Acta Anaesth. Bel., 2023, 74 | Suppl. 1: *235-261*

Master thesis | Original study

Anesthesiological management of patients with an opioid use disorder: A narrative review of the literature

C. Fierens[1], J. Lauweryns[1], M. Van De Velde[1]

[1]*Department of Anaesthesiology, UZ Leuven Herestraat 49, 3000 Leuven, Belgium.*

Corresponding author: Charlotte Fierens, Department of Anaesthesiology, UZ Leuven Herestraat 49, 3000 Leuven, Belgium. E-mail: charlotte.fierens@student.kuleuven.be

Introduction

The incidence of patients with an opioid use disorder (OUD) has increased drastically in the last decades, consisting of patients who were prescribed an opioid as well as persons abusing opioids. Although the largest growth has been reported in the United States, other Western countries have witnessed the same trend[1,2]. Over 2 million Americans have been estimated to suffer from OUD, with approximately 100 to 130 people dying each day as a result of an opioid overdose, or one person every 11 minutes[3–6]. Since 2016, when more than 42,000 deaths from opioid overdose were recorded in one year, the United States have declared it a public health emergency[7]. Opioids were responsible for approximately 61% of the overdose related deaths, which indicated a tripling since 2000 8. It is probable these numbers are still rising, because the prevalence of chronic pain and consequently chronic opioid intake, continues to grow. Currently, estimated one fifth of the European population and 100 million US adults, suffer from chronic pain and associated disability. In the oncologic population, one in five patients is estimated at risk for developing an opioid use disorder[7–9]. To summarize, opioid use and abuse pose a significant health problem today with an enormous economic cost, due to consumption of health care, addiction treatment, lost productivity and criminal justice system[3,5].

To deal with this population, educational training for physicians is necessary, both primary care physicians and specialists. Training in prescription behavior of the second group, especially surgeons and anesthesiologists, plays an important role in secondary prevention[2]. Today a big effort has already been made to control or reduce OUD. Initiatives include prescription drug monitoring programs, abuse deterrent formulations, allosteric modulators (changing the response of a receptor), peripheric restricted opioid agonists and Prospect guidelines for optimal postoperative pain management[1].

Anesthesiologists play a large role in facing OUD related challenges, generating information to optimize opioid use and providing adequate analgesia with minimal use of opioids[4,10].

If an operative event is divided in four periods (intra-operative, postoperative or recovery, in- and out-hospital period), opioid prescription and administration is managed by anesthesia providers during the first two periods. Although current studies report a rather limited risk of new OUD originating from opioids given in these stages, further research is necessary to assess this risk[11].

This narrative review aims to resume guidelines in literature to manage patients with OUD in the peri- and early postoperative period. Opioid tolerant patients are defined when exposed to doses greater than 60 mg equivalent to morphine within 90 days before surgery, according to the American Society of Enhanced Recovery and Perioperative Quality. Opioid exposed patients had taken < 60 mg equivalent to morphine within 90 days before surgery[7,12].

We summarize patient characteristics, recommendations, options and risks to treat acute pain peri- and early postoperative pain for this challenging group of patients. We excluded regional and neuraxial anesthesia techniques, due to their already well proven benefits.

The author approved the content of the manuscript, and has not been published or submitted for publication elsewhere in print or electronically.

Methods

We performed a literature search to identify relevant articles regarding the management of perioperative pain, focusing on patients with or a history of opioid addiction. We conducted our search using Pubmed, Embase, Cochrane and Tripdatabase from January 2015 until January 2021. Randomized controlled trials, reviews, systematic reviews and meta-analyses were included. The following search terms were used: anesthesia, opioid addiction, opiate addiction, drug dependence, opioid related disorders, opioid use disorder, pain management, perioperative management and anesthesia, and analgesia. Further article selection was based on the following criteria: studies performed on humans, adults, not pregnant, medication related addiction, no regional anesthetic techniques and relevance of title content. Articles with no full text availability were excluded. We limited our search to articles written in English, French or Dutch. The result of our search can be seen in Figure 1.

This research was approved after ethical review (MP017009, SCONE, KU Leuven) on 19th November 2020. This manuscript adheres to the applicable EQUATOR guidelines.

Results

Special population

Knowledge of some pharmacological particularities in OUD patients is essential to provide analgesia after surgery. Patients who chronically use or abuse opioids can develop tolerance, hyperalgesia, addiction, insomnia, cognitive impairment, physical dependence and central sensitization[1,5,7,10,12,13]. These processes act through neuronal adaptation, genetic variance and epigenetic mechanisms[14,15]. As a result, higher pain scores are reported, leading to more and increased doses of opioids used[4,15,16]. Studies show patients taking chronically opioids need 3 to 4 times more opioids in the perioperative period compared to opioid naive patients[17].

Beside the physical characteristics, patients with OUD are more likely to deal with psychiatric comorbidities, which poses an extra risk factor for more and prolonged intake of opioids during an acute pain event[4,18,19]. A review of Elman et al. reported higher addiction severity, more medical problems and poorer therapeutic outcomes in patients suffering from PTSD and OUD[20]. Other risk factors are prior opioid use, older age, physical comorbidities, smoking, longer surgery times, or concomitant substance abuse like benzodiazepines[2,4,7,11].

Not prescribing sufficient opioids however, whether it's due to fear for severe side effects or addiction, may undertreat acute pain and cause increased morbidity, prolonged hospital stays and higher medical costs[12,21–23]. Moreover, recent studies demonstrate stress accompanying untreated pain can provoke a greater risk of relapse[15].

