

doi: 10.13241/j.cnki.pmb.2018.15.020

不同剂量盐酸羟考酮复合右美托咪定对开腹手术患者镇痛效应及血流动力学的影响

张 鹏 叶 霞 杨巧艳 张雅楠 李 娅

(西安交通大学第二附属医院麻醉科 陕西 西安 710004)

摘要 目的:探讨不同剂量盐酸羟考酮复合右美托咪定对开腹手术患者镇痛效应及血流动力学的影响。**方法:**选择从 2015 年 3 月到 2017 年 3 月期间在我院接受开腹手术治疗的患者 100 例进行研究。根据随机数字表法对患者进行分组,A 组(应用 1.0 mg/kg 的盐酸羟考酮及 2.5 μ g/kg 的右美托咪定麻醉)、B 组(应用 0.75 mg/kg 的盐酸羟考酮及 2.5 μ g/kg 的右美托咪定麻醉)、C 组(应用 0.5 mg/kg 的盐酸羟考酮及 2.5 μ g/kg 的右美托咪定麻醉)和 D 组(应用 1.0 mg/kg 的盐酸羟考酮麻醉),每组各 25 例。对比各组镇痛效应满意度以及麻醉诱导前(T0)、插管即刻(T1)、插管后 5 min(T2)时的血流动力学指标,并统计各组不良反应情况。**结果:**A、B、C 三组的镇痛效应满意度均分别明显高于 D 组,差异均有统计学意义(均 $P < 0.05$),A、B、C 三组的镇痛效应满意度对比差异无统计学意义($P > 0.05$)。A、B 组 T1 时的收缩压(SBP)、舒张压(DBP)、平均动脉压(MAP)及心率(HR)水平均分别高于 C、D 组,差异有统计学意义($P < 0.05$);T0 和 T2 时,各组的 SBP、DBP、MAP 及 HR 水平相比差异均无统计学意义(均 $P > 0.05$)。各组 T1 时 SBP、DBP、MAP 及 HR 水平与 T0 时相比明显上升,而 T2 时又明显下降,差异均有统计学意义($P < 0.05$)。B 组不良反应总发生率为 12.00%,明显低于 A 组的 36.00%、C 组的 44.00%及 D 组的 40.00%,差异均有统计学意义(均 $P < 0.05$)。**结论:**不同剂量的盐酸羟考酮与右美托咪定复合麻醉对开腹手术患者的镇痛效应较好,并对患者的血流动力学水平平均造成一定影响,但随着时间的延长而逐渐减弱,2.5 μ g/kg 的右美托咪定以及 0.75 mg/kg 的盐酸羟考酮复合麻醉的安全性较高,值得在临床上推广应用。

关键词:不同剂量;盐酸羟考酮;右美托咪定;开腹手术;镇痛效应;血流动力学

中图分类号:R614;R656 文献标识码:A 文章编号:1673-6273(2017)15-2898-04

Influence of Analgesic Effect and Hemodynamics of Different Doses of Oxycodone Hydrochloride Combine Dexmedetomidine in Patients with Abdominal Surgery

ZHANG Peng, YE Xia, YANG Qiao-yan, ZHANG Ya-nan, LI Ya

(Department of Anesthesiology, The Second Affiliated Hospital of Xi'an Jiaotong University, Xi'an, Shaanxi, 710004, China)

