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脾动脉介入栓塞治疗外伤性脾破裂的临床效果 及对患者免疫功能的影响*

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摘要 目的:探讨脾动脉介入栓塞治疗外伤性脾破裂的临床效果及对患者免疫功能的影响。**方法:**选择 2013 年 4 月到 2017 年 2 月在中国人民解放军第九七医院进行急诊治疗的 116 例外伤性脾破裂患者,根据治疗方法的不同将其分为观察组 60 例与对照组 56 例,对照组接受脾脏切除手术,观察组给予脾动脉介入栓塞治疗,记录和比较两组的术后下床活动时间、术后住院时间、术后肛门排便时间、术后肛门排气时间、术中输血量、手术时间与治疗前后 $CD4^+/CD8^+$ 、 $CD8^+$ 、 $CD4^+$ 、 $CD3^+$ 的变化及不良反应的发生情况。**结果:**所有患者都完成治疗并抢救成功,观察组的术后下床活动时间、术后住院时间、术后肛门排便时间、术后肛门排气时间、术中输血量、手术时间都少于对照组($P<0.05$)。观察组围手术期间的急性肠梗阻、急性胰腺炎、肺炎等并发症发生率为 3.33%,对照组为 17.86%,观察组低于对照组($P<0.05$)。术后 14 天,两组白细胞与血小板含量均显著高于术前 1 天($P<0.05$),而观察组血小板含量显著低于对照组($P<0.05$),但两组白细胞含量比较差异无统计学意义($P>0.05$)。观察组术后 14 天与术后 1 个月的 $CD4^+/CD8^+$ 、 $CD4^+$ 、 $CD3^+$ 值均明显高于对照组($P<0.05$),两组 $CD8^+$ 对比差异无统计学意义($P>0.05$)。**结论:**脾动脉介入栓塞治疗外伤性脾破裂能提高治疗的临床效果,减少术后并发症的发生,促进患者免疫功能的恢复。

关键词:脾动脉介入栓塞;外伤性脾破裂;免疫功能

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Clinical Efficacy of Splenic Artery Interventional Embolization in the Treatment of Traumatic Splenic Rupture and Its Influence on the Immune Function*

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ABSTRACT Objective: To investigate the clinical effect of splenic artery interventional embolization in the treatment of traumatic spleen rupture and its effect on the immune function. **Methods:** 116 cases of patients with traumatic splenic rupture who were treated in the 97th Hospital of the Chinese People's Liberation Army from April 2013 to February 2017 were selected. According to different treatment methods, they were divided into 60 cases in the observation group and 56 cases in the control group. The control group was given splenectomy, and the observation group was treated by splenic artery interventional embolization. The postoperative ambulation time, postoperative hospital time, postoperative anus defecation time, postoperative anus exhaust time, intraoperative blood transfusion, operation time, the changes of $CD4^+/CD8^+$, $CD8^+$, $CD4^+$, $CD3^+$ before and after treatment and the occurrence of adverse reactions of the two groups were recorded and compared. **Results:** All patients completed the treatment and were successfully rescued. The postoperative activity out of bed days, the time of hospitalization after operation, the time of postoperative anus defecation, the time of postoperative anus exhaust, the amount of blood transfusion and the operation time of the observation group were less than those of the control group ($P<0.05$). In the observation group, the incidence of acute intestinal obstruction, acute pancreatitis, pneumonia and other complications during the perioperative period was 3.33%, it was 17.86% in the control group and was higher than that of the observation group ($P<0.05$). On the 14th day after operation, the content of white blood cells and platelets in both groups were significantly higher than those on 1 day before operation ($P<0.05$), but the content of platelet in the observation group was significantly lower than that of the control group ($P<0.05$), but there was no significant difference in the white blood cell content between the two groups ($P>0.05$). The $CD4^+/CD8^+$, $CD4^+$ and $CD3^+$ of observation group at 14 days after operation and 1 month after the operation were significantly higher than those in the control group ($P<0.05$), and there was no significant difference in the $CD8^+$ between the two groups ($P>0.05$). **Conclusion:** Splenic artery interventional embolization can improve the clinical effect in the treatment of traumatic spleen rupture, it can reduce the occurrence of

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postoperative complications and promote the recovery of immune function.

