

Table of contents

Subject	Page
Introduction	1
Aim of the work	3
Review of literature	4
Postoperative pain	4
Definition of pain	4
Anatomy and physiology of pain	6
Mechanism of postoperative pain	22
Assessment of pain	24
Assessment of acute pain	24
Assessment of chronic pain	29
Importance of postoperative pain management	32
Management of postoperative pain	38
Preemptive analgesia	38
Drug therapy of postoperative pain	43
Opioids	43
NSAIDs and cyclooxygenase-2-selective inhibitors	46
N-methyl-D-aspartate antagonists	49
Alpha-2 adrenergic agonists	52
Gabapentin-type drugs	54
Glucocorticoids	56
Cholinergic drugs	56
Local anesthetic injections at wound site	57
Patient controlled analgesia for postoperative pain (POP)	58
Intravenous patient controlled analgesia	58
Patient-Controlled Epidural Analgesia	60
Patient-Controlled Regional Analgesia	62
Patient-Controlled Intranasal Analgesia	67
Transdermal drug delivery	68
Iontophoresis	71
Other PCA Modalities	73
Pain control after cardiac surgery	74
Summary	82
References	85
Arabic summary	

List of abbreviations

ACC	Anterior cingulate cortex
ACLC	Anterior cruciate ligament construction
BP	Blood pressure
CABG	Coronary artery bypass graft
CGRP	Calcitonin gene related protein
CHADD	Controlled heat-assisted drug delivery
CNS	Central nervous system
COX	Cyclo-oxygenase
CPB	Cardiopulmonary bypass
CSF	Cerebrospinal fluid
DNIC	diffuse noxious pain inhibitory mechanisms
EMLA	Eutectic mixture of Local Anesthetic
GA	General anesthesia
GABA	Gamma-amino butyric acid
IA	Intraarticular
IASP	International Association for the Study of Pain
IC	Insular cortex
IN	Intranasal
IV PCA	Intravenous Patient-Controlled Analgesia
LMWH	Low-molecular weight heparin
MAP	Mitogen activated protein
NMDA	N-methyl D-aspartate
NO	Nitric oxide
NRM	Nucleus raphe magnus
NRS	Numeric rating scale
NSAIDs	Non-steroidal anti-inflammatory drugs
PAG	Periaqueductal gray
PCA	Patient controlled analgesia
PCEA	Patient-Controlled Epidural Analgesia
PCINA	Patient-Controlled Intranasal Analgesia
PCRA	Patient-controlled regional analgesia
PGE2	Prostaglandin E2
POD	Postoperative day
PONV	Postoperative nausea and vomiting
POP	Postoperative pain
RM	Ropivacaine/morphine
RMK	Ropivacaine/ morphine/ ketorolac
TEA	Thoracic epidural anesthesia
TNF- α	Tumor necrosis factor α
VAS	Visual analogue scale
VPL	Ventroposterolateral
VPM	Ventroposteromedian
VRS	Verbal categorical rating scale
WDR	Wide dynamic range

List of figures

no.	Title	Page
1	The nociceptive pathways from the periphery will conduct to the brain after two synaptic relays	7
2	The nociceptive afferent fibers can be separated according to their physical characteristics and conduction velocity	8
3	Endogenous pain modulation	19
4	Commonly used one-dimensional pain intensity scales	25
5	Agreement between simultaneously recorded pain intensity on a VAS and on a six-point faces pain scale: experimental pain: earlobe pinching in 4–12-yr-old children	26
6	Schematic diagram of iontophoretic drug delivery (Ag/AgCl electrode system).	72

List of tables

no.	Title	Page
1	Preemptive analgesia: concept, timing, goals	39