ABSTRACT Objective: To investigate the influence of analgesic effect and hemodynamics of different doses of oxycodone hydrochloride combine dexmedetomidine in patients with abdominal surgery. **Methods:** 100 patients who underwent abdominal surgery in our hospital from March 2015 to March 2017 were selected in the study. According to the random number table method, the patients were divided into group A (application of 1.0 mg/kg oxycodone and 2.5 μ g/kg dexmedetomidine), group B (application of 0.75 mg/kg oxycodone and 2.5 μ g/kg dexmedetomidine), group C (application of 0.5 mg/kg oxycodone and 2.5 μ g/kg dexmedetomidine), and group D (application of 1.0 mg/kg oxycodone), each group contained 25 cases. The satisfaction degree of analgesia effect in each group and hemodynamics indexes before anesthesia induction (T0), immediate intubation (T1), and 5min after intubation (T2) were compared, and the adverse reactions of each group were statistically analyzed. **Results:** The satisfaction degree of analgesia effect in group A, B and C were significantly higher than those in group D, and the differences were statistically significant (all $P < 0.05$), there was no significant difference in the satisfaction degree of analgesia effect between the three groups of A, B and C ($P > 0.05$). The systolic blood pressure (SBP), diastolic blood pressure (DBP), mean arterial pressure (MAP) and heart rate (HR) levels in group A and B at T1 were higher than those in group C and D respectively, the differences were statistically significant ($P < 0.05$). There was no statistically significant difference between SBP, DBP, MAP and HR at T0 and T2 in each groups ($P > 0.05$). The levels of SBP, DBP, MAP and HR at T1 increased significantly compared with those at T0, but decreased significantly at T2, the differences were statistically significant ($P < 0.05$). The total incidence of adverse reactions in group B was 12.00%, which was significantly lower than 36.00% in group A, 44.00% in group C and 40.00% in group D, and the differences were statistically significant (all $P < 0.05$). **Conclusion:** Different doses of oxycodone hydrochloride combine dexmedetomidine have better anesthesia on the analgesic effect of abdominal surgery patients, it has some influence on the hemodynamic level of the patients, but as time goes on, it gradually decreases. The treatment with 2.5 μ g/kg dexmedetomidine and 0.75

作者简介:张鹏(1985-),男,本科,住院医师,从事麻醉方面的研究,E-mail: yzgnma@163.com

(收稿日期:2017-10-13 接受日期:2017-11-10)

mg/kg oxycodone hydrochloride compound anesthesia of the higher safety, which is worthy of clinical application.

Key words: Different doses; Oxycodone hydrochloride; Dexmedetomidine; Abdominal surgery; Analgesic effect; Hemodynamics

Chinese Library Classification(CLC): R614; R656 **Document code:** A

Article ID: 1673-6273(2018)15-2898-04

前言

由于手术对患者造成创伤较大,手术时间较长,以及手术会对患者腹腔内各脏器造成一定干扰等,开腹手术患者通常在术后会出现疼痛等并发症。临床研究发现,术后疼痛会导致患者出现呼吸加快以及肺功能下降等情况,严重者甚至会引发肺部并发症^[1]。因此,临床对于存在术后疼痛情况的患者需给予有效的镇痛治疗处理,否则可能会影响其术后恢复。当前,临床对于术后镇痛通常选择阿片类药物和非阿片类药物复合使用,但研究发现,以往常用的阿片类药物如激动 μ 受体,虽然镇痛疗效较好,但是对患者肠胃功能的影响较大^[2]。因此制定镇痛效果理想并且不良反应少的用药模式成为当前研究的重点。有报道提出,盐酸羟考酮复合右美托咪定适用于术后镇痛治疗,但盐酸羟考酮的用药剂量问题仍需深入研究^[3,4]。本文通过研究分析不同剂量盐酸羟考酮复合右美托咪定对开腹手术患者镇痛效应及血流动力学的影响,旨在为临床麻醉用药方案的选择提供

相应的数据支持,现报道如下。

1 资料与方法

1.1 一般资料

选择从2015年3月到2017年3月期间在我院接受开腹手术治疗的患者100例进行研究。入选标准:(1)有手术指征者;(2)年龄>45岁者;(3)美国麻醉医师协会(ASA)分级为I~II级者^[5];(4)对此次研究知情同意且已签署了同意书者。排除标准:(1)有肝肾功能的严重异常者;(2)存在窦性心动过缓或是房室传导阻滞者;(3)有精神类疾病者;(4)术前服用过抗抑郁类药物者;(5)对本研究使用药物过敏者。根据随机数字表法对患者进行分组,分成A组、B组、C组和D组,每组各25例。各组的性别、年龄以及其他临床资料相比,差异均无统计学意义($P>0.05$),见表1。我院的伦理委员会已经评审并通过了本次研究。

