REVIEW ARTICLE

Pain management after outpatient surgical procedure*

Tratamento da dor após procedimento cirúrgico ambulatorial

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ABSTRACT

BACKGROUND AND OBJECTIVES: Adequate postoperative pain control is critical for any outpatient surgical procedure. This study aimed at evaluating analgesics and techniques used to manage pain of this type of procedure.

CONTENTS: Factors associated to postoperative pain intensity, parameters to be considered for outpatient surgeries, major management techniques for pain relief and the uniqueness of some surgical procedures were addressed.

CONCLUSION: Effective pain control is critical for outpatient surgeries and is aimed not only at comfort but also at decreasing complications and early rehabilitation of patients. Multimodal analgesia is beneficial, but management has to be tailored since there are several drugs and techniques for pain relief.

Keywords: Analgesia, Analgesics, Outpatient surgery, Postoperative pain, Treatment.

RESUMO

JUSTIFICATIVA E OBJETIVOS: O controle adequado da dor pós-operatória é um item importante para qualquer procedimento cirúrgico ambulatorial. O objetivo deste estudo foi pesquisar os analgésicos e técnicas que são utilizadas para o tratamento da dor nesse tipo de procedimento.

CONTEÚDO: Foram abordados os fatores associados com a intensidade da dor pós-operatória, os parâmetros que devem ser considerados para uma operação ambulatorial, os principais tratamentos empregados para alívio da dor e as particularidades de alguns procedimentos cirúrgicos.

CONCLUSÃO: O controle eficiente da dor é fundamental em operações ambulatoriais e visa não somente o conforto, mas também a redução de complicações e a reabilitação precoce do paciente. A analgesia multimodal oferece benefícios, porém o tratamento deve ser individualizado uma vez que estão disponíveis diversos fármacos e técnicas para o alívio da dor.

Descritores: Analgesia, Analgésicos, Cirurgia ambulatorial, Dor pós-operatória, Tratamento.

INTRODUCTION

Postoperative pain (POP) should be rapidly and effectively managed. Its inadequate management after outpatient surgery is directly reflected on patients' recovery. This inadequacy may be both on the effective pain control and on the use of excessive doses of anti-inflammatory drugs and opioids[1].

Many patients have severe pain after hospital discharge. In a questionnaire sent to 92 Sweden hospitals, the most frequent complaint was pain[2]. With the increasing number of outpatient procedures, there has also been an increase in the number of patients needing aggressive multimodal analgesia regimens for effective POP control[3].

Effective pain control is critical for outpatient procedures success. To be efficient and safe, postoperative analgesia requires preoperative planning, identification of risk factors and level of surgical manipulation, evaluation of pain intensity and postoperative sedation, understanding the pharmacology of analgesic agents, their indications and control of adverse effects observed during treatment.

Pubmed database was searched using as keywords the following: *ambulatory surgery, multimodal analgesia, nonopioid analgesics, nonpharmacologic analgesic therapies, opioid analgesics, postoperative (acute) pain management*. All controlled clinical trials and systematic reviews focusing on pharmacological and non-pharmacological therapy to control pain of patients submitted to outpatient surgeries were selected.

This study aimed at evaluating analgesics and techniques used to manage pain in this type of procedure.

PAIN INTENSITY-RELATED FACTORS

POP intensity depends on several factors: surgery site and length, type of surgical incision, surgery size and surgical trauma intensity, previous surgeries with adhesions on the site to be explored, physical status, preoperative preparation and psychological acceptance by patients. In addition, it also depends on the type of anesthesia, on the quality of postoperative analgesia and on early movement

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of patients submitted to outpatient procedures. From all factors, surgery site is the most related to pain intensity.

OUTPATIENT SURGICAL PROCEDURES

Outpatient surgery may be performed in a hospital or in a simpler and more autonomous facility, which may belong or not to a hospital.

Outpatient procedures are adequate when postoperative treatments may be easily made at home with low surgical complication rates, and which do not require intensive treatment or a nursing team treatment.

There are differences among centers as to the indication of outpatient procedures. Procedures such as cholecystectomy, vaginal hysterectomy, reduction mammoplasty, open arthrotomy with ligament repair and thyroidectomy are performed in some centers in outpatient regimen; while in other services these procedures are limited to hospitalized patients. Surgery length is not a criterion to contraindicate outpatient procedures because there is a weak relationship between length of anesthesia and recovery[4]. Longer procedures are in general performed early in the day. The need for blood products transfusion is also not a contraindication for outpatient procedures[5].

