Effects of general anesthesia and ultrasonography-guided interscalene block on pain and oxidative stress in shoulder arthroscopy: a randomized trial

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June 15, 2021

Abstract

Background/aim: The aim of this study was to evaluate the effects of general anesthesia and ultrasonography-guided interscalene block on pain and oxidative stress evaluated by thiol–disulphide balance and C-reactive protein levels in patients undergoing shoulder arthroscopy. Materials and methods: A total of 42 patients aged 18–75 years who were scheduled to undergo shoulder arthroscopy were randomized into interscalene block group (Group-IB, n = 20) and general anesthesia group (Group-GA, n = 22). All patients received patient-controlled analgesia during the postoperative period. Additional analgesics were administered to patients with a visual analog scale score of > 4. Native -thiol, total -thiol, disulphide and C-reactive protein levels were measured. Patients' visual analog scale scores, morphine and additional analgesic consumption were recorded. A shift in thiol–disulphide balance toward decreased thiol and increased disulphide levels was regarded as an indicator of oxidative stress. Results: Pain level, morphine and additional analgesic consumption were higher in Group-GA. Native-thiol and total-thiol levels were higher in Group-IB postoperatively and also disulphide levels were lower at postoperative 18 hours. C-reactive protein levels were similar in both the groups. Conclusion: Interscalene block induced less oxidative stress during the postoperative period, as evaluated by thiol–disulphide balance.

Acknowledgement/Disclaimers/Conflict of interest

All authors have contributed to the paper, met criteria of authorship and are familiar with the contents of the final draft.

No support has been received from any funding organization for this research.

There is no conflict of interest with any financial organization.

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Table 1. Demographic Characteristics and Duration of Surgery

		Group IB (n = 20)	Group G
		Median (minimum–maximum) or n (%)	Median (
Age (yr)	Age (yr)	49.5 (18–66)	48.5 (22–
Sex	Sex		
	M/F	6/14	10/12
Height (cm)	Height (cm)	1.64 (1.54–1.83)	1.61 (1.5-
Body weight (kg)	Body weight (kg)	71.5 (55–95)	75.5 (53–
BMI (kg/m^2)	BMI (kg/m^2)	27.95 (22–38.2)	26.95 (20
ASA score	ASA score		
	I (%)	10 (50)	10 (45.5)
	II (%)	10 (50)	12 (54.5)
Presence of comorbid disease (%)	Presence of comorbid disease (%)	9 (45)	10 (45.5)
Duration of surgery (min)	Duration of surgery (min)	47.5 (20–80)	60 (15–15

[a]Mann–Whitney U test, [b]Chi-square Test

Table 2. Amount of Total Morphine Consumed Through Patient-Controlled Analgesia and Need for Additional Analgesics

Patient-controlled analgesia (mg) *Median(minimum–maximum)*	Patient-controlled analgesia (mg) *Median(minimum–max*
Postoperative 0 minute	Postoperative 0 minute
Postoperative 30 minutes	Postoperative 30 minutes
Postoperative 3 hours	Postoperative 3 hours
Postoperative 6 hours	Postoperative 6 hours
Postoperative 18 hours	Postoperative 18 hours
Need for additional analgesics n (%)	
Postoperative 0 minute	0 (0)
Postoperative 30 minute	0 (0)
Postoperative 3 hours	0 (0)
Postoperative 6 hours	0 (0)
Postoperative 18 hours	0 (0)
[a]Mann–Whitney U test, [b]Chi-square test	[a]Mann–Whitney U test, [b]Chi-square test

Table 3. Levels of Native Thiol, Total Thiol, Disulphide and Ratio of Disulphide/Native Thiol Level

Native thiol (µmol/L)
Baseline
Intraoperative 30 minutes
Postoperative 3 hours
Postoperative 6 hours
Postoperative 18 hours
Total thiol (µmol/L)
Baseline
Intraoperative 30 minutes
Postoperative 3 hours
Postoperative 6 hours
Postoperative 18 hours
Disulphide (µmol/L)
Baseline
Intraoperative 30 minutes
Postoperative 3 hours
Postoperative 6 hours
Postoperative 18 hours
Disulphide/Native thiol level
Basal
Intraoperative 30 minutes
Postoperative 3 hours
Postoperative 6 hours
Postoperative 18 hours
$p<0,05$ Mann–Whitney U test, $^{\#}p<0.05$ compared with the baseline value for Group GA, Wilcoxon signed-rank test, $^{\&}p<0$

Table 4. Changes in Native and Total Thiol Levels Across Time Intervals

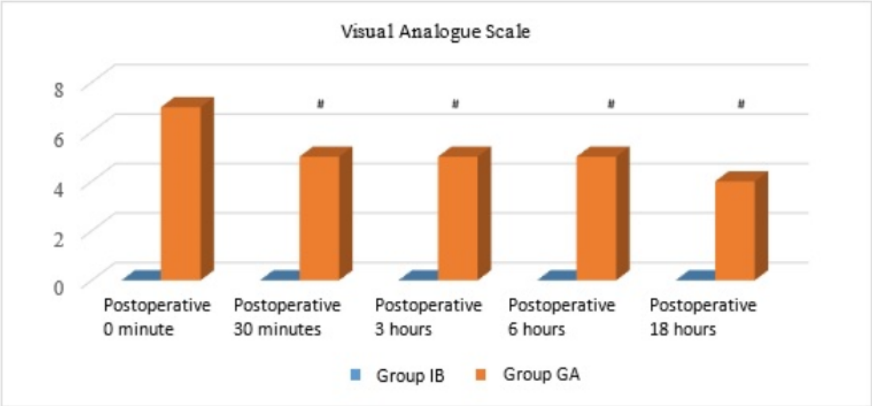
		Group IB	Group GA
		Median (minimum–maximum)	Median (minimum–ma
Native thiol	Native thiol		
	T1–T0	4.75 (-12 to 151.6)	-11.55 (-113.8 to 132.5
	T2–T1	-11.85 (-122.2 to 22.7)	-1.95 (-56.3 to 79.7)
	T3–T2	7.95 (-68.3 to 59.6)	-3.9 (-52.8 to 39.9)
	T4–T3	13.35 (-164.1 to 110.5)	4.05 (-92.5 to 89.1)
Total thiol	Total thiol		
	T1–T0	-7.75 (-141.2 to 175.3)	-20.5 (-92.8 to 41.7)
	T2–T1	-20.05 (-118.6 to 21.9)	-2.5 (-72 to 70.3)
	T3–T2	22.4 (-70.3 to 70.3)	-7.05 (-37.7 to 36.2)
	T4–T3	8.35 (-179.6 to 224.9)	6.45 (-62.8 to 89.8)
p<0,05 Mann–Whitney U test	*p<0,05 Mann–Whitney U test	*p<0,05 Mann–Whitney U test	*p<0,05 Mann–Whitn

Table 5. C-Reactive Protein Levels

C-reactive protein (mg/dL)
Baseline
Intraoperative 30 minutes
Postoperative 3 hours
Postoperative 6 hours
Postoperative 18 hours
[a]Mann–Whitney U test, $^{\&}$p=0.003 compared with the baseline value for Group IB, Wilcoxon signed-rank test, $^{\#}$p=0.001 co

FIGURE LEGENDS

Figure. Postoperative Visual Analogue Scale Scores



(p < 0.001, Mann–Whitney U test, $^{\#}$p [?] 0.001 compared with the baseline value for Group GA, Wilcoxon signed-rank test