R656.8 **文献标识码:**A **文章编号:**1673-6273(2017)09-1682-03

Effect of CO₂ Pneumoperitoneum on Postoperative Inflammatory Reaction and Immune Response of Elderly Patients with Acute Appendicitis

YU Hong-tao¹, CHEN Ning-bo¹, LI Wei¹, GONG Xiao-bo¹, ZHANG Liang-quan²

(1 Department of Emergency Surgery, Sichuan Academy of Medical Sciences & Sichuan Provincial People's Hospital, Chengdu, Sichuan, 610072, China; 2 Department of General Surgery, Pixian Second People's Hospital of Sichuan Province, Pixian, Sichuan, 611733, China)

ABSTRACT Objective: To study the effect of CO₂ pneumoperitoneum on postoperative inflammatory reaction and immune response of elderly patients with acute appendicitis, and to provide basis for clinical treatment. **Methods:** 130 elderly patients with acute appendicitis who were treated in our hospital from January 2015 to March 2016 were selected, according to the random number table method, they were divided into study group and control group, with 65 patients in each group. The patients in control group were treated with conventional open appendectomy, while the patients in study group were treated with CO₂ pneumoperitoneum laparoscopic appendectomy. The white blood cell count, neutrophil count, interleukin -10 (IL-10) and tumor necrosis factor - α (TNF- α) level were compared between the two groups before and after operation 1 d, 3 d and 5 d. **Results:** The white blood cell count, neutrophil count, levels of IL-10 and TNF- α in the two groups were significantly increased at 1 d after operation, the differences were statistically significant ($P < 0.05$). The white blood cell count and neutrophil count were compared with the control group at 1 d after operation, the differences were not statistically significant ($P > 0.05$). The levels of TNF- α and IL-10 in the study group were significantly lower than that in the control group at 1 d after operation, the differences were statistically significant ($P < 0.05$); 3 d, 5 d after operation compared with 1 d, the white blood cell count, neutrophil count, levels of IL-10 and TNF- α levels in the two groups were significantly reduced, there was no significant difference between the 3 d after operation and before operation ($P > 0.05$), the difference between the 5 d after operation and before operation was statistically significant ($P < 0.05$). The white blood cell count, neutrophil count, IL-10 and TNF- α in the study group were significantly lower than those in the control group at 3 d and 5 d after operation, the differences were statistically significant ($P < 0.05$). **Conclusion:** CO₂ pneumoperitoneum can effectively reduce postoperative inflammatory reaction and immune response of elderly patients with acute appendicitis, and improve the prognosis of patients.

Key words: Acute appendicitis; Inflammatory reaction; Immune response; CO₂ pneumoperitoneum

Chinese Library Classification(CLC): R656.8 **Document code:** A

Article ID: 1673-6273(2017)09-1682-03

作者简介:余洪涛(1982-),男,本科,主治医师,从事急腹症的临床处理方面的研究,E-mail:yhtflash@163.com

(收稿日期:2016-09-14 接受日期:2016-10-09)

前言

急性阑尾炎是指阑尾急性化脓性感染,是急腹症的最常见疾病,但是阑尾炎解剖部位变异性较大,临床表现也变化多端,较容易被误诊^[1]。临床上治疗急性阑尾炎以手术为主,常规开腹对患者伤害较大,术后患者恢复较慢。且老年患者身体机能较差,术后应激反应和炎症反应对患者危害较大,影响术后恢复^[2]。随着医学技术的发展,腹腔镜技术的进步,腹腔镜手术治疗阑尾炎被逐渐应用于临床,且推广开来^[3]。腹腔镜手术具有创伤小、出血少、切口小等优点,对其他脏器的功能影响较小,术后康复较快。有研究显示^[4,5],腹腔镜手术相比传统开腹能明显降低术后应激反应,这可能与 CO₂ 气腹存在较大关系。但是,现阶段对 CO₂ 气腹研究较少,其对术后免疫应激和炎症反应作用报道也较少^[6]。因此,本研究旨在分析 CO₂ 气腹对老年急性阑尾炎患者术后炎症反应及免疫应激反应的影响,为临床治疗提供依据。

