·临床研究·

改良头低足高位对机器人辅助前列腺癌根治术后老年患者认知功能障碍的影响

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【摘 要】 **目的** 评估改良头低足高位与传统特伦德伦伯(氏)卧位(Trendelenburg)体位在机器人辅助腹腔镜前列腺癌根治术中对老年患者术后认知功能障碍的影响。**方法** 选取2019年6月至10月南京大学医学院附属鼓楼医院择期行机器人辅助腹腔镜前列腺癌根治术患者82例,其中行传统Trendelenburg体位摆放的患者40例(传统组),行改良头低足高位摆放的患者42例(改良组)。全身麻醉插管后,分别于建立气腹前(T_0)、气腹后10 min(T_1)、摆放体位后10 min(T_2)、摆放体位后60 min(T_3)及停气腹平卧后10 min(T_4)记录脑氧饱和度(rSO_2)、同时于术前1 d进行迷你精神状态检查(MMSE),并通过MMSE评分量表于术后第1、3、7天进行术后神经认知评估。采用SPSS 18.0软件进行数据分析。组间比较采用t检验,组内比较采用重复测量方差分析。**结果** 2组患者在T_0和T_1时刻rSO_2比较,差异均无统计学意义(均$P>0.05$);传统组患者在T_2、T_3和T_4时刻rSO_2分别为(79±8)%、(80±9)%和(72±10)%,改良组患者分别为(71±6)%、(77±8)%和(69±9)%,差异均有统计学意义(均$P<0.05$)。2组患者在术前及术后第7天MMSE评分比较,差异均无统计学意义(均$P>0.05$);传统组患者术后第1、3天MMSE评分分别为(17.9±3.0)、(21.3±2.1)分,改良组分别为(24.6±2.0)、(25.2±2.2)分,差异均有统计学意义(均$P<0.05$)。**结论** 改良头低足高位能显著降低传统Trendelenburg体位带来的脑血流量增加,同时改善患者术后认知功能障碍。

【关键词】 老年人;改良头低足高位;特伦德伦伯(氏)卧位;机器人辅助手术;前列腺癌根治术;脑血流动力学
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Effect of modified Trendelenburg position on cognitive dysfunction after robot-assisted radical prostatectomy in the elderly

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【**Abstract**】 **Objective** To evaluate the effect of modified Trendelenburg position in contrast to conventional Trendelenburg position on postoperative cognitive dysfunction in the elderly patients undergoing robot-assisted laparoscopic radical prostatectomy. **Methods** A total of 82 patients who underwent elective robot-assisted laparoscopic radical prostatectomy were selected. Among them, 40 were placed in the conventional Trendelenburg position, and 42 in a modified Trendelenburg position. After intubation under general anesthesia, the cerebral oxygen saturation was recorded prior to pneumoperitoneum (T_0), 10 minutes after pneumoperitoneum (T_1), 10 minutes after posture (T_2), 60 minutes after posture (T_3), and 10 minutes after supine abdominal prone (T_4), and the mini-mental state examination was performed on the day before the operation, and the postoperative neurocognitive assessment was performed on day 1, 3, and 7 after the operation. SPSS statistics 18.0 was used for data analysis, t test was used for intergroup comparison, and variance analysis for intragroup comparison. **Results** There was no significant difference in rSO_2 between the two groups at T_0 and T_1 (all $P>0.05$). In the traditional group, cerebral oxygen saturation (rSO_2) at T_2, T_3 and T_4 was (79±8)%, (80±9)% and (72±10)%. In the modified posture group, rSO_2 at T_2, T_3 and T_4 was (71±6)%, (77±8)% and (69±9)%. The differences were statistically significant (all $P<0.05$). There was no significant difference in mini-mental state examination (MMSE) scores between the two groups before and 7 days after operation (all $P>0.05$). The MMSE scores of the conventional posture traditional group on the first and third day after operation were (17.9±3.0), (21.3±2.1) points. The MMSE scores of the modified posture group on the first and third day after operation were (24.6±2.0), (25.2±2.2) points. The difference was statistically significant (all $P<0.05$). **Conclusion** The modified Trendelenburg position can significantly reduce the increase of cerebral blood flow caused by the conventional Trendelenburg position, improving the mild impairment of postoperative cognitive function.