Key words: Splenic artery interventional embolization; Traumatic splenic rupture; Immune function

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前言

脾脏占全身淋巴组织总量的 1/4, 具有储存和血液滤过功能, 其存在丰富的血管网络, 含有丰富的淋巴细胞和巨噬细胞, 为人体最大的免疫器官^[1,2]。但脾脏的生物结构质地脆弱, 在外力作用下易出现外伤性脾破裂, 导致出血性休克, 具有很高的致残率与死亡率^[3,4]。该病约占腹腔实质脏器损伤的 1/3 左右, 当前在我国的发病率比较高, 且死亡率呈现总体上升趋势^[5-7]。

常规脾切除为外伤性脾破裂的主要方法, 具有手术简单、操作方便等优点, 能促进改善患者的预后, 降低死亡率。但该方法会导致患者 T 淋巴细胞水平突然下降, 在术中与术后容易发生爆发性感染, 增加患者的死亡率^[8,9]。相关调查显示成人脾脏切除术破坏了脾与周围组织之间丰富的侧支循环, 会影响患者的储存和血液滤过、免疫功能, 对于肝功能有一定的损伤^[10-12]。随着脾脏免疫机制研究深入, 越来越多的研究表明在止血成功的前提下, 实施保脾手术治疗对改善患者预后具有重要价值^[13]。随着栓塞技术和材料的进步, 脾动脉介入栓塞在临床上广泛使用^[14]。本研究主要探讨了脾动脉介入栓塞治疗外伤性脾破裂的临床效果及对患者免疫功能的影响, 旨在促进改善患者的预后, 现总结报道如下。

1 资料与方法

1.1 一般资料

选择 2013 年 4 月到 2017 年 2 月在中国人民解放军第九七医院进行急诊治疗的 116 例外伤性脾破裂患者。纳入标准: 患者或者直系家属知情同意本研究; 均符合外伤性脾破裂诊断标准, 临床分级为 I - II 级外; 年龄 20-80 岁, 具有手术治疗指征与介入栓塞指征; 治疗期间无死亡情况发生; 临床与随访资料完整; 研究得到医院伦理委员会的批准; 既往无脾脏手术史; 外伤至手术时间在 10 小时内。排除标准: 发生病理性脾破裂的患者; 长期服用糖皮质激素等抑制 T 淋巴细胞水平药物者; 伴有严重的感染、血液系统或神经系统疾病者; 合并严重的心脑血管、肝肾肺等器官组织疾病; 妊娠与哺乳期妇女。根据治疗方法的不同, 分为观察组(n=60)与对照组(n=56)。其中观察组脾破裂 I 级 32 例, II 级 28 例; 受伤原因: 车祸伤 22 例, 坠落伤 18 例, 打击伤 20 例; 受伤到手术时间 $[(3.27 \pm 1.02)\text{h}]$, 男性 33 例, 女性 27 例, 平均年龄 $[(66.44 \pm 2.13)\text{岁}]$, 平均 BMI $(24.21 \pm 2.48)\text{kg/m}^2$ 。对照组脾破裂 I 级 28 例, II 级 28 例; 受伤原因: 车祸伤 22 例, 坠落伤 15 例, 打击伤 19 例; 受伤到手术时间 $[(3.56 \pm 1.22)\text{h}]$, 男性 32 例, 女性 24 例, 平均年龄 $[(66.43 \pm 2.56)\text{岁}]$, 平均 BMI $(23.78 \pm 3.14)\text{kg/m}^2$ 。两组一般资料具有可比性($P>0.05$)。

1.2 治疗方法

所有患者都进行急诊治疗, 观察组: 给予脾动脉介入栓塞治疗, 选择局麻, 数字减影血管造影(Digital subtraction

angiography DSA) 引导下采用改良 Seldinger 技术穿刺入右股动脉, 使用 4F 或 5F 规格的 Cobra 导管插管直至脾动脉主干, 脾动脉破裂的损伤部位经脾动脉造影确定, 然后再行超选择插管至出血的脾动脉分支进行栓塞治疗, 再重复造影观察止血效果, 如第二级分支主干显影, 分支未显影提示栓塞成功, 拔管局部加压止血包扎, 右下肢制动 24 小时, 给予相应的对症、支持处理。术中根据出血情况, 栓塞剂选用明胶海绵颗粒、明胶海绵条和(或)不锈钢弹簧圈。

