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Postoperative Pain Management for Geriatrics – A Brief Review Focused on Administering Drugs and Providing Nerve Block

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Abstract

An aging population is a crucial issue faced by many countries. The number of people over 65 years old was estimated to be 5.06 million in 2008 and will increase to 130 million by 2040 worldwide. Pain during the treatment of the elderly is very common in surgical and non-surgical conditions. It can develop into chronic pain, delay functional recovery, prolong medical care, and increase life burden. Therefore, it is worthwhile to notice pain problems in the elderly that are often unrecognized and poorly controlled. To solve this problem, it is recommended to predict postoperative morbidity using a comprehensive geriatric assessment in the preoperative period. The Face Pain Scale has been verified for the evaluation of pain assessment, especially for older adults with cognitive impairment. Elderly patients usually have complex medical conditions that require polypharmacy that includes opioid/no-opioid drugs. According to the US Drug Pain Management Guidelines, opioids should be the first consideration. They should be combined with non-opioid adjuvants for moderate to severe postoperative pain. It is also reasonable to use multimodal analgesia in geriatric populations for postoperative pain control, especially neurological blockade to relieve severe pain. For geriatric populations, these treatments decrease pain and improve overall quality of care.

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Key Words:
geriatric medicine, geriatric pain, postoperation pain, opioid, nerve block

Introduction

There is a global health issue of an increasing geriatric population living with pain. It is estimated that in 2020, approximately 45%-85% of the older population will complain about chronic pain. A prevalence study showed that 25% to 76% of older people living in communities and from 85% to 93% of those living in residential care suffer from persistent pain.[1] A lot of healthcare programs have been developed for elderly patients in pain because of increasing need. For geriatric fracture, a multidisciplinary approach has been developed to improve the quality of care, with an additional goal of controlling pain appropriately.[2] However, the management of postoperative pain in this population is still a difficult task because such patients

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usually have a lot of co-morbidities that may contribute to polypharmacy and increase drug-drug interactions. This population also has diminished functional status, decreased physiological reserve, and concomitant age-related pharmacokinetic changes. They are also at higher risk for cognitive impairment, which may lead to problems in pain assessment.[2] In this article, we briefly review pain care for geriatric populations and proposed possible methods for dealing with postoperative pain.

Pain evaluation tools for geriatric populations

Older patients usually have associated complex health problems. Pain assessment may thus be a significant challenge. The commonly used verbal rating scale for pain (a 0 to 10 scale) has been reported to be an effective measurement of pain intensity in older adults.[3] However, some older adults with dementia may have difficulty using this scale. The American Geriatric Society has reported six pain behaviors as alternatives, namely facial expressions, verbalizations and/or vocalizations, body movements, changes in interpersonal interactions, changes in activity patterns or routines, and mental status.[4] Other tools such as the visual analog scale, numerical scale, pain thermometer scale, and the Faces Pain Scale can also be helpful (Table 1).[5] Recent evidence has established the reliability and validity of the Faces Pain Scale for use with older adults.[3]

Special considerations for geriatric populations

Polypharmacy: Polypharmacy is a very common geriatric condition that can interfere or enhance pain medication in multiple ways. A full understanding of these interactions with elderly physiology is still being developed to identify options for reducing drugs and the risk of their interactions. There is a recommendation to consult with a geriatrician in the postoperative period to determine whether polypharmacy can be reduced to lessen the risk of confusion, falling, and medical complications from medications themselves.[6]

Patients' will and support relationships: High-quality, patient-centered care is of vital importance to all patients and families. However, it is always important to include geriatric patients' preferences when developing a care plan.[7] The role of family in the postoperative care of elderly patients deserves greater attention. The support systems of elderly people may often be tenuous. For example, patients may go home with a spouse who may be the only major caretaker. Families may also have no members who can spend the time with the patient during recovery. Consideration of these issues before and after surgery will assist postoperative care and settled placement.[8]