Some patients submitted to liposuction receive autologous blood and are discharged, if there are no complications. Advanced age alone is also not a reason preventing outpatient surgeries. Age, however, affects drug pharmacokinetics, and even for those short-lasting such as midazolam and propofol, clearance is decreased for elderly individuals[6]. Another major criterion is patients' physical status according to ASA classification. Outpatient surgeries are no longer limited to patients physical status I or II. It is adequate for patients physical status III or IV if systemic diseases are clinically stable[6].

Patients submitted to outpatient procedures should have escorts to take them home and remain with them to assist them when needed. Before surgery, patients should be informed about the procedure, place where it will be performed, laboratory exams to be done and dietary restrictions. Patients should be aware that they will go home in the same day of the surgery and they or someone in charge should be able to assure that all guidelines will be adhered to. Once at home, patients should be able to tolerate postoperative pain, supposing that adequate therapy has been provided for its relief. Most patients are happy with early discharge, although some elect to remain for a longer period in the hospital[7].

In a study, authors have delivered a questionnaire to hospitals, which became the basis for a follow up during the first two days after surgery. Several hospitals have used this patients' evaluation within 24 hours to standardize the pain score which would be the criterion for hospital discharge[2].

TREATMENTS

Systemic analgesia

Non-steroid anti-inflammatory drugs, paracetamol and dipirone

Most common drugs for effective POP control are non-steroid anti-inflammatory drugs (NSAIDs) and opioids. Several drugs of these classes have been studied to compare their efficacy.

NSAIDs are used alone or in association with opioids or regional analgesia for POP control. They do not induce respiratory depression and decrease the necessary opioid dose, thus decreasing the incidence of respiratory depression, as well as other adverse effects. They are recommended for postoperative multimodal analgesia and are administered by different routes, depending on the possibility. These drugs are indicated for mild to moderate pain. For severe pain they are administered in association with other analgesics or analgesic techniques. Selective COX-2 inhibitors are also effective for outpatient procedures with postoperative pain control. They promote pain relief in a wide variety of outpatient procedures[8]. There is a significant benefit for patients' clinical conditions at discharge, both in returning to daily activities and in controlling short-term POP with the use of classic NSAIDs or COX-2 inhibitors[9,10].

Dipirone is highly effective, has low cost and broad safety margin. It is commonly used as primary or coadjuvant agent to treat acute postoperative pain[11,12]. Its action mechanism remains controversial. There is the hypothesis of peripheral action inhibiting the activation of adenylcyclase by hyperalgesic substances and blocking calcium entrance in the nociceptor. Other possibility is the activation of ATP-sensitive potassium channels[13,14]. It may act on cyclooxygenases activity.

There are evidences of a COX-2 variant, or a new COX enzyme, which could be inhibited by paracetamol[15]. Studies suggest that paracetamol inhibits central COX-2[16]. Central analgesic effect of paracetamol may be due to the activation of descending serotoninergic pathways, but its primary action might be the inhibition of prostaglandin synthesis[17]. However, a different hypothesis suggests antagonist effect of N-Methyl-Aspartate receptors or nitric oxide-related mechanism[16].

Tramadol and opioids

Tramadol promotes the inhibition of norepinephrine and serotonin reuptake in medullary synapse. (+) tramadol and the metabolite (+)-O-desmethyltramadol (M1) are μ receptor agonists. (+) tramadol inhibits serotonin reuptake while (-) tramadol inhibits norepinephrine reuptake with inhibitory effect on medullary transmission. Additional and synergistic action of enantiomers improves analgesic efficacy and tolerability[18]. The metabolite has high affinity to receptors and the analgesic effect depends on both tramadol and the metabolite[19].

Opioids are potent analgesics indicated for moderate to severe POP. They promote analgesic effect for most procedures with extensive trauma, have good action for severe pain, do not have ceiling dose for the analgesic effect and may be antagonized. They may be administered by oral, venous, subcutaneous, sublingual, spinal, intra-articular and regional venous routes. Taking into consideration the outpatient procedure proposal, best routes for drug administration are oral, spinal, regional venous and intra-articular, in addition to local infiltration and for use in nervous and plexus blocks.

Most opioids are agonists with predominant action on μ receptors: morphine, codeine, fentanyl, methadone, oxycodone and hydromorphone.