对照组: 给予开腹脾全切术, 具体手术步骤如下: 1) 体位: 平卧位, 左腰背部垫高, 选用左侧胸腹联合切口时, 取 45° 左侧卧位。2) 切口: 根据脾脏的病情和大小确定, 左上腹直肌切口最为常见, 也可采用左上腹弧形切口、左肋缘下斜切口等。3) 探查: 进腹后对腹内脏器进行仔细探查, 若发现脾脏破裂, 需迅速、准确控制止血, 向血块最多的地方进行探查, 同时吸尽腹腔积血, 边右手扪查脾脏, 并以右手捏住或使用脾蒂钳夹将脾动静脉血流阻断, 根据脾脏损伤程度, 及时确定手术方案。如控制脾蒂腹腔内仍有出血, 应全面探查腹腔。4) 结扎脾动脉: 将胃牵向内侧, 打开左侧胃结肠韧带、胃脾韧带, 进入小网膜囊内, 将脾门及胰腺体尾部暴露。在胰腺上缘触及弯曲的脾动脉, 将覆盖的腹膜切开, 分离出脾动脉, 从其下缘引过 2 根 7 号线, 距离 3 至 5 cm 分别结扎脾动脉, 注意不要损伤脾静脉, 动作要轻柔。5) 游离脾脏: 将胃脾韧带、脾结肠韧带结扎、切断, 注意防止在放置血管钳时损伤胃壁。脾下极游离后, 为暴露脾肾韧带, 需以右手将脾由外下方翻向内前侧。在粘连不多时可直接钝性分离托出脾脏。6) 处理脾蒂: 将脾脏翻向内侧, 在脾蒂后方轻轻推开胰尾, 再将脾脏翻向左侧, 脾蒂用 3 把大血管钳夹住, 在贴近脾门的血管钳内侧切断, 移除脾脏。使用粗丝线结扎脾蒂残端, 并用中号丝线贯穿缝扎。7) 放置引流: 术毕彻底止血, 清理腹腔纱布, 脾床、胰尾、胃大弯处粗糙面应特别注意有无出血。脾窝常规放置引流管。

1.3 观察指标

(1) 围手术指标: 记录两组的术后下床活动时间、术后住院时间、术后肛门排便时间、术后肛门排气时间、术中输血量、手术时间等指标。(2) 记录两组在围手术期出现的急性肠梗阻、急性胰腺炎、肺炎等并发症情况。(3) 白细胞与血小板测定: 在术前 1 天和术后 14 天抽取外周静脉血 4 mL, 在我院检验科测定白细胞与血小板含量(日本日立 7100 型全自动生化分析仪)。(4) 免疫功能测定: 所有患者在术后 14 天和术后 1 个月抽取外周静脉血 4-6 mL, 3000 r/min 离心 10 min 后去除上层清液, 采用流式细胞仪对外周血 CD3⁺、CD4⁺、CD8⁺、CD4⁺/CD8⁺ 等 T 淋巴细胞水平进行测定, 严格准守操作说明书进行。

1.4 统计学方法

采用 SPSS 21.0 专业统计学软件进行数据分析, 计量数据(均数 $\pm$ 标准差)与计数数据[率(%)]组间比较分别采用 t 检验与卡方分析, 以 $P<0.05$ 为差异具有统计学意义。

2 结果

2.1 两组围手术指标的对比

所有患者都完成治疗并抢救成功,观察组的术后下床活动时间、术后住院时间、术后肛门排便时间、术后肛门排气时间、术中输血量、手术时间都少于对照组($P<0.05$)。见表1。

表1 两组患者围手术指标的对比

Table 1 Comparison of the perioperative indicators between two groups of patients

Groups	n	Operation time (min)	Time of hospitalization (d)	The amount of transfused blood (ml)	Anus exhaust time (h)	Anus defecation time (h)	Leave bed activity time (h)	Length of stay (d)
Observation group	60	69.62± 14.27	8.05± 3.31	271.68± 30.92	23.45± 4.81	42.49± 2.99	21.67± 4.11	7.19± 2.84
Control group	56	180.48± 26.35	13.74± 1.63	550.39± 23.14	45.92± 7.19	67.38± 10.33	38.92± 8.24	9.78± 1.99
<i>P</i>		0.000	0.010	0.000	0.003	0.014	0.009	0.025

