ORIGINAL ARTICLE

Post hip replacement arthroplasty analgesia with subarachnoid morphine associated to "3 in 1" blockade: a randomized double--blind study*

Avaliação da analgesia pós-operatória em artroplastias de quadril com morfina por via subaracnoidea associada ao bloqueio "3 em 1": estudo aleatório e encoberto

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SUMMARY

BACKGROUND AND OBJECTIVES: Pain worsens postoperative morbidity and mortality, especially in surgeries such as hip replacement arthroplasty. This study aimed at evaluating postoperative pain, opioid consumption, complications and motor block for more than 6 hours in patients receiving subarachnoid morphine associated or not to "3 in 1" blockade for hip replacement arthroplasty.

METHOD: Randomized, double-blind clinical trial with 49 patients submitted to elective hip replacement arthroplasty who were distributed in two groups: 24 patients in Group 1 (G1) and 25 patients in Group 2 (G2). Both groups received spinal anesthesia with subarachnoid morphine and "3 in 1" blockade was associated in Group 2. Pain, number of rescue opioid doses, incidence of pruritus, nausea and vomiting, and motor block in lower limbs for more than 6 hours were evaluated in the postoperative period.

RESULTS: Thirteen G1 patients (54.2%) reported pain intensity ≥ 1, while in G2 pain was reported by 6 patients (24%) with statistically signiflcant difference (p = 0.029). No patient reported severe pain. Tramadol, used as rescue opioid, was administered to 25% G1 patients and 8% of G2 patients, without signiflcant difference (p = 0.11). There has been no difference between groups in pruritus, nausea, vomiting and motor block for more than 6 hours.

CONCLUSION: The association of subarachnoid morphine and "3 in 1" blockade decreases the incidence of pain in patients submitted to hip replacement arthroplasty without increasing the incidence of complications.

Keywords: Hip replacement arthroplasty, Nervous blockade, Opioids, Postoperative pain, Spinal anesthesia.

RESUMO

JUSTIFICATIVA E OBJETIVOS: A dor é um fator agravante da morbimortalidade pós-operatória, principalmente em cirurgias como a artroplastia de quadril. O objetivo deste estudo foi avaliar a dor pós-operatória, o consumo de opioide, as complicações e o bloqueio motor por mais de 6 horas em pacientes que receberam morflna por via subaracnoidea associada ou não ao bloqueio "3 em 1" para artroplastia de quadril.

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MÉTODO: Ensaio clínico aleatório, encoberto com 49 pacientes submetidos à artroplastia de quadril eletiva distribuídos em dois grupos, 24 pacientes no Grupo 1 (G1) e 25 pacientes no Grupo 2 (G2). Ambos os grupos receberam raquianestesia com morflna por via subaracnoidea, e nos pacientes do grupo G2 foi associado o bloqueio "3 em 1". No pós-operatório foi avaliada a dor, o número de doses de opioides de resgate, a incidência de prurido, náuseas e vômitos e presença de bloqueio motor nos membros inferiores por mais de 6 horas.

RESULTADOS: Treze pacientes, 54,2% do G1, relataram dor com intensidade ≥ 1, enquanto que no G2, a dor foi relatada por 6 pacientes (24%), diferença estatisticamente signiflcativa (p = 0,029). Nenhum paciente apresentou dor intensa. O tramadol, usado como opioide de resgate foi administrado em 25% dos pacientes do G1 e em 8% dos pacientes do G2, sem diferença signiflcativa (p = 0,11). Não houve diferença entre os grupos quanto ao prurido, náuseas, vômitos e bloqueio motor por mais de 6 horas.

CONCLUSÃO: A associação de morflna por via subaracnoidea com o bloqueio "3 em 1" reduz a incidência de dor em pacientes submetidos à artroplastia de quadril, sem aumentar a incidência de complicações.

Descritores: Artroplastia de substituição de quadril, Bloqueio nervoso, Dor, Dor pós-operatória, Opioides, Raquianestesia.

INTRODUCTION

Hip replacement arthroplasty is a major surgery, in general associated to severe immediate postoperative pain (PO)[1]. Adequately managing PO pain is consensus and brings several beneflts for patients such as comfort, early mobilization and faster recovery[1]. The best way to induce good quality analgesia with minimum side effects in this type of surgery is still not well deflned[1]. Subarachnoid morphine may induce excellent analgesia for up to 24 hours. It acts by binding to μ1 supraspinal and μ2 spinal receptors[2].