表1 各组一般资料比较

Table 1 Comparison of general information between each group

Groups	n	Age(years)	Male/Female	Weight(kg)	Height(cm)	ASA classification (I / II)	Anesthesia time (min)
Group A	25	52.06± 3.24	15/10	67.94± 3.26	169.54± 2.36	16/9	235.68± 32.44
Group B	25	51.87± 2.78	16/9	68.01± 2.12	171.03± 2.97	15/10	231.94± 33.58
Group C	25	52.11± 3.19	15/10	67.96± 2.94	169.88± 3.62	14/11	234.50± 29.60
Group D	25	52.32± 4.05	14/11	68.21± 1.33	170.63± 3.15	15/10	232.66± 31.02
F/x ²	-	2.068	1.394	1.942	2.114	1.402	1.977
P	-	0.137	0.263	0.146	0.108	0.258	0.132

1.2 研究方法

各组患者在进入手术室后均为其开放静脉通道,并监测患者收缩压(SBP)、舒张压(DBP)、平均动脉压(MAP)、心率(HR)等指标。而后实施麻醉诱导,为患者静注0.4 μ g/kg的舒芬太尼及2 mg/kg的异丙酚,待其意识消失之后再静注0.15 mg/kg的顺阿曲库铵,在气管插管之后实施机械通气,通气参数:(1)潮气量为6~8 mL;(2)呼吸比为1:1.5;(3)通气频率为12~15次/min;(4)呼气末二氧化碳(PETCO₂)维持在35~45 mmHg。再进行麻醉维持,为患者靶控输注药物异丙酚(确保血浆靶浓度为2.0~3.5 μ g/mL)及瑞芬太尼(确保血浆靶浓度为3~6 ng/mL),使脑电双频指数(BIS)值维持于40~60。在手术完成前的20 min静注5 mg的托烷司琼,并在完成前15 min再静注0.1 mg/kg的盐酸羟考酮。而后连接好ZZB型镇痛泵(购自南通的爱普医疗器械公司)对各组患者实施不同用药方案的镇痛。其中A组予以1.0 mg/kg的盐酸羟考酮(购自NAPP PHARMACEUTICALS LIMITED,国药准字:J20130142)及2.5 μ g/kg的右美托咪定(购自江苏恒瑞医药股份有限公司,国药准字:H20130093);B组予以0.75 mg/kg的盐酸羟考酮及2.5

μ g/kg的右美托咪定;C组予以0.5 mg/kg的盐酸羟考酮及2.5 μ g/kg的右美托咪定;D组予以1.0 mg/kg的盐酸羟考酮。各组均使用生理盐水将药物稀释到100 mL,设置输注速率为2 mL/h,且患者自控镇痛(PCA)剂量为0.5 mL,而锁定时间为15 min。通过静注0.05 mg/kg的盐酸羟考酮实施补救镇痛,并维持视觉模拟评分(VAS)值 $\leq$ 4分。

1.3 观察指标

对比各组临床资料、镇痛效应满意度以及麻醉诱导前(T0)、插管即刻(T1)、插管后5 min(T2)时的血流动力学指标(SBP、DBP、MAP、HR),同时统计各组不良反应情况。镇痛效应应用语言评价量表(VDS)对患者进行评价,分值为0~10分。根据评分进行镇痛满意度评估,得分值为0~2分记为非常满意,3~4分记为满意,5~6分记为一般,7~10分记为不满意。满意度=(非常满意例数+满意例数+一般例数)/总例数 $\times$ 100%。

1.4 统计学方法

数据的处理应用SPSS21.0统计软件,计数资料用(n,%)表示,其比较选用 χ^2 检验。计量资料用($\bar{x}\pm s$)表示,其比较实施

t 检验。多组间的计量资料比较用方差分析,计算 F 值。等级资料的比较选用秩和检验,计算 Z 值, $P<0.05$ 为差异有统计学意义。

2 结果

2.1 各组镇痛效应的对比

各组镇痛效应满意度整体对比差异有统计学意义 ($P<0.05$)。A、B、C 三组的镇痛效应满意度均分别明显高于 D 组,差异均有统计学意义(均 $P<0.05$),A、B、C 三组的镇痛效应满意度对比,差异无统计学意义($P>0.05$),见表 2。

表 2 各组镇痛效应的对比(n, %)
Table 2 Comparison of analgesic effects in each group(n, %)

Groups	n	Very satisfied	Satisfied	Commonly satisfied	Dissatisfied	Satisfaction degree
Group A	25	17	6	1	1	24(96.00)*
Group B	25	21	3	1	0	25(100.00)*
Group C	25	9	9	4	3	22(88.00)*
Group D	25	4	8	4	9	16(64.00)
Z/ χ^2	-		5.612			4.028
P	-		0.001			0.023

Note: compared with group D, * $P<0.05$.

