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Influence of levobupivacaine regional scalp block on hemodynamic stability and intra- and postoperative opioid consumption in supratentorial craniotomies: a randomized controlled trial

Anesthésie / Douleur
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Conflits d'intérêt

No conflict of interest to declare.

Position du problème et objectif(s) de l'étude

To evaluate the influence of levobupivacaine regional scalp block (SB) on hemodynamic stability during the noxious events of supratentorial craniotomies under general anaesthesia, and its influence on intra- and postoperative opioid consumption.

Matériel et méthodes

Fifty patients scheduled for elective craniotomy were prospectively enrolled. Patient, anaesthesiologist, and neurosurgeon were blind to the random performance of SB with either levobupivacaine 0.33% (group C, n = 27) or the same volume of saline (group S, n = 23). General anesthesia was induced and maintained using target-controlled infusions of remifentanil (remi) and propofol (propo). SB was performed after induction. Mean arterial pressure (MAP), heart rate (HR), State Entropy (SE), and propo and remi effect-site concentrations (Ce) were recorded at the time of SB (baseline), and 0, 1, 3, and 5 minutes after skull-pin fixation (SP), skin incision (SI), craniotomy (CR), and dura-mater incision (DM). Excessive HR, MAP, or SE responses over 20% of baseline were treated with an increase in remi and/or propo Ce until stabilization. Morphine consumption and postoperative pain intensity (0-10 visual analogue scale, VAS) were recorded 1, 3, 6, 24 and 48 hours after surgery. Propo and remi total consumptions were also recorded. Normality of data distribution was assessed when necessary. Demographic and non-repeated measure data were compared between groups using Fisher's exact tests, $\chi 2$ tests, or two-tailed Student unpaired t-tests as appropriate. MAP, HR, SE, propo and remi Ce, cumulative morphine consumption and VAS were compared within and between group using two-way mixed-design ANOVA and Tuckey's HSD tests for post-hoc comparisons. A two-tailed P-value <0.05 was considered statistically significant.

Résultats & Discussion

Complete results are reported in Table.Demographics of group S and C were comparable [median(range) or count, respectively: females 14/23 and 14/27, age 61(27-71) and 59(22-77) y, BMI 24(20-35) and 26(19-34) Kg m-2, length of anesthetic procedure 181(102-348) and 212(126-397) min]. SP and SI were associated with a significantly higher increase in MAP in group S than in group C, 1, 3, and 5 minutes after the event of interest. This was not the case at CR and DM. HR was not significantly different between groups at any time point. However, SP and SI triggered a significant HR increase in group S and not in group C. Propofol Ce was not different between groups at SP, but was significantly higher in group S than in group C at all other time points. Remifentanil Ce was singificantly higher in group S than in group C at all time points. The overall consumption rate of propo and remi for the entire procedure was not different between groups [mean (SD) in group S and C, respectively: 0.132 (0.013) and 0.086 (0.018) µg Kg-1min-1for remifentanil, and 0.109 (0.019) and 0.092 (0.015) mg Kg-1min-1for propofol]. SE had significantly higher values in group S than in group C at some time points but the difference was not clinically relevant. Pain VAS and cumulative morphine consumption were significantly higher in group S than in group C at 1, 3, 6, 24 and 48 hour postoperatively.

Conclusion

Our data demonstrate that, in supratentorial craniotomies, SB improves hemodynamic control during noxious events such as SP and SI, and reduces postoperative pain and opioid consumption.