2.2 两组围手术期间并发症的发生情况对比

观察组围手术期间的急性肠梗阻、急性胰腺炎、肺炎等并

发症发生率为3.33%,对照组为17.86%,观察组低于对照组($P<0.05$)。见表2。

表2 两组患者围手术期并发症的发生情况比较

Table 2 Comparison of the incidence of perioperative complications between two groups of patients

Groups	Infection	Intestinal obstruction	Hemorrhage	Pneumonia	Acute pancreatitis	Atelectasis	Total incidence (%)
Observation group (n=60)	1(1.67)	0(0)	1(1.67)	0(0)	0(0)	0(0)	3.33
Control group (n=56)	3(5.36)	1(1.79)	1(1.79)	2(3.57)	1(1.79)	2(3.57)	17.86
<i>P</i>							0.004

2.3 两组治疗前后白细胞与血小板含量的对比

术后14d,两组白细胞与血小板含量均显著高于术前1d

($P<0.05$),且观察组血小板含量显著低于对照组($P<0.05$),但两组白细胞含量比较差异无统计学意义($P>0.05$)。见表3。

表3 两组手术前后白细胞与血小板含量对比($\times 10^9/L$)

Table 3 Comparison of leukocytes and platelets counts between two groups before and after operation ($\times 10^9/L$)

Groups	N	Leukocyte		T	<i>P</i>	Platelet		<i>P</i>
		1d	14d			1d	14d	
		preoperation	postoperation			preoperation	postoperation	
Observation group	60	3.09± 0.45	6.55± 0.67	4.845	0.028	186.98± 5.24	278.22± 5.98	0.000
Control group	56	3.12± 0.33	6.43± 0.756	4.512	0.031	190.11± 4.89	521.25± 94.11	0.000
<i>P</i>		0.733	0.302			0.223	0.000	

2.4 两组治疗后CD4⁺/CD8⁺、CD8⁺/CD4⁺、CD3⁺的变化对比

观察组术后14d与术后1个月的CD4⁺/CD8⁺、CD4⁺/CD3⁺值均显著高于对照组($P<0.05$),两组CD8⁺对比差异无统计学意义($P>0.05$)。见表4。

3 讨论

脾脏是存在于腹腔左上方的脏器,是全身最大的免疫器官,也是造血、储血、滤血及内分泌器官^[15]。脾脏的血供丰富,但质地软而脆,容易出现外伤性破裂,进一步导致失血性休克,致残率与死亡率都比较高。流行病学调查显示在腹腔实质性脏器损伤中,外伤性脾破裂所占比例在1/3左右^[16]。既往临床认为脾

脏非生命必须器官,为此全脾切除术得到了广泛应用,其应用具有并发症低及死亡率低、操作简单、止血迅速等优势^[17]。但是随着临床与基础研究的深入,脾脏的价值得到了广泛重视。脾脏切除是既往外伤性脾破裂治疗的主要手段,也是治疗脾功能亢进、脾外伤大出血以及脾脏肿瘤的传统方法。但是常规治疗外伤性脾破裂对患者有比较大的创伤^[18-21]。本研究显示观察组的术后下床活动时间、术后住院时间、术后肛门排便时间、术后肛门排气时间、术中输血量、手术时间都少于对照组,围手术期间的急性肠梗阻、急性胰腺炎、肺炎等并发症发生率低于对照组,主要在于脾动脉介入栓塞术具有操作简单、创伤小、并发症低等优势;并且患者在术后的早期下床活动有利于下肢的静脉

表 4 两组术后不同时间点的 T 淋巴细胞水平变化比较

Table 4 Comparison of the T lymphocyte levels between two groups at different time points after operation

Groups	n	Time	CD3 ⁺ (%)	CD4 ⁺ (%)	CD8 ⁺ (%)	CD4 ⁺ /CD8 ⁺
Observation group	60	14d postoperation	52.83± 5.34	32.05± 3.24	23.52± 4.26	1.21± 0.35
Control group	56	14d postoperation	45.71± 5.02	25.40± 3.61	23.35± 4.13	1.10± 0.41
<i>P</i>			0.004	0.001	0.890	0.021
Observation group	60	1 month postoperation	65.18± 5.23	36.75± 3.81	23.38± 4.07	1.92± 0.48
Control group	56	1 month postoperation	53.24± 4.93	29.13± 3.62	23.16± 3.92	1.24± 0.50
<i>P</i>			0.000	0.001	0.775	0.002