2.2 各组血流动力学指标的对比

在 T1 时, 各组血流动力学指标整体对比差异有统计学意义($P<0.05$),T0、T2 时各组血流动力学指标整体对比差异无统计学意义($P>0.05$)。T1 时,各组 SBP、DBP、MAP 及 HR 水平均较 T0 时明显上升,且 A、B 组的 SBP、DBP、MAP 及 HR 水平均

分别高于 C、D 组,差异有统计学意义($P<0.05$),但 A 组与 B 组之间、C 组与 D 组之间比较差异无统计学意义 ($P>0.05$);而 T2 时,各组 SBP、DBP、MAP 及 HR 水平较 T1 时下降,但各组间两两比较差异无统计学意义($P>0.05$)。见表 3。

表 3 各组血流动力学指标的对比($\bar{x}\pm s$)
Table 3 Comparison of hemodynamic indexes in each group ($\bar{x}\pm s$)

Groups	n	SBP(mmHg)			DBP(mmHg)			MAP(mmHg)			HR(times/min)		
		T0	T1	T2	T0	T1	T2	T0	T1	T2	T0	T1	T2
Group A	25	119.94±9.68	133.68±10.57* ^{ab}	126.34±12.39 ^a	68.76±6.21	73.16±3.51* ^{ab}	70.23±5.12 ^a	85.96±9.33	92.37±5.68* ^{ab}	88.49±5.83 ^a	78.34±1.86	83.99±11.27* ^{ab}	80.34±6.96 ^a
		118.64±10.53	131.24±8.56* ^{ab}	125.57±10.63 ^a	67.29±5.39	72.21±3.16* ^{ab}	69.54±3.03 ^a	85.56±8.39	91.64±6.52* ^{ab}	85.29±7.66 ^a	78.89±8.14	82.44±6.78* ^{ab}	79.59±5.32 ^a
Group B	25	118.24±11.33	126.48±11.29*	124.57±15.30 ^a	66.38±8.17	70.13±4.06*	66.58±5.24 ^a	84.28±10.17	89.54±4.62*	84.58±6.12 ^a	76.83±7.55	81.06±10.25*	77.36±3.28 ^a
		120.64±11.33	123.68±10.57*	122.95±11.41 ^a	65.56±5.84	69.72±3.10*	64.83±4.29 ^a	87.28±8.33	88.49±4.06*	83.57±5.29 ^a	77.14±10.68	79.29±7.52*	76.44±3.07 ^a
Group C	25	118.24±11.33	126.48±11.29*	124.57±15.30 ^a	66.38±8.17	70.13±4.06*	66.58±5.24 ^a	84.28±10.17	89.54±4.62*	84.58±6.12 ^a	76.83±7.55	81.06±10.25*	77.36±3.28 ^a
		120.64±11.33	123.68±10.57*	122.95±11.41 ^a	65.56±5.84	69.72±3.10*	64.83±4.29 ^a	87.28±8.33	88.49±4.06*	83.57±5.29 ^a	77.14±10.68	79.29±7.52*	76.44±3.07 ^a
Group D	25	118.24±11.33	126.48±11.29*	124.57±15.30 ^a	66.38±8.17	70.13±4.06*	66.58±5.24 ^a	84.28±10.17	89.54±4.62*	84.58±6.12 ^a	76.83±7.55	81.06±10.25*	77.36±3.28 ^a
		120.64±11.33	123.68±10.57*	122.95±11.41 ^a	65.56±5.84	69.72±3.10*	64.83±4.29 ^a	87.28±8.33	88.49±4.06*	83.57±5.29 ^a	77.14±10.68	79.29±7.52*	76.44±3.07 ^a
F		1.024	5.874	2.329	1.031	3.926	2.793	2.287	6.108	2.325	1.149	8.524	2.534
P		0.187	0.001	0.067	0.173	0.012	0.082	0.123	0.000	0.071	0.163	0.000	0.060

Note: compared with T0, * $P<0.05$; compared with T1, ^a $P<0.05$; compared with group C, ^a $P<0.05$; compared with group D, ^b $P<0.05$.