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【Key words】 eged; modified head-low-foot-high position; Trendelenburg; robot-assisted surgery; radical prostatectomy with prostate cancer; cerebral hemodynamics

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达芬奇手术机器人是目前最先进的机器人手术辅助系统,该系统融合诸多新兴学科,在微创技术的基础上将手术的精度可行性提高到一个新的高度,实现了外科手术微创化、智能化和数字化[1,2]。目前机器人手术在泌尿外科开展最广泛,尤其在机器人辅助腹腔镜前列腺癌根治术优势明显[3]。与此同时,随着机器人手术的不断普及和发展,人们也逐渐开始关注并研究机器人手术对机体呼吸、循环功能及脑血流动力学的影响。机器人前列腺癌根治手术由于其生理解剖特点,术中均需建立气腹和放置特伦德伦伯(氏)卧位(Trendelenburg) 30°体位,以利用重力作用使盆腔脏器向头侧移位来获得良好的视野[4]。气腹和 Trendelenburg 30°体位会对机体造成多方面影响,例如作为机体重要系统之一的中枢神经系统。已有研究证实机器人手术术中体外和气腹是导致眼压升高,脑氧饱和度(cerebral oxygen saturation,rSO_2)降低及颅内压的变化的重要影响因素[5]。针对此问题,我们提出了改良 Trendelenburg 体位,即先将床摇至头低足高 30°位,再将床背板抬高 20°,床背板与地面基本平行,患者呈中凹位。该改良体位与传统 Trendelenburg 体位相比,在保证手术顺利完成的前提下,能显著减少脑血流动力学变化,改善老年患者术后早期存在的轻度认知功能障碍,有助于提高老年患者总体护理满意度。

1 对象与方法

1.1 研究对象

选取 2019 年 6 月至 10 月南京大学医学院附属鼓楼医院泌尿外科择期行机器人辅助前列腺癌根治术老年患者 82 例。年龄 61~80 岁,体质量指数 18~25 kg/m^2,美国麻醉医师学会(American Society of Anesthesiologists, ASA)分级Ⅰ~Ⅲ级。传统组患者 40 例,年龄(65.1±2.2)岁,体质量(65.8±5.9)kg),行传统 Trendelenburg 体位放置;改良组患者 42 例,年龄(65.3±2.9)岁,体质量(65.7±4.7)kg,行改良头低足高位放置。

纳入标准:(1)年龄>60 岁;(2)术前无视觉、听觉障碍;(3)术前无精神障碍、认知功能障碍病史;(4)术前无脑部器质性病变,例如脑肿瘤、脑卒中等;(5)诊断为前列腺癌并行机器人前列腺癌根治手术者。

排除标准:合并有严重心血管系统疾病、慢性阻塞性肺病、严重肝肾功能不全、内分泌和代谢性疾病、中枢神经系统疾病、困难气道及既往有服用镇静药、抗抑郁药、抗焦虑药、药物或酒精依赖史患者。

1.2 方法

2 组患者麻醉方法相同,均由同一组手术及麻醉医师进行。入手术室后常规检测无创血压、心电图和脉搏氧饱和度,全身麻醉诱导所用药物相同,气管插管行机械通气,呼气末 CO_2 分压维持在 35~45 cmH_2O(1 cmH_2O=0.098 kPa)。双侧前额放置电极片,使用无创脑血氧饱和度监测仪监测 rSO_2,左侧桡动脉置管监测有创血压,右侧颈内静脉穿刺置管输液并监测中心静脉压力,监测鼻咽温度,利用加温装置保障体温升降在 1℃以内[6]。

建立气腹后,传统组行传统 Trendelenburg 体位(仰卧位,头低足高位约 30°),改良组改良头低足高位(头低足高 30°位,床背板抬高 20°,床背板与地面基本平行,患者呈中凹位)[7]。

1.3 评价指数

(1)rSO_2:2 组患者分别于建立气腹前(T_0)、气腹后 10 min(T_1)、摆放体位后 10 min(T_2)、摆放体位后 60 min(T_3)及停气腹平卧后 10 min(T_4)监测 rSO_2[8]。(2)所有患者在术前 1 d 均进行迷你精神状态检查(mini-mental state examination, MMSE),术后第 1、3、7 天均进行术后神经认知评估,所有神经认知测试均由经过专业训练的熟练护士进行,通过混淆评估方法确定术后神经状态,包括意识水平改变、思维混乱、注意力不集中和急剧精神变化伴有波动情况。最后结果汇总成 MMSE 评分,作为术后认知功能评估的客观指标[9]。

1.4 统计学处理

采用 SPSS 18.0 统计学软件进行数据分析。计量资料用均值±标准差($\bar{x}\pm s$)表示,组间比较采用 t 检验;组内比较采用重复测量方差分析。$P<0.05$ 为差异有统计学意义。

2 结 果

2.1 2 组患者一般资料比较

2 组患者年龄、身高、体质量、麻醉时间、手术时间、输液量、尿量和出血量比较,差异均无统计学意义(均 $P>0.05$;表 1)。

表1 2组患者一般资料比较

Table 1 Comparison of general data between two groups ($\bar{x}\pm s$)

Group	n	Age(years)	Weight(kg)	Height(cm)	Anesthesia time (min)	Operation time (min)	Blood loss (ml)	Liquid input (ml)	Urine output (ml)
Conventional posture	40	65.1±2.2	65.8±5.9	163.2±6.8	305.8±25.9	230.2±23.1	118.9±9.2	1 533.2±126.7	161.1±28.6
Modified posture	42	65.3±2.9	65.7±4.7	167.2±4.3	304.2±15.3	229.5±15.2	125.2±20.1	1 482.8±88.7	158.3±23.2