Poor pain management: It has been reported that postoperative pain is not adequately managed in over 80% of patients in the USA and that the presence and intensity of acute pain during or after surgery is predictive of chronic pain.[9] Common surgical procedures for older adults such as joint replacements, emergent orthopedic procedure,s and surgeries for cancer are associated with higher levels of postoperative pain.[5] Physicians may think that geriatric patients need lower doses and thus use fewer pain drugs. However, their pain is often undertreated, and elderly individuals may be more vulnerable to the detrimental effects of such undertreatment.[10] The physical, social, emotional, and cognitive changes associated with aging also have an important impact on perioperative pain management. These patients may have different attitudes than younger patients toward expressing pain and seeking appropriate therapy. Altered physiology also changes the distribution and metabolism of analgesic drugs and local anesthetics,

and requires frequent dose alterations. The complexity of pain assessment in geriatric patients also often requires a multidisciplinary approach to diagnosis and management.[11]

Comprehensive geriatric assessment in perioperative period: The comprehensive geriatric assessment (CGA) was introduced to predict postoperative morbidity in geriatric patients undergoing surgery.[12] However, only 6% of surgeons routinely perform preoperative geriatric assessment.[12] The CGA has 8 domains: burden of comorbidity, polypharmacy, physical function according to activities of daily living (ADL), instrumental ADL (IADL), cognitive status (Mini-Mental State Examination), risk of postoperative delirium (Nursing Delirium Screening Scale), Korean geriatric depression scale, and nutritional status (Mini Nutritional Assessment). The CGA can provide a comprehensive health appraisal to guide targeted geriatric intervention and appropriate treatment selection.[12,13] As cognitive impairment worsens, the assessment of patients' pain by family and caregivers takes on greater importance.[5] However, this assessment still needs more data to support its wide use.

Pain management for geriatric populations

Strong opioids for geriatric patients: Opioids have become widely accepted for treating older adults with persistent pain but require physicians to manage their side effects (Table 2) to prevent possible toxicity under careful monitoring (Table 3).[3] Age-related changes in drug metabolism must be considered.[1] The decreases in hepatic blood flow/volume and glomerular filtration rate with age influence opioid metabolism, especially for opioids with a primary renal clearance such as morphine, tapentadol, and hydromorphone, and could lead to more side effects. One of the newer opiates, oxymorphone, has recently been studied as it is metabolized via a non-cytochrome P-450 pathway and therefore bypasses many drug-drug interactions in the elderly.[14] Estimating creatinine clearance and hepatic function is needed in dosage adjustments.[1] The American Geriatric Society has advised to avoid opioids, which carry the highest risk of adverse effect when minor surgery is performed, if possible. For most major surgery, opioids should still be the first line but should be quickly escalated in combination with non-opioid adjuvants for synergistic analgesia and the opioid-sparing effect. "Start low and go slow" is a wise tenet for geriatric medicine.[5] A newer drug, tapentadol, seems to not undergo significant metabolism by the cytochrome P-450 system and its potential drug-drug interaction is supposed to be lower than that of other opioids.[1]

The following equation can be used to estimate morphine consumption in the first 24 hours after major surgery: [100 - patient's age (years)] mg of intravenous morphine.[5] Intravenous patient-controlled analgesia (IVPCA) boluses of opioids might also be considered in the immediate (first several hours) postoperative period for rapid pain relief and analgesic titration. [15] IVPCA can even be used safely in carefully selected patients with cognitive impairment. IVPCA settings and continuous opioid infusions are presented in Table 4.[5]

Non-opioid adjuvants: Postoperative pain can also be treated with acetaminophen and nonsteroidal anti-inflammatory drugs (NSAIDs) in geriatrics. However, acetaminophen is primarily metabolized by the liver. Patients should not take more than 4 g/day. NSAIDs are limited due to potential side effects of gastric irritation and bleeding, inhibition of platelet function, and worsening of renal function.[16] Weak opioids such as tramadol may improve chronic pain, but clinicians must take steps to avoid its misuse or abuse as well as opioid-related adverse effects.[17] Tramadol has a different

mode of action than that of opioids as it inhibits neuronal reuptake of norepinephrine and serotonin. It has the potential to cause life-threatening serotonin toxicity or serotonin syndrome when combined with selective serotonin-reuptake inhibitors. This is a clear limitation of tramadol in the elderly because of the high concurrent rates of depression.[1]