血液回流,增加肺活量,改善组织氧合和肺功能,有利于减少肌肉丢失及增加合成代谢,促进胃肠蠕动,加快胃肠道功能的恢复^[22,23]。

虽然当前外伤性脾破裂的死亡率与致残率比较高,但外科性脾切除对外伤性脾破裂能有效降低死亡率与致残率,延长患者的存活时间^[24]。相关研究也显示脾脏全切术或者修补后患者 T 淋巴细胞水平可出现显著下降,容易诱发患者死亡,也会增加感染发生率^[25]。有研究显示当脾切除术后,患者的 5 年生存率比较低^[26]。目前常用的保脾手术包括脾动脉栓塞术、脾修补术、自体脾脏移植术等^[27]。本研究显示观察组术后 14 天的白细胞与血小板含量均显著高于术前 1d,且血小板含量显著低于对照组,表明脾动脉介入栓塞术能有效改善患者的脾功能,并且也有利于机体白细胞与血小板的恢复,从而促进患者康复。脾脏是一个重要的免疫器官,全脾切除的患者其免疫功能有改变,不利于患者康复^[28-30]。本研究结果显示观察组术后 14d 与术后 1 个月的 CD4⁺/CD8⁺、CD4⁺、CD3⁺ 值均明显高于对照组,表明脾动脉介入栓塞术的应用能促进患者免疫功能的恢复。

综上所述,脾动脉介入栓塞治疗外伤性脾破裂能提高临床治疗效果,减少术后并发症,并促进患者免疫功能的恢复。

参考文献(References)

- [1] Montana L, Genser L, Cortes A, et al. Gastrosplenic Fistula with Gastrointestinal Bleeding: a Rare and Potentially Fatal Complication After Sleeve Gastrectomy[J]. *Obes Surg*, 2018, 28(7): 2135-2139
- [2] Lindberg-Larsen V, Bandholm TQ, Zilmer CK, et al. Preoperative methylprednisolone does not reduce loss of knee-extension strength after total knee arthroplasty (A randomized, double-blind, placebo-controlled trial of 61 patients)[J]. *Acta Orthop*, 2017, 88(5): 543-549
- [3] Revishvili AS, Kriger AG, Gorin DS, et al. Endovascular procedures in pancreatic surgery[J]. *Khirurgiia (Mosk)*, 2018, 8(4): 4-16
- [4] Petersen PB, Jørgensen CC, Kehlet H, et al. Delirium after fast-track hip and knee arthroplasty - a cohort study of 6331 elderly patients[J]. *Acta Anaesthesiol Scand*, 2017, 61(7): 767-772
- [5] Wang WT, Li YY, Lin WC, et al. Bilateral visual loss and cerebral infarction after spleen embolization in a trauma patient with idiopathic thrombocytopenic purpura: A case report [J]. *Medicine (Baltimore)*, 2018, 97(16): e0332
- [6] Jørgensen CC, Pitter FT, Kehlet H, et al. Safety aspects of preoperative high-dose glucocorticoid in primary total knee replacement [J]. *Br J Anaesth*, 2017, 119(2): 267-275
- [7] Wu YJ, Wang SH, Elsarawy AM, et al. Prediction of the Development of Persistent Massive Ascites After Living Donor Liver Transplantation Using a Perioperative Risk Score[J]. *Transplantation*, 2018, 102(6): e275-e281
- [8] Lindberg-Larsen V, Ostrowski SR, Lindberg-Larsen M, et al. The effect of pre-operative methylprednisolone on early endothelial damage after total knee arthroplasty: a randomised, double-blind, placebo- controlled trial[J]. *Anaesthesia*, 2017, 72(10): 1217-1224
- [9] Lindberg-Larsen M, Pitter FT, Voldstedlund M, et al. Microbiological diagnosis in revision of infected knee arthroplasties in Denmark[J]. *Infect Dis (Lond)*, 2017, 49(11-12): 824-830
- [10] Li J, You N, Deng C, et al. Use of Iodized Oil and Gelatin Sponge Embolization in Splenic Artery Coiling Reduces Bleeding from Laparoscopic Splenectomy for Cirrhotic Portal Hypertension Patients with Complicating Hypersplenic Splenomegaly: A Comparative Study[J]. *J Laparoendosc Adv Surg Tech A*, 2018, 28(6): 713-720
- [11] Miró M, Farran L, Estremiana F, et al. Does gastric conditioning decrease the incidence of cervical oesophagogastric anastomotic leakage?[J]. *Cir Esp*, 2018, 96(2): 102-108
- [12] Shetiwy M, Fady T, Shahatto F, et al. Standardizing the Protocols for Enhanced Recovery From Colorectal Cancer Surgery: Are We a Step Closer to Ideal Recovery?[J]. *Ann Coloproctol*, 2017, 33(3): 86-92
- [13] Fang Y, Han X, Liu L, et al. Diagnosis and treatment efficacy of digital subtraction angiography and transcatheter arterial embolization in post-pancreatectomy hemorrhage: A single center retrospective cohort study[J]. *Int J Surg*, 2018, 3(51): 223-228
- [14] Hadjipavlou M, Grouse E, Gray R, et al. Managing penetrating renal trauma: experience from two major trauma centres in the UK[J]. *BJU Int*, 2018, 121(6): 928-934
- [15] Haugan K, Johnsen LG, Basso T, et al. Mortality and readmission following hip fracture surgery: a retrospective study comparing conventional and fast-track care[J]. *BMJ Open*, 2017, 7(8): e015574
- [16] Tiippana E, Hamunen K, Heiskanen T, et al. New approach for treatment of prolonged postoperative pain: APS Out-Patient Clinic[J]. *Scand J Pain*, 2016, 7(12): 19-24
- [17] Achilli P, Guttadauro A, Bonfanti P, et al. Streptococcus agalactiae infective endocarditis complicated by multiple mycotic hepatic aneurysms and massive splenic infarction: a case report [J]. *BMC Gastroenterol*, 2017, 17(1): 170

