Assessment and Management of Pain for Critically ill Intubated Patients

An Essay
Submitted for Partial Fulfillment of
Master Degree in the Intensive Care

By:

Mohamed Farouk Arafa Barghash
(M. B., B.Ch)

Supervised by

Prof. Dr. Mohammed Sallam
Professor of Anaesthesiology & Intensive Care
Faculty of Medicine

Prof. Dr. Yasir Bassyouni
Assistant Prof. of Anaesthesiology & Intensive Care
Faculty of Medicine
Ain- Shams University

Dr. Ahmed Salah El Din
Lecturer of Anaesthesiology & Intensive Care
Faculty of Medicine
Ain- Shams University

Faculty of Medicine
Ain Shams University
٢٠١٣


بسم الله الرحمن الرحيم
رَبِّ إِنِّي لِمَا أَنزَلْتَ إِلَيَّ مِنْ
خَيْرٍ فَقِيرٌ
صدق الله العظيم
سورة القصص آية (٢٤)

.

Acknowledgement

First of all, all gratitude is due to **God** *almighty for blessing this work, until it has reached its end, as a part of his generous help, throughout my life.*

Really I can hardly find the words to express my gratitude to **Prof. Dr. Mohammed Sallim** *Professor of Anaesthesiology & Intensive Care, faculty of medicine, Ain Shams University, for his supervision, continuous help, encouragement throughout this work and tremendous effort he has done in the meticulous revision of the whole work. It is a great honor to work under his guidance and supervision.*

I am deeply grateful to **Prof. Dr. Yasir Bassyouni** *Assistant Prof. of Anaesthesiology & Intensive Care, faculty of medicine, Ain Shams University, for sponsoring this work, and his keen supervision.*

I would like also to express my sincere appreciation and gratitude to **Dr. Ahmed Salah El Din** *Lecturer of Anaesthesiology & Intensive Care, faculty of medicine, Ain Shams University, for his continuous directions and support throughout the whole work.*

Last but not least, I dedicate this work to my family and my son (Ro٢aa) whom without their sincere emotional support, pushing me forward this work would not have ever been completed.

Mohamed Barghash

Contents

List of Abbreviations

ADEs	:	Adverse drug events
BPS	:	Behavioral Pain Scale
CNS	:	Central Nervous system
CPOT	:	The Critical-Care Pain Observation Tool
ECMO	:	Extracorporeal membrane oxygenation
EDTA	:	Ethylene diaminete traacetic acid
FDA	:	Food and Drug Administration
GABA	:	Gamma-amino butyric acid
IASP	:	The International Association for the Study of Pain
ICPs	:	Integrated care pathways
ICU	:	Intensive Care Unit
IM	:	Intramuscular
IV	:	Intravenous
NE	:	Norepinephrine
NMDA	:	N-methyl-D-aspartate
NPG	:	National pain guidelines
NRS	:	Numeric Rating Scale
NS	:	Nociceptivespecific neurons
NTDB	:	National Trauma Data Bank
NVPS	:	Non-Verbal Pain Scale
PAG	:	Periaqueductal grey matter

List of Abbreviations

PRIS	:	Propofol related infusion syndrome
RF	:	Reticular formation
SCCM	:	Society of Critical Care Medicine
SOFA	:	Sequential organ failure assessment
SUPPORT	:	Study to Understand Prognoses and Preferences for outcome risk and treatment
VAS	:	Visual Analogue Scale
Vd	:	Volume of distribution
WBS	:	The Wong-Baker Faces Scale
WDR	:	Wide dynamic range neurons

.

List of tables

List of Figures

Aim of the Work

The aim of this review is to explain different methods of pain assessment in critically ill intubated patients who are not able to communicate verbally and how to deal with.

Physiology of Pain

Introduction:

Pain often occurs in critical care patients and is one of the most clinically challenging problems. Pain and discomfort in these patients can be due to surgical and posttraumatic wounds, invasive monitoring devices, prolonged immobilization, mechanical ventilation, and routine nursing procedures such as suctioning and dressing changes. In addition, patients may have a preexisting chronic pain condition, complicating the assessment and treatment of acute pain. Pain is a problem in critical care that has not been adequately addressed **(Jodka and Heard, ٢٠٠٥).**

Definition:

In ١٩٠٠, Sherringtongl, was among the first modern neural scientists to define pain as the psychical adjunct to an imperative protective reflex. This is a Concise definition, and it underlines the urgent primitive dimension of pain-the motor response that is teleologically oriented to remove tissue from potentially damaging insults **(Shannon and Bucknall, ٢٠٠٣).**