Pain perception and craving are determined by adequate pain relief in the peri- and postoperative period. Moreover, pain impacts wound healing, has pulmonary and cardiovascular complications, and leads to lengthier of hospital stay[14,23,24]. An aggressive pain treatment plan is necessary to minimize these risks. Patients at risk should be identified, daily

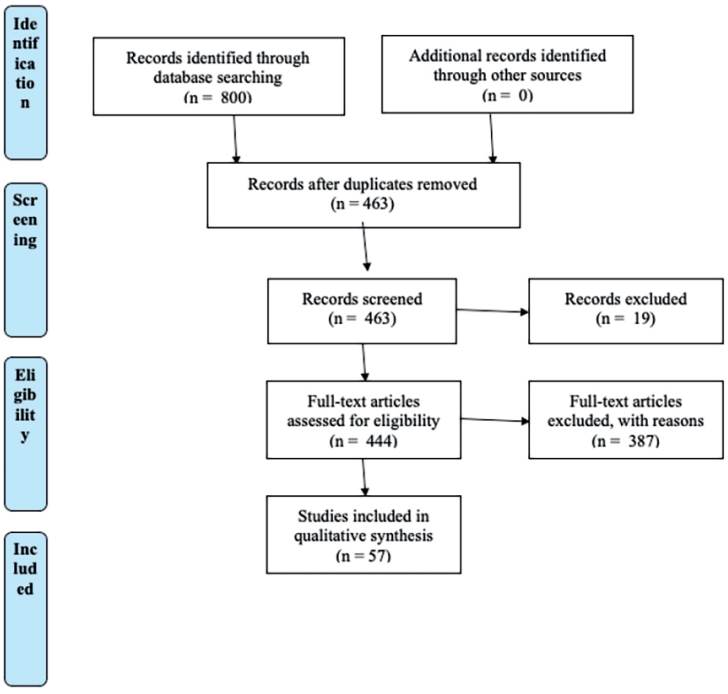

Fig. 1 — PRISMA FLOW DIAGRAM.

doses can be calculated, fear can be anticipated, and a patient centered plan can be generated[12,22,23,25]. Specific assessment tools such as ORT (opioid risk tool), PMQ (pain medication questionnaire) and COMM (Current opioid misuse) can help in this process[7,9,19,26].

Firstly, the ORT screening tool is a short list of questions to evaluate risk factors, such as history and type of substance abuse, family history and psychological disease. Together, this assesses the risk of current opioid abuse. Every question attributes one point, which allows the additive aspect of the listed risk factors to score patients in low or high risk for further developing addiction and misuse. Although according to Lynn et al this questionnaire is well studied and validated, the evidence for its value remains unclear[7,9].

Secondly, the PMQ has been designed to evaluate aberrant drug use in patients who are already prescribed opioids for chronic pain. It includes 26 questions and categorizes patients with high or low scores, defining patients with high scores are 2,6 times more likely to deal with substance abuse compared with the low-risk group[9].

Thirdly, the COMM test, seems to be the best one to evaluate current opioid misuse. It entails detecting opioid misuse over the past 30 days[9].

Also, urine drug tests can be used for preoperative screening or postoperative follow-up. However, this is not routinely recommended by the American Society of Anesthesiology due to false negative or positive results, limited instantaneous information and lack of Methadone or Fentanyl detection[22].

When patients with, or at high risk for, OUD are identified, the preoperative time should be used to optimize their start condition[25]. This includes meetings with a pain specialist to list amounts of opioids used and potentially reduce opioid misuse[12,26]. The best way to summarize the amount of opioids used entails calculating the equivalent 24 hours oral morphine doses (Figure 2). Daily needs at time of surgery must be substituted, switched to intravenous administration if necessary, and supplemental analgesics are needed to treat the additional surgical pain component[12,23]. When switching between opioids, due to dose-limiting side effects, limited effectiveness or inappropriate way of absorption, doses must be reduced with 25 to 50 % because of incomplete cross-tolerance[2,12]. In addition, psychological support and access to understandable information about pain must be arranged through brochures, videos and group sessions. Timing is important as this period has been proven most motivational for patients to learn new techniques dealing with stress[7,27,28]. It is well studied that information and education can help to create realistic expectations for the postoperative pain period[2,4,10]. Levels of anxiety, a known predictor for stress, can be reduced, as well as discomfort and pain scores. An increased trust relationship between patient also contributes to this process. Inadequate information provokes catastrophizing thinking, which is linked to higher pain intensity scores, up to 3 months post-operative. Some studies even suggest informed patients experience improved physical functioning up to 6 months postoperative[28].

On the other side, regarding the incidence (0,09 to 13 %) of new developing OUD in opioid naïve patients after elective surgery, and over-prescription of opioids, efforts are made for opioid free analgesic strategies[4,10,11,29,30]. In an OUD population this means continuation of chronic used opioids and only non-opioid analgesic to threat acute pain. The goal is to avoid opioid side effects like respiratory depression, muscle rigidity, obstructed breathing, negative inotropism, nausea and vomiting, urinary retention, tolerance and addiction[31]. Consequently, patients leave the hospital without or with minimal narcotic prescriptions and regular postoperative check-ups[32].