	SP0	SP+1	SP+3	SP+5	SI0	SI+1	SI+3	SI+5	CR0	CR+1	CR+3	CR+5	DM0	DM+1	DM+3	DM+5
MAP (mmHg)																
GS	77(17)	98(16)+	91(16)+	82(15)	71(12)	90(14)+	88(13)+	86(14)+	82(10)	82(9)	83(10)	80(11)	76(11)	77(10)	77(11)	76(11)
GC	77(13)	80(16)*	76(11)*	73(9)*	71(11)*	73(12)*	75(12)*	75(12)*	75(9)	76(11)	77(12)	76(10)	74(8)	74(7)	74(8)	73(8)
HR (b min^{-1})																
GS	57(10)	69(11)+	65(11)+	61(11)+	55(9)	64(12)+	61(11)+	59(10)+	57(8)	57(9)	57(8)	57(8)	56(8)	56(8)	56(8)	7)
GC	61(10)	63(10)	62(9)	60(8)	58(6)	59(7)	59(7)	59(7)	59(9)	60(8)	60(8)	60(9)	60(9)	60(9)	61(8)	60(8)
Propo Ce (µg mL^{-1})																
GS	2.4 (0.3)	2.7 (0.4)+	2.7 (0.4)+	2.7 (0.4)+	2.6 (0.4)	2.7 (0.4)+	2.8 (0.5)+	2.8 (0.5)+	2.8 (0.5)	2.8 (0.5)	2.8 (0.5)	2.8 (0.5)	2.7 (0.4)	2.8 (0.5)	2.8 (0.4)	2.8 (0.4)
GC	2.5 (0.5)	2.5 (0.6)	2.5 (0.6)	2.5 0.5)	2.4 (0.4)	2.4 (0.4)*	2.4 (0.4)*	2.4 (0.4)*	2.3 (0.4)*	2.5 (0.4)*	2.5 (0.4)*	2.5 (0.4)*	2.5 (0.4)*	2.5 (0.4)*	2.5 (0.4)*	2.5 (0.4)*
Remi Ce (ng mL^{-1})																
GS	2.7 (0.5)	3.7 (0.4)+	3.9 (0.5)+	3.9 (0.5)+	3.3 (0.6)	3.9 (0.5)+	4.0 (0.6)+	4.0 (0.5)+	3.8 (0.6)	3.9 (0.6)	3.9 (0.6)+	3.9 (0.6)+	3.8 (0.7)	3.7 (0.7)	3.8 (0.7)	3.8 (0.7)
GC	2.5 (0.3)	2.6 (0.5)*	2.6 (0.5)*	2.5 (0.4)*	2.3 (0.4)*	2.4 (0.5)*	2.4 (0.5)*	2.5 (0.5)*	2.5 (0.5)*	2.5 (0.5)*	2.6 (0.5)*	2.6 (0.5)*	2.6 (0.5)*	2.6 (0.5)*	2.6 (0.5)*	2.5 (0.5)*
SE																
GS	44(5)	40(7)+	48(7)+	44(4)	45(8)	47(6)	48(7)+	46(8)	45(6)	44(5)	42(4)	43(4)	42(7)	42(5)	43(6)	43(6)
GC	41(8)*	43(7)*	42(6)*	42(6)*	42(8)*	42(6)*	42(8)*	42(8)*	42(8)	44(10)	45(11)	43(11)	42(8)	43(8)	43(8)	43(8)
	PO+1	PO+3	PO+8	PO+24	PO+48											
VAS																
GS	5(3)	4(2)	4(2)	4(2)	3(2)5											
GC	2(2)*	2(2)*	2(2)*	2(2)*	1(2)*											
Morphine (mg)																
GS	4(2)	8(3)+	11(3)+	16(4)+	21(5)+											
GC	1(1)*	4(3)*	6(4)*	8(5)*	10(7)*											

Data are mean(SD). SP0, +1, +3, +5 = skull-pin insertion at time 0, 1, 3, and 5 min; SI0, +1, +3, +5 = skin incision at time 0, 1, 3, and 5 min; CR0, +1, +3, +5 = bone flap removal at time 0, 1, 3, and 5 min; DM0, +1, +3, +5 = dura-mater incision at 0, 1, 3, and 5 min; MAP = mean arterial pressure, HR = heart rate; Propo Ce = propofol effect-site concentration; Remi Ce = remifentanil effect-site concentration; SE = state entropy; PO+1, +3, +6, +24, +48 = postoperative hour 1, 3, 6, 24, and 48; VAS = pain rating on the visual analogue scale; Morphine = cumulative morphine consumption; GS = group S; GC = group C; * =significantly higher in group S than in group C according to a two-way mixed design ANOVA and Tuckey's HSD for post-hoc comparisons; + = significantly higher than at time 0 for intraoperative data or time +1 for postoperative data; $ = significantly lower than at time +1 for postoperative data. For the sake of clarity, only pertinent statistical results are provided.