2.2 2组患者术前及术中不同时间段 rSO_2 比较

2组患者在 T_0 和 T_1 时刻 rSO_2 比较,差异均无统计学意义(均 $P>0.05$);2组患者在 $T_2\sim T_4$ 时刻 rSO_2 比较,差异均有统计学意义($P<0.05$;表2)。

表2 2组患者在不同时间点 rSO_2 比较

Table 2 Comparison of rSO_2 between two groups at different time points (%, $\bar{x}\pm s$)

Group	n	T_0	T_1	T_2	T_3	T_4
Conventional posture	40	65±7	74±6	79±8	80±9	72±10
Modified posture	42	66±5	70±3	71±6*	77±8*	69±9*

rSO_2: cerebral oxygen saturation. Compared with modified posture group, * $P<0.05$.

2.3 2组患者术前及术后不同时间点 MMSE 评分比较

2组患者术前及术后第7天 MMSE 评分比较,差异均无统计学意义(均 $P>0.05$);术后第1、3天 MMSE 评分比较,差异均有统计学意义(均 $P<0.05$;表3)。

3 讨 论

机器人辅助前列腺癌根治术中传统的头低足高位会导致老年患者脑血流动力学改变。随着医疗技术的发展,机器人辅助腹腔镜手术已逐渐成为泌尿外科,尤其是前列腺癌根治术的主要手术方式,相对于传统腹腔镜手术,由于机械臂的灵活性,手术效果得到了很大的提升[10]。机器人辅助前列腺癌根治术需要将患者置于头低位几个小时,并且 CO_2 气腹压力也会促使老年患者术中术后出现颅内压和眼压升高,静脉回流减少,中心静脉压增加,导致相应组织和脏器不同程度受损[11]。有研究证实,头低位和气腹压力主要通过以下两种可能的机制造成脑血流动力学改变:(1) CO_2 气腹使升高的腹腔压力作用于下腔静脉,引起中心静脉压升高,腹腔压力的升高限制了膈肌运动使胸腔压力升高,阻碍了颅内静脉回流,同时也增大了椎静脉丛和脑脊液回流的阻力,且 Trendelenburg 和老年患者循环代偿功能的减退使上述变化更加明显[12]。(2)胸腔压力升高使胸廓顺应性下降导致肺泡通气量不足,会引起 CO_2 蓄积;腹腔内的 CO_2 也极易通过腹膜吸收入血[13]。在二者的共同作用下 $PaCO_2$ 升高,使脑血管扩张,脑血容量增加。脑血容量的增加势必会引起颅内压的升高,大脑出现过度灌注,增大了老年患者脑水肿的潜在危险性。

改良的头低足高位可以改善老年患者术后认知功能障碍。术后谵妄是此类患者常见的术后并发症,大多数情况可通过混淆评估方法诊断,需仔细评估谵妄可逆性的原因[14]。虽然关于谵妄的流行病学数据的可用性继续增加,但关于其病理生理学知识却未达成统一共识。有研究认为,rSO_2 反映了脑组织氧供需之间的区域平衡,并且已经检查了该参数以确定在机器人辅助腹腔镜手术期间各种位置对脑血流量的影响[15]。与先前的研究一致[16],我们发现 rSO_2 在手术过程中的所有预定时间点均未显示出显著变化,而2组老年患者在 $T_1\sim T_3$ 各时刻 rSO_2 升高。与此同时,改良组与传统体位组相比,在 T_2 及 T_3 时刻 rSO_2 有所下降,表明改良头低足高位可改善老年患者术后认知功能障碍;且术后不同时间 MMSE 评分也验证了这一结果。

表3 2组患者术前及术后不同时间段 MMSE 评分比较

Table 3 Comparison of MMSE scores between two groups at different time period (points, $\bar{x}\pm s$)

Group	n	Preoperative	Postoperative day 1	Postoperative day 3	Postoperative day 7
Conventional posture	40	24.6±1.0	17.9±3.0	21.3±2.1	24.2±1.0
Modified posture	42	24.3±1.3	24.6±2.0*	25.2±2.2*	25.0±1.0

MMSE: mini-mental state examination. Compared with modified posture group, * $P<0.05$.

综上,传统的 Trendelenburg 会造成行机器人辅助腹腔镜前列腺癌根治术的老年患者脑血流动力学改变,引起术后认知功能的改变。而改良头低足高位,即头低足高 30°位,床背板抬高 20°,可显著改善老年患者血流动力学变化,减少术后认知功能障碍的发生。这一体位值得在未来机器人辅助手术中的进一步推广,使老年患者受益。

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