2.3 各组不良反应的对比

各组不良反应的总发生率相比差异有统计学意义 ($P<0.05$)。B 组不良反应的总发生率为 12.00%,明显低于 A 组的

36.00%、C 组的 44.00%及 D 组的 40.00%, 差异均有统计学意义(均 $P<0.05$),A、C、D 组间总发生率比较差异无统计学意义 ($P>0.05$),见表 4。

表 4 各组不良反应的对比(n, %)
Table 4 Comparison of adverse reactions in each group(n, %)

Groups	n	Nausea and vomiting	Sleepiness	Bradycardia	Skin Itch	Total incidence
Group A	25	4(16.00)	1(4.00)	2(8.00)	2(8.00)	9(36.00)*
Group B	25	1(4.00)	1(4.00)	1(4.00)	0(0)	3(12.00)
Group C	25	5(20.00)	0(0)	5(20.00)	1(4.00)	11(44.00)*
Group D	25	4(16.00)	2(8.00)	3(12.00)	1(4.00)	10(40.00)*
χ^2	-					6.271
P	-					0.000

Note: compared with group B, * $P<0.05$.

3 讨论

术后疼痛是临床十分常见的症状,通常是指机体受到一定伤害性刺激之后所表现出的复杂性生理和心理反应。有报道指出,有效的术后镇痛措施以及高舒适度的镇静措施能够帮助降低术后并发症发生率,并且利于患者早日康复^[6,7]。伴随镇痛技术的不断提高以及镇痛类药物种类的大量更新,如何选择理想镇痛药物并制定出高效的术后镇痛用药方案是提高镇痛效果的关键。临床研究发现,盐酸羟考酮属于中枢神经类型的止痛药,其具有较高的生物利用度,整体镇痛效果理想,但是该药使用后患者呕吐情况较明显^[8,9]。而右美托咪定是 α_2 肾上腺素类型受体激动剂,既能够镇痛,还有助于降低患者术后呕吐的发生率。本研究通过探讨不同剂量的盐酸羟考酮与右美托咪定复合应用的临床效果,进而总结出镇痛以及镇静效果均非常满意的合适剂量方案,以降低开腹手术患者术后疼痛所造成的不良影响。

本文经研究发现,A、B、C三组的镇痛效应满意度均分别明显高于D组(均 $P<0.05$),A、B、C三组的镇痛效应对比,差异无统计学意义($P>0.05$),但B组的满意度最高,为100%。这提示了B组的镇痛效果满意度相对较好,分析原因,主要可能与B组在右美托咪定的用药基础上应用剂量较合适的盐酸羟考酮有关。疼痛对神经元轴产生作用,导致儿茶酚胺过量释放,并促进糖皮质激素大量分泌,增大肠黏膜发生溃烂以及出血的风险。同时,疼痛会造成呼吸加快,患者无法用力咳嗽,进而影响分泌物正常排出,较大程度地提升了术后并发症的危险。盐酸羟考酮属于阿片类中枢神经型止痛药物,其能够对 μ 以及 κ 受体产生激动作用^[10,11]。临床研究结果显示,较高剂量的盐酸羟考酮生物利用度较高,并且镇痛效果理想,可快速发挥药理作用,并且药效持久^[12,13]。右美托咪定为新研制的高选择性 α_2 肾上腺素类受体激动剂,其通常被临床用作全麻辅助性药物。研究发现该药不仅能够起到镇静作用,同时还可以发挥镇痛效果,其有助于交感神经自身张力下降以及血流动力学恢复稳定等^[14]。其次,该药对脑电活动不会造成干扰,可达到接近自然睡眠的理想镇静效果。同时,本文发现,组间比较,A、B组T1时的SBP、DBP、MAP及HR水平均分别高于C、D组($P<0.05$),但A、B组T0~T2时的SBP、DBP、MAP及HR水平相比,差异均无统计学意义(均 $P>0.05$)。组内比较,各组T1时SBP、DBP、MAP及HR水平与T0时相比明显上升,而T2时又明显下降,差异均有统计学意义($P<0.05$),这提示了各种麻醉方式均会对患者机体的血流动力学水平造成一定影响,但随着时间的延长,此种影响逐渐减弱。分析原因,可能与各组麻醉用药在机体中的正常代谢等因素有关。患者在插管时,由于受到应激作用,其机体的血流动力学有关指标均表现出不同程度的上升,但伴随麻醉药物的作用,发挥了较为明显的镇静镇痛效果,因此血流动力学又逐渐趋于稳定。此外,本文还发现,B组不良反应的总发生率为12.00%,明显低于A组的36.00%、C组的44.00%及D组的40.00%(均 $P<0.05$),这提示了B组麻醉用药方案的安全性最高。原因主要可能是因为B组应用的2.5 $\mu\text{g}/\text{kg}$ 的右美托咪定以及0.75 mg/kg 的盐酸羟考酮最大程度地符合了手术时机体的镇静及镇痛需求,此种用药方案既未因

