

Battlefield Analgesia: An Advanced Approach

Sqn Ldr G Hocking
MB,ChB,FRCA,DA(UK),RAF*
Specialist Registrar in Anaesthesia

Royal Air Force Medical Branch

Lt Col WF De Mello
BSc,MBBS,FRCA,DRCOG,DipIMC.RCS(Ed),RAMC(V)
Director of Pain Management

Pinderfields and Pontefract General Infirmary, Friarwood Lane, West Yorkshire, WF8 1PL

SUMMARY: We present an advanced battlefield analgesia protocol that is designed to provide the maximum benefit for the greatest number of patients using the minimum of resources. During the development we considered logistics, drug pharmacology and safety, aetiology of the pain and the experience of the expected administrator. Analgesia is only considered after the "ABCD" criteria of the Primary Survey have been satisfied. The analgesics administered range from enteral non-opioids through to intravenous opioids based dynamically upon the Visual Analogue Score (VAS). We suggest this protocol could be used by healthcare workers who may not have been trained in acute pain management but are called to administer analgesia to the serviceman in pain.

Introduction

We have previously produced a protocol for basic battlefield analgesia based on the morphine autojet (1,2). The protocol was designed to improve the efficacy and safety of self-administered opioid analgesia by the injured serviceman in the absence of medical expertise. We now present a more advanced protocol, based on the drugs currently available operationally in Bosnia, for use on the battlefield or in disaster relief.

Development of the protocol

To produce an advanced battlefield analgesia protocol that provides the maximum benefit for the greatest number of patients using the minimum of resources, we considered logistics, drug pharmacology and safety, aetiology of the pain and the experience of the expected administrator.

Logistic factors

The availability of drugs and medical expertise will depend upon the military threat and supply line, so the protocol should only rely on those resources that are likely to be commonly available.

Pharmacological factors

The drugs used should be effective and familiar with minimal morbidity associated with their use.

- a. Morphine or pethidine has been the most widely used opioid drug with the intra-muscular route being favoured because of its familiarity and simplicity, but it is accepted that patient-controlled analgesia may be appropriate in some circumstances. The latter is likely to be limited by availability of equipment and expertise.
- b. Non-steroidal anti-inflammatory drugs are included for their opioid-sparing effects but are not recommended until adequate cardio-respiratory stability has been established in order to minimise the potential adverse renal effects.
- c. Local anaesthetics, such as lignocaine or bupivacaine, may be useful in some circumstances by those, with the appropriate training, to perform nerve blocks (local infiltration, digital nerve, femoral nerve). We have not included the intercostal nerve block in this list because we feel that the potential for morbidity outweighs the potential

benefits.

- d. Other drugs such as ketamine (0.25-0.5 mg/kg intravenously or 1-2 mg/kg intramuscularly) or Entonox (50% oxygen in 50% nitrous oxide) could be used for short painful procedures or for the extrication of trapped victims.

Personnel factors

This protocol is for use by combat medical technicians (CMTs), nurses and doctors. The latter may have experience or training in more sophisticated methods of providing analgesia which are outside the scope of this protocol.

Safety measures

The provision of analgesia follows only if the A. B. C. D. (Fig 1), approach is satisfactory. Respiratory depression (Respiratory Rate <8 breaths per min.) from opioid administration needs titrated naloxone therapy (Fig 1 see naloxone protocol).

Chronological factors

The protocol is designed around the intensity of pain as measured by the VAS. This means that the same protocol could be applied at any point throughout the patient's illness, from admission to discharge.

