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综合体温管理对老年肺癌患者凝血功能、失血量 及早期认知功能的影响研究 *

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摘要 目的:观察综合体温管理对老年肺癌患者凝血功能、失血量及早期认知功能的影响。**方法:**148 例老年肺癌手术患者随机分为观察组(n=74)与对照组(n=74)。对照组予常规管理,观察组予综合体温管理。观察两组术前(t1)、开胸后(t2)、冲洗前(t3)、冲洗后(t4)、关胸后(t5)的鼻咽温度、肛门温度和血氧饱和度;术前、手术 30 min、术后即刻凝血功能指标;术中、术后 1d、术后 2d 失血量;术前术后认知功能评分;麻醉恢复期寒战及术后感染发生率。**结果:**t1、t2 时,两组鼻咽温度、肛门温度、血氧饱和度差异无统计学意义($P>0.05$)。t3、t4、t5 时,观察组鼻咽温度、肛门温度、血氧饱和度均高于对照组,差异有统计学意义($P<0.05$)。手术 30 min、术后,两组凝血酶原时间(PT)、活化部分凝血活酶时间(APTT)、凝血酶时间(TT)等凝血功能指标均降低,观察组 PT、APTT、TT 等凝血功能指标均低于对照组,差异有统计学意义($P<0.05$)。观察组术中、术后 1d、术后 2d 失血量均分别低于对照组,差异有统计学意义($P<0.05$)。观察组术后认知功能评分高于对照组,差异有统计学意义($P<0.05$)。观察组麻醉恢复期寒战发生率 8.11%低于对照组 27.03%,差异有统计学意义($P<0.05$),术后感染率 4.05%低于对照组 16.22%,差异有统计学意义($P<0.05$)。**结论:**综合体温管理可有效维持老年肺癌患者术中正常核心体温,维持血液、神经等系统的正常生理功能,提高患者术后早期认知功能,降低围术期风险。

关键词:体温;综合管理;肺癌;凝血功能;失血量;认知功能

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Effect of General Management of Body Temperature on Coagulation Function, Blood Loss Volume and Early Cognitive Function of Senile Patients with Lung Cancer*

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ABSTRACT Objective: To observe the effect of general management of body temperature on coagulation function, blood loss volume and early cognitive function of senile patients with lung cancer. **Methods:** A total of 148 senile patients with lung cancer were randomly divided into control group (n=74) and observation group (n=74). The control group was given routine management, and the observation group was given general management of body temperature. The nasopharynx temperature, anus temperature and oxyhemoglobin saturation were observed before (t1) and after (t2) operation, before (t3) and after (t4) irrigation, and after closing the chest(t5); the coagulation functional indicators were recorded before operation, at 30min of operation and after operation; The blood loss volume was recorded during the operation, d1 and d2 after operation and cognitive function scores before and after operation were also recorded; the shiver during anesthesia recovery period and occurrence rate of postoperative infection of the two groups were observed. **Results:** There were no statistical differences in nasopharynx temperature, anus temperature and oxyhemoglobin saturation at t1 and t2 between the two groups ($P>0.05$). The nasopharynx temperature, anus temperature and oxyhemoglobin saturation of patients in the observation group at t3, t4 and t5 were higher than those in the control group, and the difference was statistically significant ($P<0.05$). The coagulation functional indicators such as prothrombin time (PT), activated partial thromboplastin time (APTT) and thrombin time (TT) of the two groups decreased 30 min during operation and after operation, and the above indexes in the observation group were lower than those in the control group ($P<0.05$). Blood loss volume of the observation group during operation, d1 after operation and d2 after operation was lower than that in the control group, and the difference was statistically significant ($P<0.05$). The cognitive function score of the observation group was higher than that of the control group, and the difference was statistically significant ($P<0.05$). The occurrence rate of shiver(8.11%) during anesthesia recovery period and postoperative infection rate(4.05%) in the observation group were lower than those(27.03% and 16.22%) in the control group, and the difference was statistically significant($P<0.05$). **Conclusion:** General management of intraoperative temperature can effectively maintain the intra-operative normal core body temperature and the normal

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physiological functions of blood system and nervous system of senile patients with lung cancer, enhance their early postoperative cognitive function, and reduce the risks during perioperative period.