For all patients taking opioids, multimodal anesthesia and analgesia is strongly recommended based on WHO guidelines, including locoregional or neuraxial techniques, combinations and rotations within classes of medication[4,15,21,22,25]. The overall

MORFINE = MG/DAY	MORPHINE	FENTANYL	OXYCODON	TRAMADOL	BUPRENORPHINE		METHADONE	
IV	PO	TD	PO	PO	TD	SL	PO	IV
10 MG	30 mg	12 mcg/h	20 mg	120 mg	15 mcg/h	0,40 mg	6-10 mg	3 – 5 mg
50 MG	150 mg	75 mcg/h	100 mg	-	80 mcg/h	2 mg	15-30 mg	7-15 mg
100 MG	300 mg	150 mcg/h	200 mg	-	-	4 mg	24 – 36 mg	12 – 18 mg
200 MG	600 mg	300 mcg/h	400 mg	-	-	8 mg	30 – 60 mg	20 - 30 mg

Fig. 2 — Opioid conversion table.

goal is to decrease or to slow opioid dose escalation, to return as fast as possible to preoperative opioid doses and reduce the incidence of adverse events related to opioid use[24,33].

Combined use of analgesics, based on additive and synergetic characteristics, can enlarge its desired effect, and decrease the likelihood of side effects[29]. Multiple drug combinations are described in literature, but there's little consensus about 'the right' match. A review of E.N. Brown et al. proposes to choose a combination of drugs acting on different targets in the nociceptive system[34].

Results

Study population

86 patients were assessed for eligibility. Two patients were excluded because they did not meet the required criteria and 14 patients did not want to participate in the study. 1 patient was removed from the study by the principal investigator because of serious anemia (not an official exclusion criteria). We enrolled 69 patients in this study (Figure 1). During the study no drop-outs due to malfunctioning of the SSTS device were mentioned. All patients, nurses and physiotherapists completed their questionnaire.

Acetaminophen

Acetaminophen is worldwide used as a first line analgesic and has proven opioid sparing effects, also in an OUD population[4,35]. It targets prostaglandin concentrations in the brain, causing less inflammation, and inhibits reuptake of endogenous cannabinoids[15].

NSAID's

Analgesic effects of NSAID's results from suppression of prostaglandin synthesis at site of inflammation[34]. Multiple RCT's in orthopedic and abdominal surgery showed a significant decrease in pain scores 24 hours postoperative with administration of Ibuprofen IV per-operative, compared with placebo[7,16]. This effect was also seen in an OUD population[36]. Recent RCT's show even decreased pain scores (VAS) up to 4 days after orthopedic surgery[37,38].

A review of Gazendam et al. reported lower postoperative VAS scores for 24 hours when NSAID's were administered preoperative, due to reduced central and peripheral sensitization before the surgical trigger[39].

Cannabinoids

A review of S.Nielsen et al. summarizes the opioid sparing effect of co-administering cannabinoids, D-9-THC, with opioids. Some preclinical studies, 14 out of 19, reported evidence for a 3,6 times lower median administered dose of morphine in combination with D-9-HTC than morphine administered alone. Although, out of nine clinical studies only one provided evidence of an opioid sparing effect of cannabinoids[33].

Ketamine

Ketamine has antinociceptive effects by blocking NMDA glutamate receptors[34]. Subanesthetic doses can be helpful to manage acute postoperative pain, also in OUD patients, although research is still ongoing to determine the analgesic doses not provoking psychomimetic effects[40]. A meta-analysis from 14 RCT's of Pendi et al. demonstrated lower pain scores and morphine consumption at 6-, 12- and 24-hours postoperative in Ketamine groups in spine surgery. Loftus et al. reported a decrease in postoperative morphine consumption up to 6 weeks in OUD patients undergoing spine surgery after low dose ketamine infusion per-operative (0,5 mg/kg at 10 mcg/kg/h), compared with placebo[7]. A RCT from Nielsen et al. demonstrated a reduction in PCA morphine 24 hours postoperative and a reduction in pain scores up to 6 months in patients receiving ketamine during spine surgery[16].

Also, ketamine infusions have been studied in the postoperative period in OUD patients, with doses ranging from 60 to 120 mcg/kg/h over 4 hours, although titration may be needed[21].

Analgesic effects of ketamine were also described when co-administered with magnesium. A RCT from Varas et al. reported a decrease of almost 50% in morphine consumption 12 hours after abdominoplasty when ketamine (0,3 mg/kg) and magnesium (50 mg/kg) were given in a single bolus followed by a continuous infusion of 0,15 mg/kg/h ketamine and 10 mg/kg/h magnesium, compared to ketamine alone. Pain scores were not significantly different between groups 40. Das Adhikary et al. did not find any difference in postoperative pain after bariatric surgery between the use of ketamine (0,5 mg/kg) and the combination with magnesium (2 g) after single administration of each[41].

Lidocaine

Lidocaine has analgesic characteristics through binding to sodium channels, through downregulation of the inflammatory response, and through NMDA receptor antagonism[34,35]. An initial bolus (1-3 mg/kg) followed by a continuous infusion (1-5 mg/kg/h) peroperative seems to be effective in decreasing morphine consumption and early postoperative pain scores in patients undergoing abdominal surgery, presumably also in OUD patients[4,35].