Ketamine is widely used as an adjuvant analgesic in a variety of perioperative pain control regimes. It has been reported to reduce pain intensity by up to 20–25% and reduce analgesic consumption by 30–50% for up to 48 h after surgery.[18] An associated reduction in opioid-related adverse effects such as decreased nausea/vomiting was also found. Postoperative analgesia can also be achieved either by repeated boluses or by PCA ketamine with an opioid.[19] When an appropriate dose of an opioid (for example, 0.1 mg/kg morphine) is administered but pain is still >5 on a 0-10 numerical rating scale, 50% of the usual bolus dose of morphine (for example, if the usual intravenous bolus to control pain is 2 mg, use 1 mg) + 25 mg (~350 μg/kg) ketamine is an effective antinociceptive dose. Up to four such boluses (one every 10 min) may be needed to optimally suppress hyperalgesia.[19]

Gabapentinoids, as part of multimodal analgesia, may contribute to better postoperative pain management to enhance opioid analgesia and prevent opioid tolerance. The two clinically used gabapentinoids, gabapentin and pregabalin, although currently only licensed for chronic neuropathic pain, epilepsy, and anxiety (pregabalin only), are increasingly used as an adjuvant for perioperative analgesia.[18]

Nerve block for geriatric postoperative pain: Nerve blocks such as fascia iliaca block (FICB) have been successfully integrated into routine multimodal acute pain management protocols for elderly hip fracture patients.[20] Currently, multimodal analgesia based on nerve block in the perioperative period of lower extremity joint arthroplasty is still recommended.[21] Although the efficacy of FICB has been established, there is still disagreement about the exact neuroanatomy targeted by the block. In a comparison of 3-in-1 femoral nerve block and FICB, Capdevila et al. found that the obturator nerve was effectively blocked in 38% of patients receiving FICB.[22] Moreover, peripheral nerve blocks with local anesthetics are used in inguinal hernia surgery and its postoperative pain management. There is a study where the needle entry point is defined in the medial anterior superior spina iliaca as the anatomical landmark technique. However, there is also a study that pointed out that lumbar nerve origins and the progresses of iliohypogastric/ilioinguinal nerves in the anterior abdominal wall may vary.[23] The success rate of peripheral regional blocks with ultrasound guidance has increased from 60% to 95%.[20,22] Besides, evidence from populations of all ages has shown the use of peripheral regional block to be effective as a component of multimodal analgesia for a number of surgical procedures, including thoracotomy, shoulder surgery, and hemorrhoid surgery.[15] Guidelines in the United States,the United Kingdom and Australian suggest that the use of regional nerve blocks can be integrated into comprehensive pain pathways.[15,20] It is also accepted that ultrasound guidance improves safety and efficacy and can be the gold standard localization technique for regional nerve blocks.[20] Multimodal analgesia along with regional anesthesia may enhance recovery while ensuring rehabilitation, quicker transfer to an outpatient setting, and quicker return to activities of daily living.[22]

Conclusions

Geriatric postoperative pain is a clinical issue of

increasing importance. We suggest the careful use for opioids, non-opioid adjuvants, and regional nerve blocks under ultrasound guidance for postoperative pain in geriatric patients. Multimodal analgesic therapy is also recommended for the elderly to reduce opioid-related adverse effects and to provide additive or synergistic effects and more effective pain relief compared with that obtained with single-modality interventions. Detailed pain assessment and compressive understanding of special considerations for geriatric populations are key for successful pain management.

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Table 1 Pain scoring tools

Pain scoring tools		
Visual Analog Scale	Marks a score on a graded line representing no pain to severe pain	Cognitively intact patients; difficulty speaking
Numeric Rating Scale	0–10 score for no pain to severe pain	Cognitively intact patients; validated in mild to moderate cognitive impairment. Preferred
Verbal Descriptor Scale	Ranks “mild, moderate, severe pain”	Cognitively intact patients; validated in mild to moderate cognitive impairment. Preferred
Faces Pain Scale	Ranks pain on a series of smiling to frowning faces	Validated in mild to moderate cognitive impairment
Pain Assessment Checklist for Seniors with Limited Ability to Communicate Pain Assessment in Advanced Dementia Doloplus-2	-	Validated in severe cognitive impairment
Visual scales, assistive hearing devices	-	Hearing impairment