Key words: Body temperature; General management; Lung cancer; Coagulation function; Blood Loss Volume ;Cognitive function

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前言

恒定的体温是人体新陈代谢正常进行的保证,围术期低体温常易导致患者机体代谢紊乱,引发严重寒战、出血量大、苏醒延迟、心律失常、免疫功能降低等不良反应,部分患者甚至出现心功能损害,严重影响手术操作及患者预后^[1,2]。肺癌根治术是临床治疗肺癌的重要手段,且患者多为老年人。由于老年人生理机能衰退,术中更易发生低体温^[3]。资料显示,老年肺癌患者围术期低体温发生率高达 90%,如果不能维持其正常的核心体温,往往给患者带来较大的风险^[4]。在既往研究中,对于老年肺癌术中保温措施的影响多倾向于单项目的研究,本研究试图通过对凝血功能、失血量以及术后早期认知功能等多目标的联合考察研究术中综合体温管理对老年肺癌患者的影响。报道如下。

1 资料与方法

1.1 临床资料

选取 2014 年 12 月~2016 年 11 月于我院行肺癌根治术的老年肺癌患者 148 例,纳入标准:① ASA 分级为 II 级或 III 级患者;② 术前基础体温正常患者;③ 无放化疗史患者;④ 手术耐受患者;⑤ 签订知情同意书患者;⑥ 未使用抗生素、激素及免疫调节类药物患者。排除标准:① 心、肝、肾等脏器重大疾病患者;② 并发其他癌症患者;③ 存在放化疗史患者;④ 反复感染患者;⑤ 拒绝签署知情同意书者。其中男性 82 例,女性 66 例,年龄 60~79 岁,平均年龄(68.76±7.49)岁。病理分型:腺癌 102 例,鳞癌 28 例,鳞腺癌 13 例,其他 5 例。病灶分期:I 期 66 例,II 期 57 例,III 期 25 例。病灶部位:右上肺 33 例,右中肺 26 例,右下肺 15 例,左上肺 28 例,左下肺 46 例。ASA 分级:II 级 63 例,III 级 85 例。将 148 例患者按照随机数字表法分为观察组(n=74)与对照组(n=74),其中观察组男 42 例,女 32 例,年龄 60~78 岁,平均(68.64±7.41)岁,病理分型:腺癌 52 例,鳞癌 13 例,鳞腺癌 7 例,其他 2 例,病灶分期:I 期 31 例,II 期 29 例,III 期 14 例,病灶部位:右上肺 16 例,右中肺 14 例,右下肺 7 例,左上肺 13 例,左下肺 24 例,ASA 分级:II 级 33 例,III 级 41 例;对照组男 40 例,女 34 例,年龄 61~79 岁,平均(68.82±7.54)岁,病理分型:腺癌 50 例,鳞癌 15 例,鳞腺癌 6 例,其他 3 例,病灶分期:I 期 35 例,II 期 28 例,III 期 11 例,病灶部位:右上肺 17 例,右中肺 12 例,右下肺 8 例,左上肺 15 例,左下肺 22 例,ASA 分级:II 级 30 例,III 级 44 例。两组性别、年龄、病理分型、病灶分期、病灶部位、ASA 分级资料比较差异无统计学意义($P>0.05$),临床资料均有均衡可比性。

1.2 方法

两组患者均行开胸肺癌根治术。对照组行常规管理。保证手术室内温度为 22℃~25℃,维持湿度为 40%~60%,避免患者

躯体过多暴露,以毛毯、棉被等覆盖非手术裸露部位。观察组在对照组基础上予体温综合管理。体温综合管理措施:提前将输注液体与血液制品置于保温箱内,保温箱温度设置为 37℃;术中以加温毯加温,维持加温毯温度 38℃~42℃;加温冲洗液至 37℃;擦洗液加温至 38℃~40℃;术中以热盐水(38℃)间断冲洗胸腔。