Gabapentinoids

Gabapentinoids have an analgesic effect through binding voltage-gated calcium channels,

thereby inhibiting the release of excitatory neurotransmitters[23,35,42]. Although the analgesic effects are demonstrated in patients undergoing abdominal and gynaecological surgery, Li et al. couldn't confirm this in urogynecologic surgeries[43,44]. A review of Hurley et al. concluded a beneficial effect of gabapentinoids in postoperative pain management after various types of surgery, suggesting this could also be beneficial for OUD patients[36]. A systematic review of Fabritius et al., including 97 RCT's, showed decreased pain scores postoperative, only in rest, with pregabaline and slightly less morphine used 24 hours after surgery. Beside its potential minimal opioid sparing effect, more adverse events (dizziness, vomiting and visual disturbances) were reported, especially with multiple doses[42].

Gabapentinoids are presumed to carry a low risk for addiction in general population due to functional NMDA antagonist capacities, creating a negative feedback loop for habituation and dependence. However, data are showing misuse, up to 20% in OUD populations, mostly in persons dealing with opioid withdrawal symptoms[4,45].

Alfa 2 Adrenergic Agonists

Dexmedetomidine and Clonidine have anxiolytic, sedative and analgesic properties due to inhibition of nociceptive transmission and decreased arousal[34,35]. The addition of dexmedetomidine perioperative shows analgesic and opioid sparing effects up to 24 hours after discontinuation of infusion and could be helpful in OUD patients[16] .

Dexamethasone

Dexamethasone is a mineral glucocorticoid with analgesic effects when administered in doses over 100 mcg/kg, due to a decrease in presynaptic neurotransmitter release and production of NMDA antagonists[31,36]. It could be helpful in OUD patients, when administered in analgesic instead of anti-emetic doses. Preoperative administration seems to have a more stable effect compared with intraoperative administration.

Caffeine

Caffeine is a methylxanthine with excitatory effects on the central nervous system. Although intrinsic analgetic effects are described in very high doses, it is mostly used as an analgesic adjuvant (100-130 mg). A review with 4262 patients receiving Caffeine as analgesic adjuvants shows a modest increase in number of patients with good pain relief, due to increased drug absorption, reduced drug clearance and peripheral pronociceptive adenosine signaling[35].

Ondansetron

Recently more research has been done to the potential analgesic effects of ondansetron, a 5-HT3 receptor antagonist. A RCT of Mahikhan et al., including 96 patients, shows a beneficial effect of 2 doses ondansetron 8 mg on morphine consumption during recovering, compared with a placebo group, although no significant differences in pain scores were noticed[46]. 5-HT3 receptor antagonists seem to play a role in countering the process of opioid addiction and dependence. This may implicate patients receiving ondansetron need less opioids to manage their pain or feel less urge to consume opioids to prevent withdrawal symptoms[47].

Total intervenous anesthesia

The potential analgesic effects related to the type of anesthesia used perioperative are recently investigated. Despite propofol has probably analgesic characteristics by suppressing nociceptive transmission, antagonizing NMDA receptors and activating GABA-A receptors, Windpassinger et al. couldn't demonstrate any superiority in postoperative analgesia compared with sevoflurane[48]. A review of Wong et al., including 16 RCT's, compared acute postoperative pain after TIVA or gas anesthesia. Nine RCT's showed a beneficial analgesic effect after TIVA anesthesia, especially after surgery with an inflammatory component. Five RCT's didn't show any differences and 2 trials resulted in worse analgesic outcomes after propofol use[49].

Buprenorphine

Buprenorphine, a partial μ agonist and k antagonist, is used for chronic pain and addiction treatment. Its kappa component limits respiratory side effects and decreases euphoria and tolerance, giving it a safe profile[3,22,25,50–54]. Its partial μ receptor agonism makes it difficult to manage acute pain with full opioid agonists[55]. Continuation or discontinuation of buprenorphine in OUD patients remains an open question in literature. If discontinued, this must be planned 3 weeks to 72 hours before surgery, with gradual decreasing doses. When stopped faster or for a longer period, risk for relapse is higher[22,51,52,56]. Withdrawal symptoms or pain can be treated with μ agonist replacement therapy[52–54]. Mehta et al. suggest discontinuation only 12 hours pre-operative and use the remaining part of buprenorphine (T1/2 20 up to 70 hours), which is at that time not too high to overcome with μ agonists[52,56].

On the other hand, recent reports propose to continue buprenorphine where an interruption can destabilize patients, provoking anxiety and discomfort, higher pain scores and increase relapse

risk[3,22,25,50,54,55]. Quaye et al. recommend in their review to continue buprenorphine treatment at a reduced dose, to avoid withdrawal symptoms provoked by discontinuation of intake[5]. High doses of opioid agonists are probably required to overcome the partial μ agonist effects of buprenorphine[53,55]. This can increase the risk for illicit drug use, relapse, tolerance and severe adverse events[5,51–53].

Also, daily dosage of buprenorphine can be increased up to 32 mg/day sublingual, divided over 4 to 6 equal gifts a day to promote its analgesic properties[22]. A review of Goel et al. suggest continuing buprenorphine when doses of more than 16 mg a day SL are used[50]. Anderson et al., Jonan et al., Buresh et al. and protocols of the University of Michigan suggest continuing when only mild pain levels are expected post-operative, when estimated high abuse relapse risk or when buprenorphine was taken as OUD treatment[51,55]. When moderate to high pain levels are expected, buprenorphine can be stopped and substituted with full μ agonist s[3,52]. The answer whether to stop buprenorphine depends on the degree of emergency, the expected postoperative pain levels, patient preference and local guidelines.