- Ankle Inversion Angle and Moment During Single-Leg Landing: Implications in the Prevention of Lateral Ankle Sprains[J]. *Journal of sport rehabilitation*, 2017, 26(6): 530-535
- [10] Fuglsang EI, Telling AS, Sørensen H, et al. Effect of Ankle Mobility and Segment Ratios on Trunk Lean in the Barbell Back Squat[J]. *Journal of strength and conditioning research*, 2017, 31(11): 3024-3033
- [11] Ryu YA, Jin M, Kang N, et al. Histological, Physical Studies after Xenograft of Porcine Ear Cartilage[J]. *Arch Craniofac Surg*, 2017, 18(3): 155-161
- [12] Brorsson A, Willy RW, Tranberg R, et al. Heel-Rise Height Deficit 1 Year After Achilles Tendon Rupture Relates to Changes in Ankle Biomechanics 6 Years After Injury[J]. *The American journal of sports medicine*, 2017, 45(13): 3060-3068
- [13] Akin D, Ozmen S, Yilmaz ME, et al. Hyaluronic Acid as a New Biomarker to Differentiate Acute Kidney Injury From Chronic Kidney Disease[J]. *Iran J Kidney Dis*, 2017, 11(6): 409-413
- [14] Meza-Morelos D, Fernandez-Maestre R. Caffeine and glucosamine mobility shifts by adduction with 2-butanol depended on interaction energy, charge delocalization, and steric hindrance in ion mobility spectrometry[J]. *Journal of mass spectrometry*, 2017, 52(12): 823-829
- [15] Passalacqua LFM, Jimenez RM, Fong JY, et al. Allosteric Modulation of the Faecalibacterium prausnitzii Hepatitis Delta Virus-like Ribozyme by Glucosamine 6-Phosphate: The Substrate of the Adjacent Gene Product[J]. *Biochemistry*, 2017, 56(45): 6006-6014
- [16] Steinberg N, Waddington G, Adams R, et al. Use of a Textured Insole to Improve the Association Between Postural Balance and Ankle Discrimination in Young Male and Female Dancers [J]. *Med Probl Perform Art*, 2015, 30(4): 217-223
- [17] Liu X, Brock KE, Brennan-Speranza TC. et al. Comment on Association between serum osteocalcin and body mass index: a systematic review and meta-analysis[J]. *Endocrine*, 2017, 58(3): 595-596
- [18] Berger PK, Pollock NK, Laing EM, et al. Zinc Supplementation Increases Procollagen Type 1 Amino-Terminal Propeptide in Premenarcheal Girls: A Randomized Controlled Trial[J]. *The Journal of nutrition*, 2015, 145(12): 2699-2704
- [19] Sun R, Wang J, Zheng Y, et al. Traditional Chinese medicine baixin decoction improves cardiac fibrosis of rats with dilated cardiomyopathy[J]. *Exp Ther Med*, 2017, 13(5): 1900-1906
- [20] Kang SJ, Choi BR, Kim SH, et al. nti-climacterium effects of pomegranate concentrated solutions in ovariectomized ddY mice[J]. *Exp Ther Med*, 2017, 13(4): 1249-1266