1.3 观察指标

观察两组术前(t1)、开胸后(t2)、冲洗前(t3)、冲洗后(t4)、关胸后(t5)的鼻咽温度、肛门温度、血氧饱和度;术前、手术 30 min、术后即刻凝血酶原时间(PT)、活化部分凝血活酶时间(APTT)、凝血酶时间(TT)等凝血功能指标;术中、术后 1d、术后 2d 失血量;术前术后认知功能评分^[5];麻醉恢复期寒战及术后感染发生率。鼻咽温度、肛门温度以体温监测探头检测。血氧饱和度以心电监护仪检测。PT、APTT、TT 等凝血功能指标以 Sysmex CA-7000 全自动血液凝固分析仪检测。失血量以引流量/敷料重量测定法测定。认知功能评分依据 Loewenstein 认知功能评定量表进行评价。

1.4 统计学处理

以 SPSS 19.0 统计软件进行数据分析,定量资料以均数±标准差($\bar{x}\pm s$)描述,组内比较行配对 t 检验,组间比较行独立样本 t 检验;定性资料以例数结合率描述,组间比较行 χ^2 检验。检验水准 α 为 0.05。

2 结果

2.1 两组围术期不同时间鼻咽温度、肛门温度、血氧饱和度

t1、t2 时,两组鼻咽温度、肛门温度、血氧饱和度差异均无统计学意义($P>0.05$);t3、t4、t5 时,观察组鼻咽温度、肛门温度、血氧饱和度均高于对照组,差异均有统计学意义($P>0.05$),见表 1。

2.2 两组术前、手术 30 min、术后 PT、APTT、TT 凝血功能指标

两组术前 PT、APTT、TT 等凝血功能指标差异均无统计学意义($P>0.05$);手术 30 min、术后,观察组 PT、APTT、TT 等凝血功能指标均低于对照组,差异均有统计学意义($P<0.05$)。见表 2。

2.3 两组术中、术后 1d、术后 2d 失血量情况

观察组术中、术后 1d、术后 2d 失血量均低于对照组,差异均有统计学意义($P<0.05$)。见表 3。

2.4 两组术前术后认知功能评分比较

两组术前认知功能评分差异无统计学意义($P>0.05$)。观察组术后认知功能评分高于对照组,差异均有统计学意义($P<0.05$),见表 4。

2.5 两组麻醉恢复期寒战及术后感染发生率情况

观察组麻醉恢复期寒战发生率 8.11%低于对照组寒战发生率 27.03%,差异有统计学意义($P<0.05$)。观察组术后感染率

表 1 两组围术期不同时间鼻咽温度、肛门温度、血氧饱和度比较($\bar{x} \pm s$)
Table 1 Comparison of nasopharynx temperature, anus temperature and oxyhemoglobin saturation
at different time during perioperative period of two groups($\bar{x} \pm s$)

Groups	Indexes	t1	t2	t3	t4	t5
Observation group (n=74)	Nasopharyngeal temperature(°C)	36.52± 0.41 ^a	36.38± 0.39 ^a	36.22± 0.37 ^b	36.21± 0.36 ^b	36.31± 0.38 ^b
	Anus temperature (°C)	36.91± 0.66 ^a	36.67± 0.63 ^a	36.53± 0.61 ^b	36.44± 0.58 ^b	36.56± 0.61 ^b
	Oxyhemoglobin saturation(%)	98.54± 1.92 ^a	97.06± 1.98 ^a	97.39± 1.99 ^b	97.64± 2.18 ^b	97.82± 2.04 ^b
Control group (n=74)	Nasopharyngeal temperature(°C)	36.51± 0.40	36.08± 0.35	35.36± 0.32	35.22± 0.27	35.35± 0.30
	Anus temperature (°C)	36.90± 0.65	36.54± 0.61	36.01± 0.58	35.87± 0.59	35.79± 0.58
	Oxyhemoglobin saturation(%)	98.53± 1.91	96.91± 1.86	95.04± 1.75	94.89± 1.70	95.10± 1.84

Notes: Compared with the control group, ^a $p>0.05$, ^b $p<0.05$.