After resolution of the acute pain event, a follow-up program must provide continuation on or re-switch to buprenorphine, what could be intensive and difficult to achieve[3,54–56].

Methadone

Methadone, a full μ opioid agonist, NMDA antagonist and reuptake inhibitor of norepinephrine and serotonin, is often used for chronic pain and opioid withdrawal 51. Methadone can provoke QT prolongation and sudden cardiac death, as such responsible for one in three opioid overdose related deaths[2,22]. Literature is advising to continue chronic use per- and postoperative[22,23]. The maintenance dose of Methadone is not sufficient to counter acute pain, and extra analgesic regimes or splitting the dose in 3 times a day are necessary[23,25,57]. When oral intake is not possible, a switch to alternative analgesic therapies is recommended, and as soon as possible returning postoperative to the previous taken dose. First choice for alternatives are non-opioids, with attention for drug interactions and QT prolongation. When opioids are used, higher doses are often necessary, with risks for typically opioid side effects, due to the long half time of Methadone and little % unoccupied mu receptors[3]. Also switch to intravenous Methadone is possible, usually started in 2:1 ratio and sometimes up titrated to 1:1[22]. Methadone can be introduced per- and postoperative in OUD patients, started with 30-40 mg per day, as an analgesic adjuvant, as well as a prevention and treatment strategy for withdrawal symptoms, which can complicate recovery[25]. Nevertheless, multimodal treatment with non-opioid analgesics will often be necessary for adequate pain relief[57].

PCA Opioids

Some studies describe the inevitable need for opioids in OUD patients to manage acute postoperative pain. Even though PCIA systems were considered potentially dangerous for stimulating addictive behavior, nowadays their use is widely implemented through safety systems with dosage limits and lockout intervals, and preferred over basal opioid infusions[51]. Although risks of overdose are low, frequent re-assessment is necessary[36]. Self-dosing systems provide better patient satisfaction and prevent underdosing, leading to less anxiety and better pain scores in general[22]. It can be used as a safe rescue option to provide effective analgesia[16].

Non-pharmacological appraoches

Alternative analgesic approaches are acupuncture, massages, TENS, music therapy, hypnosis, meditation, and cold laser therapies, with proven analgesic effects, especially for High Intensity Laser Therapy (HILT)[3,6,8,12,30]. Also, psychological based therapies and forms of STEPS (Steps to Surgical success) could help to manage acute postoperative pain and improve postoperative outcomes. Studies do not show a shift in pain perception, but a higherperception of patient managed pain control[4,13]. All together this can be a new starting point in managing pain. However, these strategies are still not generally implemented in clinical use, mostly due to time and cost efforts, although psychological and educational interventions decrease the average time of hospitalization (1,25 to 2,4 days) and complication rate, and by consequence general medical costs[8,28].

Discussion

A lot of analgesics are already proposed, examined, and used to reduce pain in the postoperative period. Many of these studies examine specific analgesics in very heterogenous groups of patients and different types of surgery, making it difficult to fit an analgesic conclusion for all, especially for OUD patients. Definitions of opioid misuse are also widely variable, varying from DSM criteria to prescription shopping to patient-based doses escalation.

Multimodal strategies are generally recommended, although guidelines for one golden combination cannot be generated. Combining medication also implicate a risk for drug interactions

or patient specific synergistic effects, which can also cause unforeseen complications. Personalized individual planning can help to prevent this but is expensive and time consuming, although cost effective at long term. Single therapy with opioids remains unfortunately an easy and cheap choice to relieve pain and to satisfy patients demand and rights to be pain free, compared to multimodal strategies[2]. Moreover, opioids used perioperative have synergetic effects with anesthetic products, contributing to more stable anesthesia especially in trauma patients or patients with limited cardiac reserves[11].

NSAID's have proven their benefits but according to Norris et al. and Uribe et al., the question remains about the benefit on postoperative pain scores whit preoperative administration of NSAID's[39].

Lots of the analgesics proposed for multimodal treatment also carry some limitations.

We found strong evidence for the use of ketamine for reducing pain scores and opioid consumption postoperative, but further research is necessary in OUD populations to determine analgesic doses and risk of new addiction behavior[16]. The combination with single use magnesium did not show better pain scores, but standard doses were used in a bariatric population without adaption to body weight. Further studies are necessary to detect if these results are due to a lack of continuous infusion or undertreatment[41].

The use of cannabinoids could be promising in reducing opioid consumption, but these studies were pre-clinical, had little patient groups and showed conflicting data.

Regarding the evidence for gabapentionoids, there is a place for its use in acute postoperative management, but there is no consensus about dosing and duration or timing of treatment[16,35].

Caffeine could be a promising analgesic adjuvant, but further studies are necessary to define its impact on pain scores and opioid consumption, as well as dose related side effects.

Evidence for the use of Ondansetron in pain management or preventing urge to consume opioids is low regarding the very low numbers of patients included in the studies.

The type of anesthesia (TIVA/gas) remains an individual choice depending on patient and surgery factors and anesthesiologist preferences. We cannot make consistent recommendations regarding acute postoperative pain due to conflicting study results and weak evidence because small numbers of patients and short-term follow-up[49].

The uncertainty about the best practice for Buprenorphine remains, despite its widespread use among OUD patients. The provided evidence remains low, and further research is necessary to resolve the question about discontinuation and to evaluate relapse rate after both strategies[5,50,54,57]. Probably an individual approach (level of tolerance, psychological support) in combination with the rate of emergency and expected pain levels will be determinative[52,56].