1 资料与方法

1.1 一般资料

选取 2015 年 1 月到 2016 年 3 月我院收治的老年急性阑尾炎患者 130 例,纳入标准:所有患者均经腹部彩超或 CT 确诊为急性阑尾炎,年龄均≥ 60 岁。排除标准:存在严重心、肺疾病,存在免疫系统疾病、血液系统疾病,肝、肾功能异常者。按照随机数字表法将患者分为研究组和对照组,研究组 65 例,男性 35 例,女性 30 例,年龄介于 60-80 岁,平均年龄为(76.2± 2.7)岁,对照组 65 例,男性 34 例,女性 31 例,年龄介于 60-80 岁,平均年龄为(75.9± 3.4)岁,两组年龄和性别比较均无统计学意义(P>0.05),具有可比性,研究经医学伦理委员会批准,所有患者及家属均知情同意并签署知情同意书。

1.2 方法

对照组:给予常规开腹阑尾炎切除术,应用气管插管全麻,麻醉后于麦氏点或右下腹做 4-6 cm 的切口,寻找阑尾后游离阑尾系膜,将阑尾动脉结扎,在阑尾根部进行双重结扎,并于阑尾近端将阑尾切除。然后应用碘伏消毒,消毒后将阑尾残端进

行荷包式缝合,术区使用无菌纱布擦净,确认术区无渗血后将腹部逐层关闭缝合。研究组:给予腹腔镜下阑尾切除术,麻醉同对照组,在脐部上缘做一个约 1 cm 的弧形切口,将气腹针插入,放置 10 mm 的 Trocar 以后,建立 CO₂ 气腹,使腹压维持在 1.33-1.87 kPa,在脐平面与右锁骨中线的交点处置孔,将 10 mm 的 Trocar 置入为主操作孔。在腹腔镜直视下观察阑尾情况,并应用超声刀切断阑尾系膜和阑尾动脉,结扎阑尾根部,并应用生物夹夹闭,从阑尾根部切断,将阑尾根部粘膜烧灼,然后通过操作孔取出阑尾。检查手术视野并确认手术视野无出血以后,关闭 CO₂ 气腹,退出腹腔镜,最后缝合切口。

1.3 观察指标

分别于术前、术后 1 天、3 天、5 天清晨 7:00-9:00 抽取空腹肘静脉血约 5 mL,应用全自动血液分析仪检测白细胞计数、中性粒细胞计数,另抽取肘静脉血约 4 mL,将其放置在离心机上以 3000 r/min 速度离心约 10 min,抽取上清液放置在 EP 管中,将其放置在 -20℃ 环境中保持待用,应用酶联免疫吸附法检测白细胞介素-10 (Interleukin-10, IL-10)、肿瘤坏死因子-α (tumor necrosis factor-α, TNF-α) 水平。

1.4 统计学方法

全部数据均在 SPSS17.0 软件上统计,其中计量资料用($\bar{x} \pm s$)表示,应用单因素方差分析或 t 检验,以 P<0.05 表示有统计学意义。

2 结果

2.1 两组免疫应激反应指标比较

术后 1 天两组白细胞计数、中性粒细胞计数水平均明显升高,比较差异具有统计学意义(P<0.05),研究组术后 1 天白细胞计数和中性粒细胞计数与对照组比较,差异无统计学意义(P>0.05),术后 3、5 天与术后 1 天相比,两组白细胞计数、中性粒细胞计数水平均明显降低,术后 3 天与术前比较差异无统计学意义(P>0.05),术后 5 天与术前比较差异具有统计学意义(P<0.05),术后 3 天和 5 天研究组白细胞计数、中性粒细胞计数均显著低于对照组,比较差异具有统计学意义(P<0.05)。见表 1。

表 1 两组术前和术后各时期免疫应激反应指标比较

Table 1 Comparison of immune responses in two groups before and after operation

Groups	Time	White blood cell counts($\times 10^9/L$)	Neutrophil counts($\times 10^9/L$)
Study group	Before operation	12.31± 3.04	9.98± 1.24
	1 d after operation	15.09± 2.43 ^a	13.15± 2.75 ^a
	3 d after operation	11.02± 1.78 ^b	7.66± 3.25 ^b
	5 d after operation	7.04± 1.47 ^{ab}	5.13± 1.04 ^{ab}
	Before operation	12.29± 2.32	9.97± 2.05
Control group	1 d after operation	15.08± 2.65 ^a	13.99± 1.67 ^a
	3 d after operation	13.47± 3.08	10.84± 3.52
	5 d after operation	9.78± 2.06 ^a	7.89± 0.64 ^a
	Before operation	12.29± 2.32	9.97± 2.05

2.2 两组炎症反应指标比较

术后 1 天两组 IL-10 和 TNF-α 水平均明显升高,比较差异具有统计学意义(P<0.05),研究组术后 1 天 TNF-α 和 IL-10

水平显著低于对照组,比较差异具有统计学意义(P<0.05);术后 3 天、5 天与术后 1 天相比,两组 IL-10 和 TNF-α 水平均明显降低,术后 3 天与术前比较差异无统计学意义(P>0.05),术