表 2 两组术前、手术 30 min、术后凝血功能指标比较($\bar{x} \pm s$)
Table 2 Comparison of coagulation functional indexes of two groups before operation, at 30 min during operation and after operation($\bar{x} \pm s$)

Groups	Indexs	Before operation	Postoperative 30 min	After operation
Observation group(n=74)	PT(s)	12.28± 1.19 ^a	12.6± 1.22 ^b	12.83± 1.24 ^b
	APTT(s)	34.09± 1.42 ^a	34.77± 1.76 ^b	35.83± 2.03 ^b
	TT(s)	17.79± 1.76 ^a	18.92± 1.93 ^b	19.11± 2.18 ^b
Control group(n=74)	PT(s)	12.27± 1.18	15.87± 1.62	18.28± 1.83
	APTT(s)	34.07± 1.41	40.82± 2.29	44.02± 4.18
	TT(s)	17.78± 1.75	22.36± 2.16	25.02± 2.41

Notes: Compared with the control group, ^a $P>0.05$, ^b $P<0.05$.

表 3 两组失血量比较($\bar{x} \pm s$)
Table 3 Comparison of blood loss volume between the two groups

Groups	During operation(mL)	Postoperative d1(mL)	Postoperative d2(mL)
Observation group(n=74)	329.73± 33.29	54.92± 5.35	31.82± 3.18
Control group(n=74)	471.82± 47.21	86.97± 8.72	50.21± 5.28
t	41.980	26.950	25.666
P	0.000	0.000	0.000

表 4 两组认知功能评分比较($\bar{x} \pm s$)
Table 4 Comparison of cognitive function score between the two groups($\bar{x} \pm s$)

Groups	Before operation	After operation
Observation group(n=74)	29.76± 2.89	29.24± 2.86
Control group(n=74)	29.75± 2.87	27.43± 2.73
t	0.021	3.938
P	0.983	0.000

4.05%低于对照组 16.22%,差异有统计学意义($P<0.05$)。见表 5。

3 讨论

低体温是老年肺癌术中较为常见的并发症^[6]。临床资料显示,术中低体温常导致核心体温降低、凝血功能障碍、失血量增

加、认知功能降低、术后感染率增加等不良事件^[7,8]。导致老年肺癌术中低体温的因素主要有:①环境温度低^[9];②手术操作时间长,患者肢体、内脏暴露面积大、时间长^[10];③术中大量补液^[11];④灌注液、冲洗液、擦洗液的使用^[12];⑤全麻可导致体温调节中枢抑制,机体体温自动调节能力降低^[13]。⑥麻醉药物可引发血

表 5 两组麻醉恢复期寒战及术后感染发生率比较[n(%)]

Table 5 Comparison of shiver during anesthesia recovery period and incidence rate of postoperative infection between the two groups[n(%)]

Groups	Shiver During Anesthesia Recovery Period[n(%)]	Postoperative infection[n(%)]
Observation group(n=74)	6(8.11)	3(4.05)
Control group(n=74)	20(27.03)	12(16.22)
t	9.145	6.009
P	0.003	0.014

管扩张,血流速度降低,体温丢失量大。肌松药导致肌肉松弛,肌肉产生热量速度降低^[14];②老年人身体机能降低,体温调节水平差^[15]。正是因为导致老年术中低体温的因素较为复杂,故采取单纯的保温措施难以维持患者体温^[16]。术中体温综合管理是针对上述因素制定的低体温综合性管理措施,可有效维持患者核心体温的稳定^[17]。Yamasaki H^[18]研究证明,亚体温治疗可有效维持根治性食管癌手术患者核心体温,降低术中低体温发生率。徐乐等^[19]发现,术中保温可维护体温恒定,对凝血功能无显著影响。在本研究中,t3、t4、t5 时综合管理组鼻咽温度、肛门温度、血氧饱和度均高于常规组,其麻醉恢复期寒战发生率低于常规组,与上述研究一致,提示综合体温管理对于维持患者核心体温具有重要作用。