Benzodiazepines and anti-psychotics also could help to reduce fear, and so reducing pain, next to their analgesic effects through muscle relaxation. However, beside a long list of side effects, they carry a risk for addiction in an already vulnerable group of patients[23].

Many studies mention the importance of preoperative information and education about pain, leading to better pain scores and faster recovery[39]. Although many questionnaires are developed to identify OUD patients and help clinicians, their value remains controversial due to the multifactorial context of opioid misuse and honesty. They often screen only for opioid misuse, neglecting other medication groups like gabapentinoids[9]. It remains time consuming and difficult to share the right amount of information to an individual patient, where too much information can cause less understanding and treatment compliance[19,28]. Also, nonpharmacological strategies are gaining attention the last years. More research about their analgesic potential is needed, but we have very little to lose in this already poly-medicated patients.

Prescription behavior in the postoperative period remains a problem. Although White et al. describe guidelines about prescription of opioids for clinicians, less than 60% follows them according to questionnaires[8]. Over 90% of opioid overdose survivors keep receiving opioid prescriptions, with consequently up to 17% reported repeat overdoses[2]. It is important to inform patients explicit about the risks for addiction, and to prescribe restrictively on regular check-ups[26,29].

Further research is necessary for development of a personalized and individual approach in pain management. Many other products, like Amantadine and Duloxetine, are examined but so far, consistent effects or lower VAS scores are not demonstrated[35]. Beta blockers like esmolol could help reduce hyperalgesia effects of opioids and block the excitatory effects of pain signaling, but this mechanism of working and effects remains unclear[3,35]. Furthermore, studies about Calcitonine, Nicotine and Capsaicine are still ongoing, as well as studies about personal genetic constitution and sensitivity for pain[6,28].

Conclusion

Patients suffering from OUD require specific pharmacological knowledge to treat acute per-

and postoperative pain. Preoperative screening, to identify OUD patients, can guide patients to pain specialists, provide information and psychological training, with promising results on postoperative pain perception.

Per- and postoperative they need a personalized and titrated analgesic approach, with often higher doses analgesics compared with opioid naïve patients. Multimodal strategies are highly recommended, however one analgesic cocktail for all patients probably does not exist. Beside pharmacological intervention with analgesics and primary non analgesics, also non-pharmacological techniques can contribute to the management of postoperative pain. Center based protocols must be developed, based on staff preferences and patient individual considerations.

More research is necessary to combine and implement these strategies in daily practice.

*Acknowledgments: I*would like to thank my supervisor Dr. Julie Lauweryns for her guidance and help through this work.

Conflict of interest: We have no conflict of interest to disclose. This research received no external funding.

Key messages:

- Patients with an opioid use disorder need a personalized and titrated per-and post-operative analgesic approach
- Implementation of pre-operative screening (questionnaires) is important to identify OUD patients
- Pre-operative period can be used to provide advice from pain specialists and psychological coaching
- Multimodal analgesic treatment is recommended with combined analgesics, primary non analgesics and non-pharmacological therapies
- The individual analgesic approach will be based on anesthesiologists, center and patient preferences and guidelines
- Post-operative close and long-term follow-up with restricted opioid prescription behavior is needed.