Adapted from: [5] McKeown JL: Pain Management Issues for the Geriatric Surgical Patient Anesthesiology Clin 2015 Sep;33(3):563-76.;563–576

Table 2 Management of opioid-related adverse effects in older adults

Management of opioid-related adverse effects in older adults		
Adverse effect	Frequency	Management
Constipation	+++	Prescribe laxatives when starting opioids Consider oxycodone/naloxone preparation
Nausea	+++	Low doses and slow titration To treat with antiemetics
Sedation, mental confusion	+	Careful review of medications (benzodiazepines, antidepressants, etc.) Low doses and slow titration
Delirium	+	Careful review of medications (benzodiazepines, antidepressants, etc.) Low doses and slow titration
Falls, fractures	+/-	To monitor walking instability and fall risk when initiating opioids Careful review of medications
Respiratory depression	Very rare	Low doses and slow titration
Immunosuppression	Rare	To consider in long-term therapy
Addiction	Very rare	Abuse history Use tools to assess risk Monitoring patient

Adapted from: [1]Guerriero F: Guidance on opioids prescribing for the management of persistent non-cancer pain in older adults. World J Clin Cases, 2017 Mar; 16 5(3): 73–81

Table 3 When prescribing opioids in older adults

When prescribing opioids in older adults
Beginning at the lowest possible dose and titrating upwards base on tolerability and efficacy
Longer dosing interval and regular monitoring are recommended
Switching to another opioid might be indicated in cases of unacceptable side effects of insufficient analgesia
The oral route may be the most convenient
Low-doses of strong opioids should be preferred to weak opioids because of its effectiveness and safety
Strong opioids generally recommended in frail old population are buprenorphine, hydromorphone and oxycodone (including oxycodone/naloxone formulation)
Controlled-release formulation and transdermal formulations are generally preferred (low risk of addiction and adverse effects)
Considering laxatives or oxycodone/naloxone to prevent constipation
Over-the-counter analgesics use should be avoided

Adapted from: [1]Guerriero F: Guidance on opioids prescribing for the management of persistent non-cancer pain in older adults. World J Clin Cases, 2017 Mar; 16 5(3): 73–81

Table 4 Suggested starting doses for intravenous patient-controlled analgesia

Suggested starting doses for intravenous patient-controlled analgesia			
Drug	Dose	Bolus Interval (min)	Loading/Rescue
Morphine	1 mg	10	2 mg every 4 h
Hydromorphone	0.1 mg	10	0.2 mg every 4 h
Fentanyl	10 μg	5	20 μg every 2 h

Adapted from: [5]McKeown JL: Pain Management Issues for the Geriatric Surgical Patient Anesthesiology Clin 2015 Sep;33(3):563-76.;563–576

老年人術後疼痛管理之文獻回顧

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人口高齡化是當今每個國家共同面對的問題 ，估計全世界超過 65 歲的老年人口數將從 2008 年約 506 萬人，在 2040 年增加到 1.3 億人。老年人在手術和非手術情況，疼痛未接受治療是非常普遍，將導致發展成慢性疼痛問題，並延遲他們功能恢復或是延長醫療照護，最後增加生活的負擔。值得關注老年人手術後疼痛問題經常無法被辨認且正確地控制。為了解決此問題，在手術前使用廣泛性老人評估 (CGA)，預測手術後合併症已經是被建議使用。其它評估工具，臉譜量表 (Faces Pain Scale) 疼痛評估已證實用於特別是有認知受損的老年人。老年病患通常合併複雜內科疾病，需要多重藥物治療包括嗎啡類和非嗎啡類藥物。根據美國藥物疼痛管理指引，在手術後期間有重度和中度疼痛，嗎啡類藥物應視為第一線用藥，但應合併非嗎啡類輔助藥物使用。在老年人手術後疼痛控制是很合理使用多種模式止痛，特別是用於神經阻斷術去減輕嚴重疼痛問題。由於人口老化，這些疼痛治療降低他們疼痛問題並改善全面性照護品質。

關鍵字：老年人疼痛管理、術後、嗎啡類

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