过高剂量的盐酸羟考酮产生更高的不良反应,又未因过低剂量而导致麻醉效果不足^[15,16]。申军梅等人^[17,18]报道指出,盐酸羟考酮所产生的不良反应较小,十分适用于术后疼痛治疗。但是该药容易造成恶心呕吐等不良反应,因此,不适于单独用药。将盐酸羟考酮与右美托咪定联合应用,能够较好地帮助临床控制麻醉药物以及阿片类药物的总使用量,同时在临床镇痛治疗当中,有利于交感神经的抑制,进而起到预防寒颤的效果,并且可使得患者术后呕吐发生率显著降低。这在Wang X等人^[19,20]的报道结果中也有类似的结论可以进行佐证。

综上所述,对于开腹手术患者的镇痛效应而言,不同剂量的盐酸羟考酮与右美托咪定复合麻醉对患者的血流动力学水平平均造成一定影响,但以2.5 $\mu\text{g}/\text{kg}$ 的右美托咪定以及0.75 mg/kg 的盐酸羟考酮复合麻醉的安全性较高,临床可考虑选择此种药物配比方式进行麻醉,值得推广。

参考文献(References)

- [1] Kim S, Jeon Y, Lee H, et al. The evaluation of implementing smart patient controlled analgesic pump with a different infusion rate for different time duration on postoperative pain management [J]. J Dent Anesth Pain Med, 2016, 16(4): 289-294
- [2] Haeseler G, Schaefer D, Prison N, et al. Combatting pain after orthopedic/trauma surgery- perioperative oral extended-release tapentadol vs. extended-release oxycodone/naloxone[J]. BMC Anesthesiol, 2017, 17(1): 91
- [3] Xie K, Zhang W, Fang W, et al. The analgesic efficacy of oxycodone hydrochloride versus fentanyl during outpatient artificial abortion operation: A randomized trial [J]. Medicine (Baltimore), 2017, 96(26): e7376
- [4] 武春银,疏树华,柴小青,等.盐酸羟考酮注射液用于腹部全麻患者术后镇痛的有效性和安全性 [J]. 现代生物医学进展, 2017, 17(11): 2131-2133, 2151
Wu Chun-yin, Shu Shu-hua, Chai Xiao-qing, et al. Efficacy and Safety of Oxycodone Hydrochloride Injection for Postoperative Analgesia in Patients Undergoing Operation under General Anesthesia[J]. Progress in Modern Biomedicine, 2017, 17(11): 2131-2133, 2151
- [5] 雍芳芳,王合梅,李超,等.右美托咪定混合羟考酮用于胃肠道手术后病人自控静脉镇痛的适宜药量配比[J]. 中华麻醉学杂志, 2015, 35(11): 1300-1303
Yong Fang-fang, Wang He-mei, Li Chao, et al. Optimum ratio of medicine dosage for dexmedetomidine mixed with oxycodone used for PCIA after gastrointestinal surgery [J]. Chinese Journal of Anesthesiology, 2015, 35(11): 1300-1303
- [6] Kopecky EA, Vaughn B, Lagasse S, et al. Tolerability, Safety, and Effectiveness of Oxycodone DETERx in Elderly Patients ≥ 65 Years of Age with Chronic Low Back Pain: A Randomized Controlled Trial[J]. Drugs Aging, 2017, 34(8): 603-613
- [7] Qu G, Cui XL, Liu HJ, et al. Ultrasound-guided Transversus Abdominis Plane Block Improves Postoperative Analgesia and Early Recovery in Patients Undergoing Retroperitoneoscopic Urologic Surgeries: A Randomized Controlled Double-blinded Trial [J]. Chin Med Sci J, 2016, 31(3): 137-141
- [8] Donaldson SR, Harding AM, Taylor SE, et al. Evaluation of a targeted prescriber education intervention on emergency department discharge oxycodone prescribing[J]. Emerg Med Australas, 2017, 29(4): 400-406