Opioids are usually prescribed together with NSAIDs. This way the analgesic effect is more intensive and occurs by different mechanisms, in addition to preventing the use of high doses of both classes of drugs and to decreasing adverse effects intensity.

Local anesthetics

Local anesthetics may be indicated for different objectives. They are administered by different routes and sites to manage acute pain. They are used alone or in association with other drugs to decrease latency, and to increase analgesic effect duration or intensity. Venous lidocaine has been used in different surgical procedures[20-24].

Others

Other drugs which may be used are: ketamine, dexmedetomidine, clonidine, steroids, gabapentin and pregabalin. Steroids may also promote beneficial effects in multimodal perioperative analgesia[25-27]. Gabapentinoids have been used as part of multimodal postoperative analgesia[28-32].

Regional analgesia

Regional analgesia decreases the use of opioids, decreasing the high incidence of postoperative vomiting. Local analgesia should be used for all pediatric anesthetic procedures where there is no contraindication because it is effective and safe. Peripheral nervous blocks are also used and the most popular are penile, ileoinguinal, ileo-hypogastric and greater auricular nerve blocks[33]. Ultrasound (US) guided blocks enable the visualization of studied structures and desired site for local anesthetic injection, thus assuring efficacy. Success rate is higher with a substantially lower volume as compared to conventional techniques[34,35]. Caudal epidural block is widely used in pediatric anesthesia and has a critical role in postoperative analgesia for pediatric outpatient procedures[36]. In general, 0.125%-0.25% bupivacaine is used. Other drugs are opioids and alpha-2 agonists[37].

Local anesthetics infiltration

This analgesic technique has been used for decades. It may be a bolus injection or an infusion catheter may be maintained. Catheters are placed in the surgical wound, fascia, intra-articular and intra-abdominal regions for local anesthetic infusion or bolus injection. Catheters have been used in different ways according to the needs of outpatient procedures, such as intra-abdominal, subfascial, subcutaneous, intra-articular, interpleural, substernal and perineural[39]. High volumes of anesthetics with or without adjuvants may be also infiltrated in different section planes in the intraoperative period[38]. Continuous local anesthetic infusion via catheter in the surgical wound promotes effective postoperative analgesia with decreased opioid consumption and consequently decreasing adverse effects and improving patients' satisfaction[39].
Local anesthetics infusion is becoming increasingly popular to control moderate to severe POP in large-sized orthopedic outpatient surgeries[40-43]. However, the specific benefits of this technique should be counterbalanced with equipment costs and resources for its safe use outside the hospital.

Transcutaneous electric nerve stimulation (TENS)

TENS has been used in association to analgesics to relief POP and acts through the activation of pain suppressing system[44]. Electrodes may be placed on paravertebral dermatomes corresponding to the surgical incision or on acupoints[45].

Multimodal analgesia

This is a technique aiming at POP relief with the association of drugs and analgesic techniques. It involves the combined administration of anti-inflammatory, opioids and other drugs acting on different sites in both nervous system central and peripheral pathways. The objective of this association is to improve pain control preventing adverse effects. Multimodal analgesia to prevent outpatient POP is the key element for the recovery process, decreasing late hospital discharges and, most importantly, helping patients' return to their activities the day after[1,26,46-48].
Multimodal treatment should be effective for pain relief, should induce minimum adverse effects, should be safe and easily handled both by patients and caregivers[49].
Pain pathophysiology has multiple mechanisms and there is the need for multimodal or balanced treatment, of analgesics with additive or synergistic effects[50]. Multimodal analgesia should be adjusted to supply individual needs of patients, taking into consideration their medical history, associated diseases, type of proposed surgery and previous experiences related to the management of both chronic and acute pain.

SURGERIES PARTICULARITIES

General surgery

Videolaparoscopy

In a study, celecoxib (400 mg/d) has decreased POP scores and analgesic needs for 24h to 48h, and has provided faster functional recovery, even for daily activities[9]. Preoperative 1 g intravenous paracetamol has decreased the opioid dose needed to control POP, helping the recovery of patients submitted to cholecystectomy[51]. With 4 mg intravenous dexamethasone for patients submitted to anorectal surgeries there has been earlier hospital discharge[52]. Pregabalin, in a single oral dose of 150 mg has relieved POP in patients submitted to cholecystectomy[53].
A multimodal analgesia regimen consisting of preoperative oral 150 mg pregabalin, 975 mg paracetamol and 400 mg celecoxib was effective to decrease the use of intra and postoperative opioids in patients submitted to robotic-assisted prostatectomy[54].
Intraperitoneal administration of local anesthetics for cholecystectomy has relieved POP. Authors have concluded that intraperitoneal local anesthetics are well tolerated and results are promising to control early postoperative abdominal pain[55].