后 5 天与术前比较差异具有统计学意义($P<0.05$),两组术后 3 天和 5 天研究组 IL-10 和 TNF- α 均显著低于对照组,比较差异具有统计学意义($P<0.05$)。见表 2。

表 2 两组术前和术后各期炎症反应比较

Table 2 Comparison of inflammatory reactions in two groups before and after operation

Groups	Time	TNF- α (μ g/L)	IL-10(μ g/L)
Study group	Before operation	67.34 $\pm$ 8.96	23.84 $\pm$ 3.09
	1 d after operation	124.26 $\pm$ 10.32 ^{ab}	40.53 $\pm$ 2.04 ^{ab}
	3 d after operation	72.43 $\pm$ 8.05 ^b	26.03 $\pm$ 2.04 ^b
	5 d after operation	38.06 $\pm$ 4.27 ^{ab}	13.16 $\pm$ 1.25 ^{ab}
	Before operation	67.29 $\pm$ 7.35	23.87 $\pm$ 2.48
Control group	1 d after operation	154.35 $\pm$ 6.24 ^a	52.09 $\pm$ 2.01 ^a
	3 d after operation	82.23 $\pm$ 7.87 ^a	33.04 $\pm$ 1.19
	5 d after operation	53.54 $\pm$ 6.08 ^a	20.93 $\pm$ 0.98 ^a

3 讨论

手术是临床上治疗急性阑尾炎的重要方式,是一种有创治疗方式,会引起大量组织因子入血液,导致机体出现一系列免疫应激反应,反应程度与手术时间、创伤程度及出血量有较大关系^[7,8]。而免疫应激反应越强烈,免疫抑制的时间也会越长,手术后感染的几率也会明显增加。且老年急性阑尾炎人群特殊,老年人群基础疾病较多,免疫力多较低,术后感染的几率明显增加,急性阑尾炎患者机体处于炎症反应状态,机体抗炎反应强烈,会引起免疫功能低下,容易引起细菌播散,导致多脏器功能衰竭,给患者生命健康带来较大危害^[9,10]。腹腔镜是一种微创治疗方式,对患者伤害较小,患者术后应激反应较小^[11]。且手术中多应用 CO₂ 气腹,使腹内压升高,术中腹部血流量降低,也会减少进入血液中的组织液,降低因组织因子引起的免疫应激反应。有研究显示,腹腔镜手术会明显降低手术炎症反应和免疫应激反应,且与 CO₂ 气腹发挥较大作用^[12]。

机体处于免疫应激状态时,免疫细胞会产生和分泌大量炎症因子,引起血中炎症因子大量增加。IL-10 是一种重要的抗炎因子,对 IL-1、TNF- α 等有抑制作用,也可以抑制细胞免疫作用,对机体的抗炎反应程度具有一定检测作用^[13,14]。TNF- α 则是一种促炎因子,对炎症反应具有始动作用,可以激活炎症反应中细胞的级联反应,对中性粒细胞和巨噬细胞具有活化作用,增强炎症反应程度^[15]。有研究显示^[16,17],测定机体的抗炎因子和炎症因子情况可以反映机体的免疫情况,白细胞和中性粒细胞是机体中的炎症细胞,在炎症反应过程中发挥较大的作用,中性粒细胞凋亡对炎症反应具有一定消除作用,为抗炎和促炎平衡具有调节作用。因此,本研究选取老年急性阑尾炎患者为研究对象,比较常规开腹手术和 CO₂ 气腹下腹腔镜手术对患者炎症反应和免疫应激反应的影响,检测术前、术后 1 天、3 天、5 天患者机体白细胞计数、中性粒细胞计数、IL-10、TNF- α 水平,研究显示,术后第 1 天两组免疫应激反应和炎症反应均较高,术后 3 天和 5 天有所降低,且研究组降低较明显,与其他研究结果具有相似性^[18,19],说明腹腔镜 CO₂ 治疗老年急性阑尾炎患者能有效降低术后炎症反应和免疫应激反应程度,分析其原因为^[20]:腹腔镜手术相比开腹手术对患者伤害小,机体因伤害刺激

带来的应激反应也较小,但是腹腔镜手术中应用 CO₂ 气腹,会使腹腔压力增加,手术区域血流量较少,出血量也明显降低,组织因子进入血液中量也明显减少,导致免疫应激反应和炎症反应程度低。