Peripheral nerve block with local anesthetics is an excellent way to promote postoperative analgesia because it considerable decreases pain scores[3,4] and systemic opioids consumption[3,5], has minor side effects and low incidence of complications, when performed with the adequate technique and respecting toxic levels of local anesthetics[6]. The "3 in 1" block, described by Winnie in 1973, uses a modifled conventional femoral nerve blockade to induce analgesia also in obturator and lateral cutaneous nerves[6].

This study aimed at evaluating postoperative analgesia of hip replacement arthroscopy by the numeric visual scale (NVS), and opioid consumption in patients receiving subarachnoid morphine alone or associated to "3 in 1" block, as well as complications and lower limbs motor block for more than 6 hours.

METHOD

This was a randomized double-blind clinical trial with patients aged above 18 years, of both genders and physical status I to II according to the American Society of Anesthesiology (ASA), admitted for elective hip replacement arthroscopy in the Operating Center of the Institute of Integral Medicine Prof. Fernando Figueira, from November 2010 to October 2011.

Exclusion criteria were chronic pain, allergy to any drug used in the study, inability to understand pain NVS or to decide about their participation in the study, and those with counterindication to spinal anesthesia or "3 in 1" block. Chronic pain was deflned as pain for more than 3 months and/or chronic use of analgesics to control it.

Sample calculation was based on a preliminary pilot study, as from which we have obtained the flnal number of 48 patients. Randomization was obtained with the R 2.13.0 software, using the SAMPLE command. The nursing team evaluating PO pain was blind to the group patients belonged to. Data were evaluated by the Epinfo software version 3.5.3. Confldence interval was 95% considering signiflcant $p < 0.05$.

From 53 patients eligible for the study, 49 patients were distributed in two groups: 24 patients in Group 1 (G1) and 25 patients in Group 2 (G2). Four patients were excluded due to the following: one patient received analgesics during surgery (fentanyl) and three patients did not undergo the initially proposed surgery, namely hip replacement arthroscopy.

G1 patients received spinal anesthesia with 13 mg of 0.5% hyperbaric bupivacaine and morphine (70 μg). In G2, in addition to spinal anesthesia with the same drugs and doses, patients were submitted to "3 in 1" block with 50 mL of 0.25% bupivacaine, induced with peripheral nerve stimulator and respecting the toxic dose of 3 $mg.kg^{-1}$ of body weight. Both groups have received intravenous dipirone (1 g) every 6 hours in the PO, according to department routine.

During the flrst 12 postoperative hours, pain was evaluated by NVS every hour in the flrst 6 hours and every 2 hours from the 6^{th} to the 12^{th} hour. Pain intensity was

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classifled as mild when scores were 1-2; moderate when scores equal to 3-7 and severe when > 7. Two pain intensity evaluation moments were considered for statistical analysis: during the flrst 6 hours and between 6th and 12th hours. Intravenous tramadol (50 mg) was the rescue drug when patients reported NVS higher than 2.

We have also evaluated opioid consumption, motor block for more than 6 hours, postoperative nausea, vomiting and pruritus and time for hospital discharge.

This study was approved by the Human Beings Research Ethics committee, Institute of Integral Medicine Prof. Fernando Figueira (IMIP) under protocol 1797/2010.

RESULTS

Both groups were homogeneous in age and gender (Table 1). Mean age was 51.5 years for G1 and 52.2 years for G2 (p = 0.89).

Thirteen G1 patients (54.2%) had pain NVS ≥ 1, while in G2, 6 patients (24%) had pain, and this difference was statistically signiflcant (p = 0.029) (Table 2).

There has been no signiflcant difference between groups in pain intensity both during the flrst 6 hours (p = 0.49) and between the 6th and the 12th hours (p =0.43). No patient had severe pain (Table 3).

With regard to opioids, tramadol was administered to 25% of G1 patients and to 8% of G2 patients, without signiflcant difference (p = 0.11). The number of tramadol doses had a median of 1 for both groups (p = 0.4) (Table 4).

Complications and postoperative nausea and vomiting (PONV) were similar for both groups, being 16.7% for G1 and 20% for G2 (p = 0.52).