研究证明,术中体温降低可对血小板、纤溶系统及凝血级联反应产生影响,进而影响凝血功能^[20]。刘芹凤等^[21]证明,低体温可降低活化凝血因子酶活性,延长 PT、APTT 和 TT,抑制凝血级联反应。低体温可抑制血小板的变形能力,减少血小板数量,降低血小板释放、聚集功能。低体温还可抑制血小板产生血栓烷 B2,抑制血小板聚集并导致血栓形成^[22]。低体温还可促进外周血管收缩,抑制血浆内纤维蛋白原渗出,促进生成冷沉淀纤维蛋白原,增加血液黏稠度,致使凝血功能紊乱^[23]。此外,低体温还可损伤肝功能,影响凝血因子正常分泌,导致凝血功能障碍^[24]。在本研究中,手术 30 min、术后观察组 PT、APTT 和 TT 等凝血功能指标及术中、术后 1d、术后 2d 失血量均小于对照组,与上述研究一致,提示综合体温管理可维持患者体温恒定,降低对凝血功能的影响,减少失血量。研究证明,机体温度降低可提高血红蛋白的氧亲和力,氧气难以释放至脑组织细胞,导致细胞缺氧。低体温还可减慢心率,降低心输出量,影响大脑血流灌注,导致脑神经细胞氧供应不足,致使神经中枢认知信息障碍,降低认知功能^[25]。施灵丹等^[26]认为,低体温可导致神经中枢损伤,导致早期认知功能障碍。杨春要等^[27]研究证明,主动保温可有效缩短患者术后清醒时间,提高患者术后早期认知功能。李荆钟等^[28]研究发现,系统性保温措施可改善术后血清神经元特异性烯醇化酶及 S-100 β 蛋白,改善患者术后认知功能。在本研究中,观察组术后认知功能评分显著高于对照组,提示综合体温管理可有效避免低体温对大脑血流灌注的影响,维护神经中枢正常功能的发挥。此外,低体温可通过影响血流动力学,降低创口血液供应及氧合能力,在抑制胶原合成的同时促进消耗蛋白质,从而增加创口的感染风险^[29,30]。在本研究中,观察组术后感染率显著低于对照组,说明术中体温综合管理可有效维持患者体温,促进血流动力学稳定,减少术后感染的发生。

在既往研究中,对于术中低体温管理对老年肺癌手术患者

的影响多倾向于单项指标的研究,本研究通过对凝血功能、术后早期认知功能等指标的研究发现,术中核心体温的降低可对老年患者血液、神经等系统产生较大的影响,综合体温管理可有效维持老年肺癌患者术中核心体温,维持血液、神经等系统的正常生理功能,避免发生围术期风险。总之,术中体温综合管理可有效维持老年肺癌手术患者核心体温及正常凝血功能,减少失血量,提高患者术后早期认知功能,降低手术风险,促进患者康复,值得应用于临床。

参考文献(References)

- [1] Sun Z, Honar H, Sessler DI, et al. Intraoperative core temperature patterns, transfusion requirement, and hospital duration in patients warmed with forced air[J]. *Anesthesiology*, 2015, 122(2): 276-285
- [2] Han SB, Gwak MS, Choi SJ, et al. Risk factors for inadvertent hypothermia during adult living-donor liver transplantation [J]. *Transplant Proc*, 2014, 46(3): 705-708
- [3] 徐彦,陈茜,陆建平,等.术后苏醒室低体温发生率及危险因素[J].*复旦学报(医学版)*, 2016, 43(3): 302-307
Xu Yan, Chen Xi, Lu Jian-ping, et al. Incidence and risk factors of hypothermia in post anesthesia care unit[J]. *Fudan University Journal of Medical Sciences*, 2016, 43(3): 302-307
- [4] 赵敏,赵力,王忠慧.术中轻度低温对老年肺癌患者术后早期认知功能的影响[J].*昆明医科大学学报*, 2013, 34(5):123-127
Zhao Min, Zhao Li, Wang Zhong-hui, et al. Effects of Mild Hypothermia Undergoing Surgery on Early Postoperative Cognitive Dysfunction in Elderly Patients with Lung Cancer [J]. *Journal of Kunming Medical University*, 2013, 34(5): 123-127
- [5] 王玉龙. 康复功能评定学[M].北京:人民卫生出版社, 2008: 295-296
Wang Yu-long. *Rehabilitation function assessment* [M]. Beijing: People's Medical Publish House, 2008: 295-296
- [6] 谢言虎,陈旭,吴运香,等.术中低体温危险因素分析[J].*临床麻醉学杂志*, 2016, 32(9): 925-927
Xie Yan-hu, Chen Xu, Wu Yun-xiang, et al. Analysis of risk factors of intraoperative hypothermia [J]. *The Journal of Clinical Anesthesiology*, 2016, 32(9): 925-927
- [7] Scott AV, Stonemetz JL, Wasey JO, et al. Compliance with surgical care improvement project for body temperature management (SCIP Inf-10) is associated with improved clinical outcomes [J]. *Anesthesiology*, 2015, 123(1): 116-125
- [8] Lauronen SL, Kalliomäki ML, Aho AJ, et al. Thermal suit in preventing unintentional intraoperative hypothermia during general anaesthesia: a randomized controlled trial [J]. *Acta Anaesthesiol Scand*, 2017, 61(9): 1133-1141
- [9] Brown MJ, Curry TB, Hyder JA, et al. Intraoperative hypothermia and