References

1. Stein C, Kopf A. Pain therapy – Are there new options on the horizon? Best Pract Res Clin Rheumatol. 2019;33(3):101420.
2. Manchikanti L, Kaye AM, Kaye AD. Current State of Opioid Therapy and Abuse. Curr Pain Headache Rep. 2016;20(5):1-9.
3. Scholzen E, Zeng AM, Schroeder KM. Perioperative Management and Analgesia for Patients Taking Buprenorphine and Other Forms of Medication-Assisted Treatment for Substance Abuse Disorders. Adv Anesth. 2019;37:65-86.
4. Soffin EM, Lee BH, Kumar KK, Wu CL. The prescription opioid crisis: role of the anaesthesiologist in reducing opioid use and misuse. Br J Anaesth. 2019;122(6):e198-e208.
5. Quaye ANA, Zhang Y. Perioperative Management of Buprenorphine: Solving the Conundrum. Pain Medicine (United States). 2019;20(7):1395-1408.
6. Everson M, McLain N, Collins MJ, Rayborn M. Perioperative Pain Management Strategies in the Age of an Opioid Epidemic. Journal of Perianesthesia Nursing. 2020;35(4):347-352.
7. Kaye AD, Kandregula S, Kosty J, et al. Chronic pain and substance abuse disorders: Preoperative assessment and optimization strategies. Best Pract Res Clin Anaesthesiol. 2020;34(2):255-267.
8. White PF. An alternative approach to solving the opioid epidemic: is there a role for non-pharmacologic analgesic therapies? Postgrad Med. 2019;131(1):1-5.
9. Lawrence R, Mogford D, Colvin L. Systematic review to determine which validated measurement tools can be used to assess risk of problematic analgesic use in patients with chronic pain. In: British Journal of Anaesthesia. 2017;119:1092-1109.
10. Clark DJ, Schumacher MA. America's Opioid Epidemic: Supply and Demand Considerations. Anesth Analg. 2017;125(5):1667-1674.
11. Malik KM, Imani F, Beckerly R, Chovatiya R. Risk of opioid use disorder from exposure to opioids in the perioperative period: A systematic review. Anesth Pain Med. 2020;10(1):e101339.
12. Karamchandani K, Carr ZJ, Bonavia A, Tung A. Critical Care Pain Management in Patients Affected by the Opioid Epidemic: A Review. Ann Am Thorac Soc. 2018;15(9):1016-1023.
13. Cornett EM, Budish R, Latimer D, Hart B, Urman RD, Kaye AD. Management of Challenging Pharmacologic Issues in Chronic Pain and Substance Abuse Disorders. Anesthesiol Clin. 2018;36(4):615-626.
14. Coluzzi F, Bifulco F, Cuomo A, et al. The challenge of perioperative pain management in opioid-tolerant patients. Ther Clin Risk Manag. 2017;13:1163-1173.
15. Cornett EM, Kline RJ, Robichaux SL, et al. Comprehensive Perioperative Management Considerations in Patients Taking Methadone. Curr Pain Headache Rep. 2019;23(7):49.
16. Thomas DA, Boominathan P, Goswami J, Mukherjee S, Vadivelu N. Perioperative Management of Patients with Addiction to Opioid and Non-opioid Medications. Curr Pain Headache Rep. 2018;22(7):52.
17. Vadivelu N, Chang D, Lumermann L, Suchy T, Burg MM, Fontes ML. Management of Patients on Abuse-Deterrent Opioids in the Ambulatory Surgery Setting. Curr Pain Headache Rep. 2017;21(2):10.
18. Macintyre PE, Roberts LJ, Huxtable CA. Management of Opioid-Tolerant Patients with Acute Pain: Approaching the Challenges. Drugs. 2020;80(1):9-21.
19. Pulley DD. Preoperative Evaluation of the Patient with Substance Use Disorder and Perioperative Considerations. Anesthesiol Clin. 2016;34(1):201-211.
20. Elman I, Borsook D. The failing cascade: Comorbid post traumatic stress- and opioid use disorders. Neurosci Biobehav Rev. 2019;103:374-383.
21. Vadivelu N, Kai AM, Kodumudi V, Zhu R, Hines R. Pain Management of Patients with Substance Abuse in the Ambulatory Setting. Curr Pain Headache Rep. 2017;21(2):9.
22. Sen S, Arulkumar S, Cornett EM, et al. New Pain Management Options for the Surgical Patient on Methadone and Buprenorphine. Curr Pain Headache Rep. 2016;20(3):1-8.
23. Grancaric N, Lee W, Scanlon M. Postoperative Analgesia in the Chronic Pain Patient. Otolaryngol Clin North Am. 2020;53(5):843-852.
24. Edwards DA, Hedrick TL, Jayaram J, et al. American Society for Enhanced Recovery and Perioperative Quality Initiative Joint Consensus Statement on Perioperative Management of Patients on Preoperative Opioid Therapy. Anesth Analg. 2019;129(2):553-566.
25. Anitescu M. The patient with substance use disorder. Curr Opin Anaesthesiol. 2019;32(3):427-437.