(下转第2905页)

- [9] Stock R, Thrane G, Anke A, et al. Early versus late-applied constraint-induced movement therapy: A multisite, randomized controlled trial with a 12-month follow-up [J]. *Physiother Res Int*, 2018, 23(1): e1689
- [10] Kwakkel G, Veerbeek JM, Van Wegen EE, et al. Constraint-induced movement therapy after stroke[J]. *Lancet Neurol*, 2015, 14: 224-234
- [11] Shi Y, Tian J, Yang K, et al. Modified constraint-induced movement therapy versus traditional rehabilitation in patients with upper-extremity dysfunction after stroke: a systematic review and meta-analysis[J]. *Arch Phys Med Rehabil*, 2011, 92(6): 972-982
- [12] Veerbeek J, van Wegen E, van Peppen R, et al. What is the evidence for physical therapy post stroke? A systematic review and metaanalysis[J]. *PLoS One*, 2014, 9(2): e87987
- [13] Langhorne P, Bernhardt J, Kwakkel G. Stroke rehabilitation [J]. *Lancet*, 2011, 377(9778): 1693-1702
- [14] Wattchow KA, McDonnell MN, Hillier SL. Rehabilitation interventions for upper limb function in the first four weeks following stroke: a systematic review and meta-analysis of the evidence [J]. *Arch Phys Med Rehabil*, 2018, 99(2): 367-382
- [15] Corbetta D, Sirtori V, Moja L, et al. Constraint-induced movement therapy in stroke patients: systematic review and meta-analysis [J]. *European journal of physical and rehabilitation medicine*, 2010, 46(4): 537-544
- [16] Jonsdottir J, Cattaneo D, Recalcati M, et al. Task-oriented biofeedback to improve gait in individuals with chronic stroke: Motor learning approach[J]. *Neurorehabil Neural Repair*, 2010, 24: 478-485
- [17] Yen CL, Wang RY, Liao KK, et al. Gait training-induced change in corticomotor excitability in patients with chronic stroke [J]. *Neurorehabil Neural Repair*, 2008, 22: 22-30
- [18] Mao YR, Lo WL, Lin Q, et al. The effect of body weight support treadmill training on gait recovery, proximal lower limb motor pattern, and balance in patients with subacute stroke[J]. *Biomed Res Int*, 2015, 175719: 1-10
- [19] Marklund I, Klässbo M. Effects of lower limb intensive mass practice in poststroke patients: single-subject experimental design with long-term follow-up[J]. *Clin Rehabil*, 2006, 20(7): 568-576
- [20] Morris D, Taub E, Mark V. Constraint-induced movement therapy: characterizing the intervention protocol [J]. *Europa medicophysica*, 2006, 42(3): 257-268
- [21] Whitehead L. Constraint-Induced Movement Therapy for Hemiparesis Following Stroke[J]. *Am J Nurs*, 2016, 116(8): 63
- [22] Kim H, Koo YS, Shin M, et al. Combination of constraint-induced movement therapy with electroacupuncture improves functional recovery following neonatal hypoxic-ischemic brain injury in rats [J]. *Biomed Res Int*, 2018, 7: 8638294
- [23] Coleman ER, Moudgal R, Lang K, et al. Early rehabilitation after stroke: a narrative review[J]. *Curr Atheroscler Rep*, 2017, 19(12): 59
- [24] Thrane G, Askim T, Stock R, et al. Efficacy of constraint-induced movement therapy in early stroke rehabilitation: a randomized controlled multisite trial [J]. *Neurorehabil Neural Repair*, 2015, 29(6): 517-525