- surgical site infections in patients with class I/clean wounds: a case-control study[J]. *J Am Coll Surg*, 2017, 224(2): 160-171
- [10] Frisch NB, Pepper AM, Rooney E, et al. Intraoperative hypothermia in total hip and knee arthroplasty[J]. *Orthopedics*, 2017, 40(1): 56-63
- [11] Frisch NB, Pepper AM, Jildeh TR, et al. Intraoperative hypothermia during surgical fixation of hip fractures [J]. *Orthopedics*, 2016, 39(6): e1170-e1177
- [12] Fujita T, Okada N, Kanamori J, et al. Thermogenesis induced by amino acid administration prevents intraoperative hypothermia and reduces postoperative infectious complications after thoracoscopic esophagectomy[J]. *Dis Esophagus*, 2017, 30(1): 1-7
- [13] Stamos MJ. Lessons learned in intraoperative hypothermia: coming in from the cold[J]. *JAMA Surg*, 2015, 150(6): 575-576.
- [14] Yi J, Xiang Z, Deng X, et al. Incidence of inadvertent intraoperative hypothermia and its risk factors in patients undergoing general anesthesia in Beijing: a prospective regional survey [J]. *PLoS One*, 2015, 10(9): e0136136
- [15] 陈燕. 围麻醉手术期老年患者体温变化相关因素和策略分析[J]. *检验医学与临床*, 2014, 11(2): 266-267
Chen Yan. Analysis of related factors and Strategies of body temperature changes in elderly patients undergoing perioperative anesthesia[J]. *Laboratory Medicine and Clinic*, 2014, 11(2): 266-267
- [16] 张瑛, 李金娜, 白莉平. 综合保温措施预防老年患者前列腺电切手术期低体温的研究[J]. *山西医科大学学报*, 2015, 46(5): 492-494
Zhang Ying, Li Jin-na, Bai Li-ping. Study on the effects of comprehensive thermal insulation measures on perioperative hypothermia in senile patients undergoing transurethral resection[J]. *Journal of Shanxi Medical University*, 2015, 46(5): 492-494
- [17] 章敏, 谢言虎, 周玲, 等. 充气式保温毯联合输液加温对全麻食管癌手术苏醒和免疫功能的影响 [J]. *临床麻醉学杂志*, 2016, 32(4): 351-353
Zhang Min, Xie Yan-hu, Zhou Ling, et al. Effect of forced-air warming system combined with infusion heating technology on recovery quality and cellular immune [J]. *The Journal of Clinical Anesthesiology*, 2016, 32(4): 351-353
- [18] Yamasaki H, Tanaka K, Funai Y, et al. The impact of intraoperative hypothermia on early postoperative adverse events after radical esophagectomy for cancer: a retrospective cohort study [J]. *J Cardiothorac Vasc Anesth*, 2014, 28(4): 955-959
- [19] 徐乐, 周军. 术中保温对妇科手术患者术中体温变化及凝血功能的影响[J]. *中国妇幼保健*, 2015, 30(13): 2109-2111
Xu Le, Zhou Jun. Effect of intraoperative warming on temperature change and coagulation function in patients undergoing gynecological surgery [J]. *Maternal and Child Health Care of China*, 2015, 30(13): 2109-2111
- [20] 黄晶. 围术期保温干预对老年腹腔镜直肠癌根治术患者凝血功能的影响[J]. *中国老年学杂志*, 2014, 34(17): 4842-4843
Huang Jing. Effect of perioperative thermal intervention on coagulation function in elderly patients undergoing laparoscopic radical resection of rectal carcinoma [J]. *Chinese Journal of Gerontology*, 2014, 34(17): 4842-4843