26. Demsey D, Carr NJ, Clarke H, Vipler S. Managing opioid addiction risk in plastic surgery during the perioperative period. Plast Reconstr Surg. 2017;140(4):613E-619E.
27. Lee BH, Wu CL. Educating patients regarding pain management and safe opioid use after surgery: A narrative review. Anesth Analg. 2020;130(3):574-581.
28. Horn A, Kaneshiro K, Tsui BCH. Preemptive and Preventive Pain Psychoeducation and Its Potential Application as a Multimodal Perioperative Pain Control Option. Anesth Analg. 2020;130(3):559-573.
29. Nassif GJ, Miller TE. Evolving the management of acute perioperative pain towards opioid free protocols: a narrative review. Curr Med Res Opin. 2019;35(12):2129-2136.
30. Fiore JF, Olleik G, El-Kefraoui C, et al. Preventing opioid prescription after major surgery: a scoping review of opioid-free analgesia. Br J Anaesth. 2019;123(5):627-636.
31. Sultana A, Torres D, Schumann R. Special indications for Opioid Free Anaesthesia and Analgesia, patient and procedure related: Including obesity, sleep apnoea, chronic obstructive pulmonary disease, complex regional pain syndromes, opioid addiction and cancer surgery. Best Pract Res Clin Anaesthesiol. 2017;31(4):547-560.
32. Katims AB, Eilender BM, Pfail JL, Sim AJ, Sfakianos JP. Tips and tricks in achieving zero peri-operative opioid used in onco-urologic surgery. World J Urol. Published online 2020:1-8 – IN PRESS.
33. Nielsen S, Sabioni P, Trigo JM, et al. Opioid-sparing effect of cannabinoids: A systematic review and meta-analysis. Neuropsychopharmacology. 2017;42(9):1752-1765.
34. Brown EN, Pavone KJ, Naranjo M. Multimodal general anesthesia: Theory and practice. Anesth Analg. 2018;127(5):1246-1258.
35. Kumar K, Kirksey MA, Duong S, Wu CL. A Review of Opioid-Sparing Modalities in Perioperative Pain Management: Methods to Decrease Opioid Use Postoperatively. Anesth Analg. 2017;125(5):1749-1760.
36. Shah S, Kapoor S, Durkin B. Analgesic management of acute pain in the opioid-tolerant patient. Curr Opin Anaesthesiol. 2015;28(4):398-402.
37. McDonald E, Daniel J, Nicholson K, et al. A Prospective Randomized Study Evaluating the Effect of Perioperative NSAIDs on Opioid Consumption and Pain Management After Ankle Fracture Surgery. Foot Ankle Orthop. 2018;3(3):2473011418S0008.
38. Gürkan Y, Yörükoğlu HU, Işık E, Kuş A. The effect of ibuprofen on postoperative opioid consumption following total hip replacement surgery. Turk J Anaesthesiol Reanim. 2019;47(1):31-34.
39. Gazendam A, Ekhtiari S, Horner NS, Nucci N, Dookie J, Ayeni OR. Perioperative nonopioid analgesia reduces postoperative opioid consumption in knee arthroscopy: a systematic review and meta-analysis. Knee Surgery, Sports Traumatology, Arthroscopy. Published online 2020:1-17 – IN PRESS.
40. Varas V, Bertinelli P, Carrasco P, et al. Intraoperative Ketamine and Magnesium Therapy to Control Postoperative Pain After Abdominoplasty and/or Liposuction: A Clinical Randomized Trial. Journal of Pain Research. 2020;13:2937-2946.
41. Adhikary S das, Thiruvenkatarajan V, McFadden A, Liu WM, Mets B, Rogers A. Analgesic efficacy of ketamine and magnesium after laparoscopic sleeve gastrectomy: A randomized, double-blind, placebo-controlled trial. J Clin Anesth. 2021;68:110097.
42. Fabritius ML, Strøm C, Koyuncu S, et al. Benefit and harm of pregabalin in acute pain treatment: A systematic review with meta-analyses and trial sequential analyses. Br J Anaesth. 2017;119(4):775-791.
43. Li ALK, Wadsworth K, Siddiqui NT, et al. Does low-dose gapapentin reduce opioid use postoperatively?: A randomized controlled trial in women undergoing reconstructive pelvic surgery. Int Urogynecol J. 2019;30(2):211-217.
44. Hassani V, Pazouki A, Nikoubakht N, Chaichian S, Sayarifard A, Khankandi AS. The effect of gabapentin on reducing pain after laparoscopic gastric bypass surgery in patients with morbid obesity: A randomized clinical trial. Anesth Pain Med. 2015;5(1):1-5.
45. McAnally H, Bonnet U, Kaye AD. Gabapentinoid Benefit and Risk Stratification: Mechanisms Over Myth. Pain Ther. 2020;9(2):441-452.
46. Mahikhan F, Hashemian M, Dehesh T, Jafari E, Jafari M, Rahimi HR. Impact of Ondansetron on Withdrawal Signs, Fentanyl Requirement and Pain Relief in Opioid-addicted Patients under General Anesthesia. Curr Clin Pharmacol. 2019;14(3):232-241.
47. Chu LF, Rico T, Cornell E, et al. Ondansetron does not prevent physical dependence in patients taking opioid medications chronically for pain control. Drug Alcohol Depend. 2018;183:176-183.
48. Windpassinger M, Plattner O, Gemeiner J, et al. Utilisation d'opioïdes après une anesthésie au propofol ou au sévoflurane: une étude randomisée. Canadian Journal of Anesthesia. 2016;63(11):1258-1265.
49. Sau S, Wong C, Chan WS, Irwin MG, Cheung CW. Total Intravenous Anesthesia (TIVA) With Propofol for Acute Postoperative Pain: A Scoping Review of Randomized Controlled Trials. Asian Journal of Anesthesiology 2020 1 Asian Journal of Anesthesiology. 2020:1;1-15.
50. Goel A, Azargive S, Lamba W, et al. The perioperative patient on buprenorphine: a systematic review of perioperative management strategies and patient outcomes. Canadian Journal of Anesthesia. 2019;66(2):201-217.
51. Anthony Anderson T, Quaye ANA, Nalan Ward E, Wilens TE, Hilliard PE, Brummett CM. To stop or not, that is the question acute pain management for the patient on chronic buprenorphine. Anesthesiology. 2017;126(6):1180-1186.
52. Jonan AB, Kaye AD, Urman RD. Buprenorphine formulations: Clinical best practice strategies recommendations for perioperative management of patients undergoing surgical or interventional pain procedures. Pain Physician. 2018;21(1):E1-E12.
53. Huhn AS, Strain EC, Bigelow GE, Smith MT, Edwards RR, Tompkins DA. Analgesic effects of hydromorphone versus buprenorphine in buprenorphine-maintained individuals. Anesthesiology. 2019;130(1):131-141.
54. Goel A, Azargive S, Weissman JS, et al. Perioperative Pain and Addiction Interdisciplinary Network (PAIN) clinical practice advisory for perioperative management of buprenorphine: results of a modified Delphi process. Br J Anaesth. 2019;123(2):e333-e342.
55. Buresh M, Ratner J, Zgierska A, Gordin V, Alvanzo A. Treating Perioperative and Acute Pain in Patients on Buprenorphine: Narrative Literature Review and Practice Recommendations. J Gen Intern Med. 2020;35(12):3635-3643.
56. Mehta D, Thomas V, Johnson J, Scott B, Cortina S, Berger L. Continuation of buprenorphine to facilitate postoperative pain management for patients on buprenorphine opioid agonist therapy. Pain Physician. 2020;23(2):E163-E174.
57. Ward EN, Quaye ANA, Wilens TE. Opioid use disorders: Perioperative management of a special population. Anesth Analg. 2018;127(2):539-547.

doi.org/10.56126/75.S1.34