Postoperative Pain Management in Geriatric Patient after Joint Replacement Surgery

Essay

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List of Abbreviations

IASP	The International Association for the Study of Pain
STT	spinothalamic tract
OSA	Obstructive sleep apnea
PACU	Post anesthetic care unit
SMT	Spinomesencephalic tract
PaO_2.	Arterial partial pressure of Oxygen
PCO_2	Arterial partial pressure of carbon dioxide
PCA	Patient controlled analgesia
SRT	spinoreticular tract
CNS	Central nervous system
NMDA	*N*-methyl-D-aspartate
FRC	functional residual capacity
AMPA	α-amino-3-hydroxy-5-methyl-4-isoxazolepropionic acid
CGRP	Calcitonin gene-related peptide
GABA	Gamma amino butyric acid
DRG	Dorsal root ganglion
$\dot{V}O_2max$	maximal oxygen uptake
CO_2	carbon dioxide
ROS	Reactive oxygen species
OSA	obstructive sleep apnea
V/Q	Ventilation/perfusion
ADL	activities of daily living
CPSP	Chronic postsurgical pain
HRQL	health-related quality of life
Vd	volume of distribution
IV	Intravenous
IM	Intramuscular
SQ	Subcutaneous
IR	immediate release
ER	extended release
NSAIDs	Non-steroidal anti-inflammatory drugs

COX	cyclooxygenase
CEI	continuous epidural infusion
PCEA	Patient controlled epidural analgesia
CPNB	continuous peripheral nerve block
TKA	total knee arthroplasty
THA	total hip arthroplasty
ACL	anterior cruciate ligament repair
ORIF	Open reduction, internal fixation
LPB	Lumbar plexus blockade
TENS	transcutaneous electrical nerve stimulation
↑	Increased
↓	Decreased or reduced

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Introduction

The process of aging refers to the normal physiological process of degeneration .Chronological age refers to the age according to birth date while biological age is the estimated age based on the state of body organs. As a result of increased life expectancy with advances in surgical and anesthetic techniques and life –supporting systems, more surgical procedures are now carried out for those patients previously thought to be unfit for anesthesia and surgery ***(Lee, 2006).***

With the aging of the population, major orthopedic joint replacement procedures are becoming increasingly more common .The rate of major adverse events after hip and knee arthroplasties is 6.4% and as stated earlier, the most important risk factor is advanced age ***(Parviz et al., 2007).***

Joint replacement has been the greatest advance in orthopedic surgery in the past two to three decades. Replacement of the hip, knee, shoulder and finger have contributed to improved function and relief of pain in many patients especially geriatric patients ***(Mercedes, 1998).***

Although pain is often considered a protective mechanism, postoperative pain serves no useful purpose and can be harmful. Despite this knowledge and the increased sophistication of available pain relief modalities, postoperative pain continues to be undertreated and patients continue to suffer from it ***(Christoph, 1994).***

Geriatric patients require special attention with regard to postoperative analgesia. As a result of age-related changes in physiology and coexisting disease, analgesia must be administered carefully to ensure a good outcome and decrease side effects (especially respiratory depression and sedation). The goal of safe, quality analgesia is to provide the “3L’s”: lowest effective dose, longest duration and least side effects. ***(Kelly, 1995)***

Aim of work

The aim of work to gain the basic knowledge for postoperative pain management in geriatric patient after joint replacement surgery.

1

Physiology of pain

Pain is a universal human experience and the most common reason people seek medical care. Pain tells us something is wrong in the structure or function of our body and that we need to do something about it. Because pain is such a strong motivator for action, it is considered one of the body's most important protective mechanisms ***(Watkins et al., 2008).***

Definition of pain

The International Association for the Study of Pain (IASP) defines pain as “an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage” ***(Merskey, 2008).***

There are two different approaches to pain: the sensory-discriminative (perception of the intensity, location, duration, temporal pattern, and quality of noxious stimuli) and motivational-affective (relationship between pain and mood, attention, coping, tolerance, and rationalization) ***(Lin, 2009).***

Pain is always subjective and it is a sensation in part of the body and also has an emotional component. Many people report pain in the absence of tissue damage or any probable pathophysiologic cause; usually this happens for psychological reasons. There is no way to distinguish their experience from that due to tissue damage ***(Collett, 2007).***

The Purpose of pain

A withdrawal reflex response to an acute noxious stimulus is an understandable and necessary reaction that has an obvious protective

function even in the absence of conscious perception. More importantly, the experience of pain may lead to the avoidance of potentially harmful situations and possible injury. Immobility and withdrawal due to pain may serve to provide an environment in which healing and restoration of function can occur. However, chronic pain appears to serve no protective or restorative purpose; indeed, the pain itself becomes a disease process. This appears to be related to the pathophysiologic processes that occur following inflammation and nerve injury, which are quite different from those seen following acute 'physiologic' pain ***(Hudspith et al, 2006).***

Classification of pain

a) According to the clinical status:

● **Acute pain:** is "the normal, predicted physiological response to an adverse chemical, thermal or mechanical stimulus . . . associated with surgery, trauma and acute illness".Generally ,acute pain resolves within 1 month ***(Macres et al., 2009).***
The most important type of acute pain is the postoperative pain.

● **Chronic pain**

It is defined as pain without apparent biological value that has persisted beyond the normal tissue healing time usually taken to be 3 months."The presence or extent of chronic pain often does not correlate with the documented tissue pathology. Examples of chronic pain: pariphheral neuropathy and multiple sclerosis ***(Collett, 2007).***

b) According to pathophysiology:

· **Nociceptive Pain**

Nociceptive pain may be classified according to the mode of noxious stimulation; the most common categories being "thermal" (heat or cold),

"mechanical" (crushing, tearing, etc.) and "chemical" (iodine in a cut, chilli powder in the eyes). Nociceptive pain may also be divided into "superficial" and "deep", and deep pain into "deep somatic" and "visceral" ***(Coda and Bonica, 2001).***

-Superficial pain is initiated by activation of nociceptors in the skin or superficial tissues, and is sharp, well-defined, clearly localized pain. Examples of injuries that produce superficial pain include minor wounds and minor (first degree) burns ***(Coda and Bonica, 2001).***

-Deep somatic pain is initiated by stimulation of nociceptors in ligaments, tendons, bones, blood vessels,fasciae and muscles. It is dull-aching, poorly-localized pain; examples include sprains, broken bones and myofascial pain ***(Coda and Bonica, 2001).***

-Deep Visceral pain originates in the viscera (organs). Visceral pain may be well-localized, but often it is extremely difficult to locate, and several visceral regions produce "referred" pain when injured, where the sensation is located in an area completely unrelated to the site of injury; examples include shoulder pain from myocardial infarction, back pain from pancreatitis, and right shoulder pain from gallbladder disease ***(Heuther and Leo, 2002).***

· **Neuropathic pain**

The International Association for the Study of Pain introduced the term neuropathic pain, defined as "pain initiated or caused by a primary lesion or dysfunction in the nervous system." Neuropathic pain is divided into "peripheral" (originating in the peripheral nervous system) and "central" (originiting in the brain or spinal cord) ***(Treede et al., 2008).***