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- [18] Dong SL, Chen X, Tu ZX, et al. Aneurysm of the Anomalous Splenic Artery Arising from Superior Mesenteric Artery Treated by Coil Embolization: A Report of Two Cases and Literature Review[J]. *Ann Vasc Surg*, 2018, 48(251): e5-251.e10
- [19] Zoremba M, Kommann D, Vojnar B, et al. Recovery and prediction of postoperative muscle power - is it still a problem? [J]. *BMC Anesthesiol*, 2017, 17(1): 108
- [20] Venturini M, Marra P, Colombo M, et al. Endovascular Repair of 40 Visceral Artery Aneurysms and Pseudoaneurysms with the Viabahn Stent-Graft: Technical Aspects, Clinical Outcome and Mid-Term Patency[J]. *Cardiovasc Intervent Radiol*, 2018, 41(3): 385-397
- [21] Han K, Kim MD, Diffley M, et al. Safety and effectiveness of transarterial embolization for splenic artery hemorrhage in patients undergoing radical gastrectomy[J]. *Acta Radiol*, 2018, 59(8): 939-945
- [22] Akhtar MI, Sharif H, Hamid M, et al. Fast Track Extubation In Adult Patients On Pump Open Heart Surgery At A Tertiary Care Hospital [J]. *J Ayub Med Coll Abbottabad*, 2016, 28(4): 639-643
- [23] Alamri Y, Moon D, Yen DA, et al. Ten-year experience of splenic trauma in New Zealand: the rise of non-operative management [J]. *N Z Med J*, 2017, 130(1463): 11-18
- [24] Philips CA, Kumar L, Augustine P. Partial splenic artery embolization for severe hepatic myelopathy in cirrhosis [J]. *Hepatology*, 2018, 67(3): 1169-1171
- [25] Rao JH, Zhang F, Lu H, et al. Effects of multimodal fast-track surgery on liver transplantation outcomes [J]. *Hepatobiliary Pancreat Dis Int*, 2017, 16(4): 364-369
- [26] Ologun G, Sharpton K, Granet P. Successful use of resuscitative endovascular balloon occlusion of the aorta in the treatment of ruptured 8.5-cm splenic artery aneurysm[J]. *J Vasc Surg*, 2017, 66(6): 1873-1875
- [27] Seeber GH, Wijnen A, Lazovic D, et al. Effectiveness of rehabilitation after a total hip arthroplasty: a protocol for an observational study for the comparison of usual care in the Netherlands versus Germany[J]. *BMJ Open*, 2017, 7(8): e016020
- [28] Rasuli P, Moosavi B, French GJ, et al. Splenic Artery Embolization in Blunt Trauma: A Single-Center Retrospective Comparison of the Use of Gelatin Sponge Versus Coils[J]. *AJR Am J Roentgenol*, 2017, 209(6): W382-W387
- [29] Rana SS, Kumar A, Lal A, et al. Safety and efficacy of angioembolisation followed by endoscopic ultrasound guided transmural drainage for pancreatic fluid collections associated with arterial pseudoaneurysm[J]. *Pancreatology*, 2017, 17(5): 658-662
- [30] Senturk JC, Kristo G, Gold J, et al. The Development of Enhanced Recovery After Surgery Across Surgical Specialties [J]. *J Laparoendosc Adv Surg Tech A*, 2017, 27(9): 863-870