Pruritus was present in 16.7% of G1 patients and in 12% of G2 patients, also without signiflcant difference (p = 0.47).Only one G1 patient had motor block for more than 6 hours, without statistical difference. Block was partial and disappeared until the 7th PO hour (Table 5).

Table 1 – Anthropometric data: age and gender distribution.

Groups	Number of Patients	Age (years)	Gender M / F	p Value
1	24	51.5 ± 15.9	16 / 8	0.89
2	25	52.2 ± 15.7	14 / 11	

Table 2 – Pain according to groups

Groups	No Pain (nº & %)	Pain (nº & %)	p Value
1	11 (45.8)	13 (54.2)	0.029
2	19 (76)	6 (24)	

Table 3 – Pain intensity in the flrst 6 hours and between 6th and 12th hours.

Groups	Mild Pain (nº & %)	Moderate Pain (nº & %)	Severe Pain (n° & %)	p Value
1 (< 6 hours)	7 (53.8)	6 (46.2)	0 (0)	0.49
2 (< 6 hours)	4 (66.7)	2 (33.3)	0 (0)	
1 (6ª – 12ª hours)	10 (83.3)	2 (16.7)	0 (0)	0.43
2 (6ª – 12ª hours)	6 (100)	0 (0)	0 (0)	

Table 4 – Patients receiving postoperative tramadol

Groups	Tramadol		p Value
	Yes (nº & %)	No (nº & %)	
1	6 (25)	18 (75)	0.11
2	2 (8)	23 (92)	

Table 5 – Incidence of complications

Groups	PONV	p Value	Pruritus	p Value	Motor block for more than 6 hours
1	4* (16.7%)		4* (16.7%)	0.44	1* (4.4%)
2	5* (20%)	0.52	3* (12%)		0 (0%)

* patients with complications

PONV = postoperative nausea and vomiting.

DISCUSSION

This study reinforces the concept that multimodal analgesia is better to control postoperative pain with synergy between analgesic techniques and decreased side effects. Pain was signiflcantly lower in G2 patients (spinal anesthesia associated to "3 in 1" block).

The beneflt of this regional technique had already been shown by different authors in their "3 in 1" block studies. Fletcher, Alan & Heyes[7], Finlayson & Underhill[8] and Haddad & Williams[9] have described that "3 in 1" block was effective to promote analgesia and to decrease PO opioid consumption in femoral neck fracture patients, result which has been conflrmed by our study.

Subarachnoid morphine (70 μg) is an adequate PO analgesia for acting on laminae of Rexed I, II and IV of spinal cord dorsal horn. This analgesic action starts within 30 to 60 minutes and lasts from 8 to 24 hours, so it may have somehow gone beyond the "3 in 1" block analgesic time and could have been a factor raising some issues with regard to the analgesic time resulting from the association of both techniques. As to the dose used in this study, it has shown to be enough to provide good analgesia and at the same time to decrease side effects.

The association of "3 in 1" block to spinal anesthesia has adequately complemented the action of subarachnoid morphine, resulting in better analgesia.

Initially, there was the hypothesis that G1 patients would require more PO analgesics. However, as opposed to what was expected, tramadol consumption was similar for both groups and there has been no difference in pain intensity during the 6th and 12th hours. G2 (subarachnoid morphine + "3 in 1" block) had lower incidence of PO pain; however, among those with pain, intensity was not different than that referred by G1 patients (subarachnoid morphine alone). A feasible explanation for this flnding is that "3 in 1" block may have failed in some patients. Although the block is induced with nerve stimulator, there may be failures due to inadequate distal pressure after anesthetic administration, resulting in insufflcient dispersion due to inadequate needle inclination or to other causes.

So, although the possibility of block failure in some patients, the major outcome reinforces literature data where multimodal analgesia, especially the association of low-dose subarachnoid morphine and "3 in 1" block, decreases the incidence of pain without increasing the risk for complications.

Our study has shown that the association of "3 in 1" block and subarachnoid morphine is better than subarachnoid morphine alone to control pain in patients submitted to hip replacement arthroplasty, with low incidence of complications and reinforcing the concept that multimodal analgesia is better to control postoperative pain with synergy between analgesic techniques and decreased side effects.

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