综上所述,CO₂ 气腹腹腔镜手术应用于老年急性阑尾炎具有较好的临床疗效,能明显降低患者的炎症反应和免疫应激反应,有利于术后康复。

参考文献 (References)

- [1] Sama CB, Aminde LN, Njim TN, et al. Foreign body in the appendix presenting as acute appendicitis: a case report [J]. J Med Case Rep, 2016, 10(1): 129
- [2] Lourenco P, Brown J, Leipsic J, et al. The current utility of ultrasound in the diagnosis of acute appendicitis [J]. Clin Imaging, 2016, 40(5): 944-948
- [3] Yu G, Han A, Wang W. Comparison of Laparoscopic Appendectomy with open appendectomy in Treating Children with Appendicitis[J]. Pak J Med Sci, 2016, 32(2): 299-304
- [4] Aktimur R, Gokakin AK, Deveci K, et al. Oxidative stress markers in laparoscopic vs.open appendectomy for acute appendicitis: A double-blind randomized study [J]. J Minim Access Surg, 2016, 12(2): 143-147
- [5] Halter JM, Mallory B, Neilson IR, et al. Same-Day Discharge Following Laparoscopic Appendectomy for Uncomplicated Acute Appendicitis as a Measure of Quality in the Pediatric Population [J]. J Laparoendosc Adv Surg Tech A, 2016, 26(4): 309-313
- [6] Segev L, Keidar A, Schrier I, et al. Acute appendicitis in the elderly in the twenty-first century[J]. J Gastrointest Surg, 2015,19(4): 730-735
- [7] Liang TJ, Liu SI, Tsai CY, et al. Analysis of Recurrence Management in Patients Who Underwent Nonsurgical Treatment for Acute Appendicitis[J]. Medicine(Baltimore), 2016, 95(12): e3159
- [8] Sutton TL, Pracht EE, Ciesla DJ. Acute appendicitis: variation in outcomes by insurance status[J]. J Surg Res, 2016, 201(1): 118-125
- [9] Saar S, Talving P, Laos J, et al. Delay Between Onset of Symptoms and Surgery in Acute Appendicitis Increases Perioperative Morbidity: A Prospective Study[J]. World J Surg, 2016, 40(6): 1308-1314
- [10] Van Rossem CC, Bolmers MD, Schreinemacher MH, et al. Prospective nationwide outcome audit of surgery for suspected acute appendicitis[J]. Br J Surg, 2016, 103(1): 144-151

(下转第 1647 页)

- PGF1 α 的变化及意义 [J]. 中国中医基础医学杂志, 2009, 15(12): 914-916
- Rong Xiao-feng, Li Rong-heng, Lv Xia. Changes of NO, ET, TXB2, 6- keto- PGF1 α in Rats with Qi Deficiency and Blood Stasis [J]. Chinese Journal of Basic Medicine in Traditional Chinese Medicine, 2009, 15(12): 914-916
- [12] 陈奔, 钟振国. 血瘀证病证结合动物模型研究进展[J]. 世界中西医结合杂志, 2015, 01: 136-139
- Chen Ben, Zhong Zhen-guo. Research Progress on animal model of syndrome of Blood Stasis syndrome [J]. World Journal of Integrated Traditional and Western Medicine, 2015, 01: 136-139
- [13] 杨洪雁, 张香东, 崔梓扬, 等. 复合因素致气虚血瘀证模型的制备[J]. 中药药理与临床, 2013, 02: 192-194
- Yang Hong-yan, Zhang Xian-dong, Cui Zi-yang, et al. Preparation of the model of Qi Deficiency and Blood Stasis due to complex factors [J]. Pharmacology and Clinics of Chinese Materia Medica, 2013, 02: 192-194
- [14] 杜金行, 史载祥. 第八次全国中西医结合血瘀证及活血化瘀研究学术大会纪要[J]. 中国中西医结合杂志, 2011, 03: 341
- Du Jin-xing, Shi Zai-xiang. Summary of the Eighth National Academic Conference on blood stasis and blood circulation to remove blood stasis[J]. Chinese Journal of Integrated Traditional and Western Medicine, 2011, 03: 341
- [15] 杨志成, 刘良红, 张晓青, 等. 水蛭提取液对凝血酶诱导血管内皮细胞释放血栓素 B2 和 6- 酮 - 前列腺素 F1 α 的影响[J]. 中国中西医结合急救杂志, 2013, (3): 146-148
- Yang Zhi-cheng, Liu Liang-hong, Zhang Xiao-qing, et al. Effects of Hirudo extract on release of TXB2 and 6-keto-PGF1 α from cultured human umbilical vein endothelial cells induced by thrombin [J]. Chinese Journal of Intergrated Traditional and Western Medic, 2013, (3): 146-148
- [16] 韩华, 任建民, 刘云凤. 2 型糖尿病微血管病变与血浆 AT- II、ET、TXB2、6-Keto-PGF1 α 的相关性[J]. 山东医药, 2009, 25: 80-81
- Han Hua, Ren Jian-min, Liu Yun-feng. Correlation between microvascular disease and plasma AT- II, ET, TXB2, 6-Keto-PGF1 α in type 2 diabetes mellitus [J]. Shandong Medical Journal, 2009, 25: 80-81
- [17] 张小鸿, 徐先祥, 汪宁卿. 黄芪保护血管内皮细胞作用机制研究进展[J]. 中国药理学杂志, 2013, 18: 1526-1530
- Zhang Xiao-hong, Xu Xian-xiang, Wang Ning-qin. Research Progress on the effect mechanism of Astragalus on protecting vascular endothelial cells [J]. Chinese Pharmaceutical Journal, 2013, 18: 1526-1530
- [18] 陈希, 穆祥, 许剑琴. 硫酸软骨素对 LLO 诱导大鼠肠黏膜微血管内皮细胞分泌 NO、ET-1 的影响[J]. 中国兽药杂志, 2015, 11: 25-29
- Chen Xi, Mu Xiang, Xu Jian-qin. Effects of Chondroitin Sulfate on the Secretion of NO and ET-1 in Rat Intestinal Mucosa Microvascular Endothelial Cells Induced by LLO [J]. Chinese Journal of Veterinary Drug, 2015, 11: 25-29
- [19] 李红蓉, 位庚, 尹玉洁, 等. 人参保护血管内皮细胞的研究进展[J]. 中国老年学杂志, 2015, 20: 5957-5960
- Li Hong-rong, Wei Geng, Yin Yu-jie, et al. Research progress of ginseng protect vascular endothelial cells [J]. Chinese Journal of Gerontology, 2015, 20: 5957-5960