Inguinal hernia repair

With local anesthetics infiltration in surgical wound, superior postoperative analgesia was observed in a study with 0.5% bupivacaine subfascial infusion as compared to oral analgesics as single therapy[56]. In a different study, local anesthetics infusion after inguinal hernia repair has decreased pain scores as compared to placebo. However, these effects are limited to the first postoperative day[57].

Anorectal surgery

For anorectal surgeries, authors have observed that with perianal local anesthetics infiltration patients were safely qualified for hospital discharge with low incidence of urinary retention[58].

Gynecological surgeries

Videolaparoscopy

Preoperative intravenous 1 g paracetamol decreases opioid doses needed to control POP, helping the recovery of patients submitted to hysterectomy[59]. In a study, preoperative oral 300 mg pregabalin did not improve POP in patients submitted to minor gynecological procedures[60,61]. In a different study with high pregabalin doses there has been a higher incidence of sedation[62]. Multimodal analgesia with subarachnoid local anesthetics and opioids, and intravenous NSAIDs was excellent with minor side effects[63]. Surgical wound infiltration with local anesthetics has significantly decreased the need for opioids after gynecological laparoscopic surgeries[64].

Breast reconstruction

For breast reconstruction, levobupivaine injected in the incision site every 3h, as supplement to oral paracetamol, has resulted in effective analgesia[65].

Abdominal hysterectomy

Bupivacaine infusion in the surgical wound above the fascia, in patients submitted to hysterectomy, has improved postoperative pain control for 12h as compared to infusion below the fascia[66].

Orthopedic surgery

Spinal procedures

Preoperative gabapentin was effective to improve POP control for children and adolescents submitted to spinal procedures[67].

Total hip arthroplasty

The combination of 1200 mg gabapentin, 8 mg dexamethasone and 0.15 mg.kg-1 ketamine, plus 1 g paracetamol and 15 mg ketorolac has decreased pain scores in patients submitted to total hip replacement, as compared to paracetamol and ketorolac alone. However, there has been no decrease in morphine needs[68]. Pregabalin (300 mg) has promoted chronic neuropathic pain relief after total hip replacement when administered before surgery and for 14 days after procedures (150-50 mg twice a day). In addition to decreasing opioid needs, these patients had improvement in rehabilitation in the first 30 days[69].

Total knee replacement

Local infiltration with 400 mg ropivacaine and 30 mg ketorolac has relieved pain and decreased morphine consumption for total knee replacement[70]. Intracapsular local anesthetic was as effective as intra-articular local anesthetics[71]. Ropivacaine and morphine infusion has decreased POP and helped rehabilitation[70,73]. With local infiltration there has been lower morphine consumption and lower pain intensity as compared to placebo[74].

Knee arthroscopy

In a systematic review, joint infiltration with local anesthetics has promoted decreased POP[75]. Ketamine and morphine with ropivacaine had analgesic effect without increasing adverse effects[76].

Ligament reconstruction

Treatment may be multimodal with NSAIDs, intra-articular injection, ketamine, nervous block, cryotherapy and opioids[77]. NSAIDs decrease POP[78].

Shoulder surgery

Brachial plexus block and intra-articular anesthetic infiltration are superior to surgery wound anesthetic infiltration, suprascapular nervous block and intravenous patient-controlled analgesica (PCA)79. One may perform intrabursal and subacromial local anesthetic injection via PCA[80]. Morphine and bupivacaine infusion has been used for post-arthroscopy pain relief[81].

ENT surgery

The association of paracetamol and NSAIDs promotes better analgesia then each drug separately[82]. Ketorolac may be used intranasally[83]. Bupivacaine infiltration is effective for adenotonsylectomy[84].

Pediatric surgery

Hernia repair

For inguinal hernia repair, local anesthetic infiltration of the surgical wound has promoted decrease POP[85]. The association of 1 mg.kg-1 ketorolac and 20 mg.kg-1 paracetamol was effective for inguinal hernia repair[86].

CONCLUSION

Effective pain control is paramount in outpatient surgeries and aims not only at comfort, but also at decreasing complication rates and providing early rehabilitation. Multimodal analgesia is beneficial to patients, however the treatment should be tailored since there are several drugs and technique for pain relief.

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