More recently, The International Association for the Study of Pain (IASP) defines pain as "an unpleasant sensory and emotional experience which we primarily associate with tissue damage or describe in terms of such damage, or both." This definition recognizes that pain is a perception and not a sensation. One influential model described pain in terms of three hierarchical levels: a sensory-discriminative component (e.g., location, intensity, quality), a motivational-affective component (e.g., depression, anxiety), and a cognitive-evaluative component (e.g., thoughts concerning the cause and significance of the pain) **(Mark ٢٠٠٧).**

There is an important implication of both the IASP definition and the hierarchical model of pain: As a perception, pain may or may not correlate with an identifiable source of injury. The activity in the body's "nociceptive" system, which senses noxious stimuli and generates a physiological and behavioral response, can be initiated by injury and sustained by neuroplastic changes even after healing; activity in this system can occur in the absence of any discrete injury but in association with a recognizable disease **(Mark ٢٠٠٧).**

Classification of pain:

Pain is generally classified according to its location, duration, frequency, underlying cause, and intensity. Classification of pain is thus complicated and can be a source of confusion for many clinicians. As a result, many practitioners now commonly use several different classifications systems. Clear distinctions between these systems are not always possible: the more simplistic the classification of pain, the greater the number of omissions and overlaps that can occur. To successfully manage pain, practitioners must be able to work with pain classifications that encompass all considerations (i.e., time,course, involved anatomy, intensity, type of patient, and specific pathology) and be able to switch from model to model, depending on a patient's individual circumstances **(Pasero et al.,٢٠٠٩).**

Classification of pain according to location:

Pain is often classified by body location. Two overlapping schemes relate the pain to the specific anatomy and/or body system thought to be involved. The anatomic pain classification system identifies sites of pain as viewed from a regional perspective (e.g., lower back pain, headache, pelvic pain). In contrast, the body system pain classification method focuses on classical body systems (e.g., musculoskeletal,

neurologic, vascular). Yet, both classification systems address only a single dimension (ie, where or why does the patient hurt) and thus may ultimately fail to adequately define the underlying neurophysiology of the problem. **(Turk and Okifuji, ٢٠٠٧).**

Classification of pain according to Duration:

The duration of the pain process is the most obvious distinction that can be made when classifying pain symptoms. Conventionally, acute pain is limited to pain of less than ٣٠ days' duration, whereas chronic pain persists for more than ٦ months. Subacute pain comprises the interval from the end of the first month to the beginning of the seventh month of continued pain. Recurrent acute pain describes a pain pattern that persists over an extended period of time but occurs mainly as isolated episodes of pain. Chronic pain is further divided by its underlying etiology into non-cancer-related pain (often called benign or nonmalignant pain) and cancer-related pain (often called malignant pain) **(Eliot, ٢٠٠٢).**

Acute pain:

Acute pain serves a biologic purpose by providing a warning that illness or injury has occurred. The pain is usually confined to the affected area and is limited over time. Acute pain stimulates the sympathetic nervous system, resulting in "fight or flight" response symptoms, including increased heart and respiratory rates sweating, dilated pupils, restlessness, and apprehension. Without acute pain, it is doubtful that human survival would be possible at all. Pain after surgery (i.e., postoperative pain) is a specific type of acute pain. No matter how successful or well performed, operations cause tissue trauma and release potent mediators of inflammation and pain, although postoperative pain is experienced by millions of patients throughout the world, it is rarely recognized as producing harmful physiologic or psychological effects. The

axiom "No one ever died from pain" is clearly incorrect, given the modern recognition that unrelieved pain increases cardiac work, increases metabolic rate,interferes with blood clotting, leads to water retention, lowers oxygen levels, impairs wound healing, alters immune function, interferes with sleep, and creates negative emotions **(Akca et al., ٢٠٠٩).**

Unrelieved pain can, for example, delay the return of normal gastric and bowel function in postoperative patients. Recognition of the widespread inadequacy of acute pain management prompted the United States Department of Health and Human Services to publish Acute Pain Management as the first set of federal clinical practice recommendations **(Rockville, ٢٠٠٢).**

Sub acute pain:

Acute pain must be recognized before the pain becomes chronic. In this regard, the presence of subacute pain, which is quite similar to acute pain in its etiologic and nociceptive mechanisms, may offer physicians the last opportunity for a full restoration of patients to a pain-free existence. Once the pain has been established for more than ٦ months, the likelihood of complete pain relief is small. study elaborates that most patients, during the first ١٠٠ days of pain, appear to respond fully to therapy and often can return to near normality. Beyond this time, however, patients generally don't feel fully restored or comfortable, even when they recover the majority of lost function. By the time pain becomes subacute. **(Crue, et al,٢٠٠٩).**

Recurrent pain:

Recurrent acute pain involves the acute flare-up of peripheral tissue pathology resulting from an underlying chronic pathologic entity. Typically, headaches, gastrointestinal motility disorders, degenerative disk and joint

disease, collagen vascular disease, sickle cell disease, and similar functional processes can elicit this type of pain. Unlike chronic or subacute pain, recurrent acute pain implies discrete acute episodes, which return over time. Determining the dividing line between recurrent acute pain and subacute pain is often a judgment decision by the pain practitioner. In general, daily pain for several weeks is subacute pain, but several limited pain episodes over many months or years is most likely recurrent acute pain. The recognition of recurrent acute pain enables physicians to apply a more comprehensive management approach involving patient education, contingency planning, and family involvement than ordinarily would be required by a single pain episode **(Eliot, ٢٠٠٢)**.

Types of acute pain:

١-Somatic pain:

Is superficial, coming from the skin or subcutaneous tissues.

٢-Visceral pain:

Originates in the internal organs and the linings of the body cavities. Visceral pain caused by obstruction of hollow viscus is poorly localized and is often described as cramping and gnawing, with a daily pattern of varying intensity. When organ capsules or other structures such as myocardium, are involved, however, the pain usually is well localized and described as sharp, stabbing or throbbing, descriptors similar to those associated with somatic pain.

٣-Referred pain:

Is felt in an area distant from the site of the stimulus, it occurs because the area of referred pain is supplied by the same spinal segment as the site of the stimulus. Referred pain often occurs with visceral pain .Examples include shoulder

pain from myocardial infarction, back pain from pancreatitis, and right shoulder pain from gallbladder disease. Nociceptive pain of any type can be referred and some referral patterns are clinically relevant. For example, injury to the hip joint may be referred to the knee and bile duct blockage may produce pain near the right shoulder blade **(Heuther et al., ٢٠٠٤), (Ignatavicius and Workman, ٢٠٠٦)**.

Fig. (١): Sites of referred pain

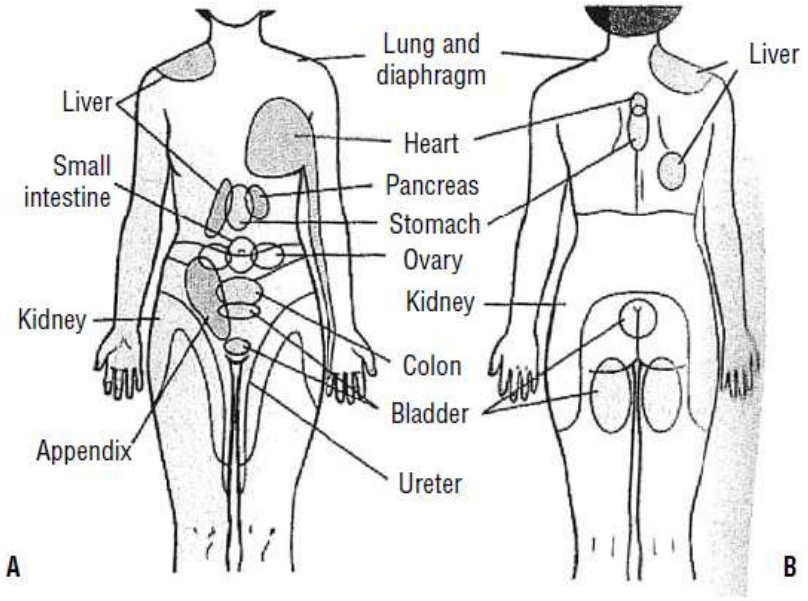

Fig. (١): Sites of referred pain. **(Huether and McCance,٢٠٠٤).**

Chronic pain:

Chronic pain is prolonged pain, persisting beyond the expected normal healing time. This characterization was previously the official definition of chronic pain according to the International Association for the Study of Pain. The term chronic is still widely used, although many pain experts now think that all forms of chronic pain are variations of the same phenomenon and should be labeled specifically, such as neuropathic pain **(Grichnik and Ferrante, ٢٠٠١).**