(上接第 1684 页)

- [11] Kotuluoto S, Pauniah SL, Helminen MT, et al. Severe Complications of Laparoscopic and Conventional Appendectomy Reported to the Finnish Patient Insurance Centre [J]. World J Surg, 2016, 40(2): 277-283
- [12] Calhoun JT, Redan JA. Elimination of laparoscopic lens fogging using directional flow of CO₂[J]. JSLS, 2014, 18(1): 55-61
- [13] Yeruva L, Spencer NE, Saraf MK, et al. Erratum to: Formula diet alters small intestine morphology, microbial abundance and reduces VE-cadherin and IL-10 expression in neonatal porcine model [J]. BMC Gastroenterol, 2016, 16(1): 55
- [14] Obál I, Klausz G, Mándi Y, et al. Intraperitoneally administered IgG from patients with amyotrophic lateral sclerosis or from an immune-mediated goat model increase the levels of TNF- α , IL-6, and IL-10 in the spinal cord and serum of mice [J]. J Neuroinflammation, 2016, 13(1): 121
- [15] Siregar GA, Halim S, Sitepu VR, et al. Serum TNF- α , IL-8, VEGF levels in Helicobacter pylori infection and their association with degree of gastritis[J]. Acta Med Indones, 2015, 47(2): 120-126
- [16] Zuchtriegel G, Uhl B, Puhr-Westerheide D, et al. Platelets Guide Leukocytes to Their Sites of Extravasation [J]. PLoS Biol, 2016, 14(5): e1002459
- [17] Morotti A, Phuah CL, Anderson CD, et al. Leukocyte Count and Intracerebral Hemorrhage Expansion[J]. Stroke, 2016, 47(6): 1473-1478
- [18] Van Rossem CC, Schreinemacher MH, van Geloven AA, et al. Antibiotic Duration After Laparoscopic Appendectomy for Acute Complicated Appendicitis[J]. JAMA Surg, 2016, 151(4): 323-329
- [19] Wu JX, Dawes AJ, Sacks GD, et al. Cost effectiveness of nonoperative management versus laparoscopic appendectomy for acute uncomplicated appendicitis[J]. Surgery, 2015, 158(3): 712-721
- [20] Hrad V, Waisbren SJ. Results of Immediate Discharge From Postanesthesia Care Unit to Home After Laparoscopic Appendectomy for Acute Nonperforated Appendicitis [J]. Surg Laparosc Endosc Percutan Tech, 2015, 25(4): 343-346