(上接第 2901 页)

- [9] Lange B, Von Zabern D, Elling C, et al. Efficacy and safety of tapentadol prolonged release for moderate-to-severe chronic osteoarthritis knee pain: a pooled analysis of two double-blind, randomized, placebo- and oxycodone controlled release-controlled studies[J]. *Curr Med Res Opin*, 2017, 33(8): 1413-1422
- [10] Nagao S, Furihata M, Fukagawa K, et al. Premedication with fast-acting oxycodone hydrochloride hydrate effectively reduced oxaliplatin-induced severe vascular pain [J]. *J Infect Chemother*, 2017, 23(7): 493-497
- [11] Ruan X, Mancuso KF, Kaye AD. Revisiting Oxycodone Analgesia: A Review and Hypothesis[J]. *Anesthesiol Clin*, 2017, 35(2): e163-e174
- [12] Olczak B, Kowalski G, Leppert W, et al. Analgesic efficacy, adverse effects, and safety of oxycodone administered as continuous intravenous infusion in patients after total hip arthroplasty [J]. *J Pain Res*, 2017, 4(10): 1027-1032
- [13] 周萍. 盐酸羟考酮注射液用于食管癌根治术后镇痛的临床观察[J]. *实用药物与临床*, 2015, 18(1): 56-59
Zhou Ping. Clinical observation of oxycodone hydrochloride injection for postoperative analgesia after esophageal resection [J]. *Practical Pharmacy and Clinical Remedies*, 2015, 18(1): 56-59
- [14] 黄莉. 羟考酮与右美托咪定复合应用对肺部手术患者全麻恢复期质量的影响[J]. *中国中西医结合外科杂志*, 2017, 23(4): 369-372
Huang Li. Effect of Dexmedetomidine and Oxycodone Hydrochloride on the Quality during Recovery Period of General Anesthesia in Patients Undergoing Thoracic Surgery[J]. *Chinese Journal of Surgery of Integrated Traditional and Western Medicine*, 2017, 23(4): 369-372
- [15] Jacob JC, Poklis JL, Akbarali HI, et al. Ethanol Reversal of Tolerance to the Antinociceptive Effects of Oxycodone and Hydrocodone [J]. *J Pharmacol Exp Ther*, 2017, 362(1): 45-52
- [16] Gavin PD, Tremper L, Smith A, et al. Transdermal oxycodone patch for the treatment of postherpetic neuralgia: a randomized, double-blind, controlled trial[J]. *Pain Manag*, 2017, 7(4): 255-267
- [17] 申军梅, 宋子贤, 雍芳芳, 等. 单剂量盐酸羟考酮和地佐辛用于妇科腹腔镜手术后镇痛效果的比较[J]. *天津医药*, 2015, 43(5): 542-544
Shen Jun-mei, Song Zi-xian, Yong Fang-fang, et al. Comparison of postoperative analgesic effect between the single dose of oxycodone and dezocine in patients undergoing gynecological laparoscopic operation[J]. *Tianjin Medical Journal*, 2015, 43(5): 542-544
- [18] Rettig JS, Arnold JH. Dexmedetomidine in the PICU: Can We Get More for Less?[J]. *Pediatr Crit Care Med*, 2017, 18(9): 893-894
- [19] Wang X, Wang K, Wang B, et al. Effect of Oxycodone Combined With Dexmedetomidine for Intravenous Patient-Controlled Analgesia After Video-Assisted Thoracoscopic Lobectomy [J]. *J Cardiothorac Vasc Anesth*, 2016, 30(4): 1015-1021
- [20] Liu YJ, Wang DY, Yang YJ, et al. Effects and mechanism of dexmedetomidine on neuronal cell injury induced by hypoxia-ischemia[J]. *BMC Anesthesiol*, 2017, 17(1): 117