- [21] 刘芹凤. 围手术期保温策略对行腹腔镜直肠癌根治术老年患者凝血功能的意义[J]. *中国医师进修杂志*, 2014, 37(26): 54-57
Liu Qin-feng. Significance of perioperative warming strategy on coagulation function in elderly patients undergoing laparoscopic radical resection of rectal cancer[J]. *Chinese Journal of Postgraduates of Medicine*, 2014, 37(26): 54-57
- [22] 荀全霞. 手术室术中保温干预对老年股骨骨折患者出血量、体温及术后凝血功能的影响[J]. *血栓与止血学*, 2017, 23(3): 501-503
Gou Quan-xia. Effects of Intraoperative heat Preservation Intervention in Operating room on Blood Loss Volume, body Temperature and Postoperative Coagulation Function of Elderly Patients with Femoral Fracture[J]. *Chinese Journal of Thrombosis and Hemostasis*, 2017, 23(3): 501-503
- [23] 李辉, 陈少军, 唐朝晖, 等. 多发伤患者低体温、酸中毒及凝血功能障碍临床研究[J]. *中华急诊医学杂志*, 2015, 24(3): 310-314
Li Hui, Chen Shao-jun, Tang Zhao-hui, et al. Clinical study of hypothermia, acidosis and coagulopathy in the patients with multiple trauma [J]. *Chinese Journal of Emergency Medicine*, 2015, 24(3): 310-314
- [24] 高劲谋. 严重肝脏损伤时为什么容易出现凝血障碍以及如何防治? [J]. *创伤外科杂志*, 2016, 18(9): 540-540
Gao Jin-mou. Why is it prone to coagulopathy and how to prevent and cure severe liver injury? [J]. *Journal of Traumatic Surgery*, 2016, 18(9): 540-540
- [25] Haseneder R, Kochs E, Jungwirth B, et al. Postoperative Cognitive Dysfunction: Possible Neuronal Mechanisms and Practical Consequences for Clinical Routine[J]. *Der Anaesthesist*, 2012, 61(5): 437-443
- [26] 施灵丹. 老年脊柱手术后早期认知功能障碍的因素分析[J]. *浙江创伤外科*, 2015, 20(2): 262-264
Shi Ling-dan. Analysis of early cognitive dysfunction in elderly patients after spinal surgery [J]. *Zhejiang Journal of Traumatic Surgery*, 2015, 20(2): 262-264
- [27] 杨春要, 冯艳平. 充气式保温毯对老年患者术后清醒时间及认知功能的影响[J]. *中国实用医刊*, 2014, 41(10): 83-84
Yang Chun-yao, Feng Yan-ping. Effect of inflatable blanket on postoperative awake time and cognitive function in elderly patients [J]. *Chinese Journal of Practical Medicine*, 2014, 41(10): 83-84
- [28] 李荆钟, 汪世高. 系统性保温对老年患者术后血清 S-100 β 蛋白、神经元特异性烯醇化酶的影响[J]. *中国医药导报*, 2013, 10(20): 80-81
Li Jing-zhong, Wang Shi-gao. Effects of perioperative systemic warming on S-100 β protein and neuron-specific enolase in elderly patients[J]. *China Medical Herald*, 2013, 10(20): 80-81
- [29] 张俊烁, 褚忠华. 不同术中保温对开腹手术患者低体温及手术部位感染的影响[J]. *中国临床药理学杂志*, 2015, 31(18): 1834-1836
Zhang Jun-shuo, Chu Zhong-hua. Effect of different intraoperative insulation methods on hypothermia and surgical site infection in patients with gastrointestinal surgery [J]. *The Chinese Journal of Clinical Pharmacology*, 2015, 31(18): 1834-1836
- [30] Rittenberger JC, Callaway CW. Temperature management and modern post-cardiac arrest care [J]. *N Engl J Med*, 2013, 369(23): 2262-2263