Aetiological factors

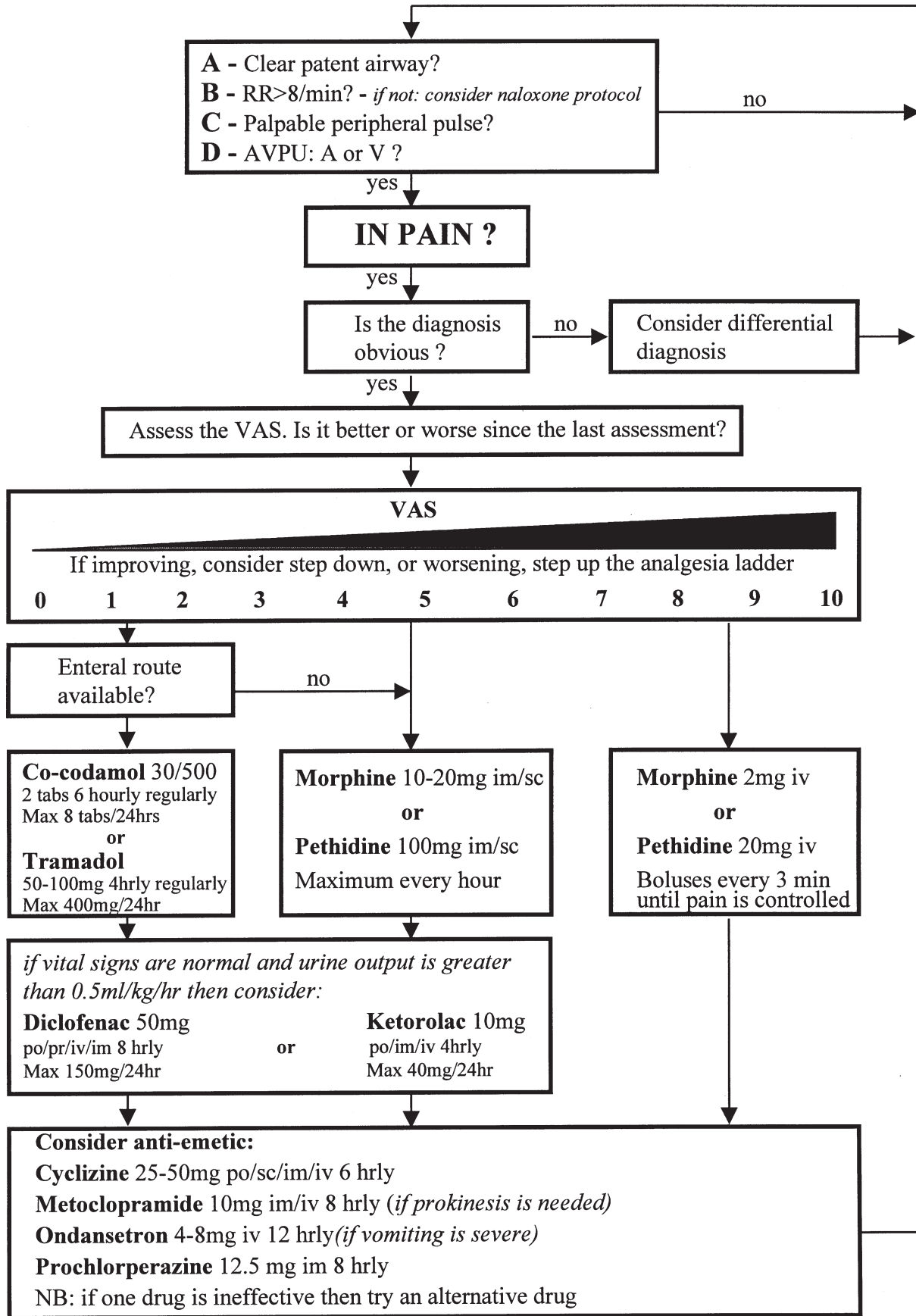
The protocol should be equally applicable to 'medical' pain (e.g. myocardial infarction), 'surgical' pain or that from an injury.

Testing the protocol

We have assessed the potential of this protocol using tactical exercises without troops (TEWT), during peacetime practice in home units and operational units in Bosnia. However, the true potential of this protocol will only be established following its introduction into the routine care of the serviceman in pain.

Notes for using the protocol

1. Analgesia is administered to those servicemen who are cardio-respiratory stable, are alert or are verbally responsive and who say they are in pain. Those servicemen who do not



Naloxone protocol: Dilute 400 micrograms of naloxone into 4 ml with normal saline. Give 1ml iv every minute until respiratory rate >8 / minute or the sedation score is alert or verbally responsive
 NB: Further doses may be needed due to the short half life of naloxone compared to morphine.

Fig 1

- meet the criteria of ABCD are likely to be treated by doctors who can then administer titrated intravenous opioids. This may avoid the potential problem of intramuscular injections in a shocked patient.
2. The flow chart has all the 'NO' replies going horizontally and the 'YES' going vertically.
 3. The advanced analgesia protocol begins when the patients are able to complain of pain.
 4. The cause of the pain may not always be initially obvious, and servicemen who had previously been well controlled may become worse. We have therefore included a box to ensure that other diagnoses such as infection, compartment syndrome, haematoma and muscle cramps / stiffness are considered. Some diagnoses are often missed so it is important to check the mechanism of injury to exclude specific commonly occurring conditions. For example, when there is skeletal injury, surrounding soft tissues, viscera or neurovascular tissue may be involved. Missed diagnoses during the secondary survey are more common in the unconscious patient with severe head injuries and those with blunt trauma to the chest. Medical causes of pain such as myocardial infarction, pleurisy, post-herpetic neuralgia, acute low-back pain, gout and renal / biliary colic can also be overlooked.
 5. The Visual Analogue Score (VAS) is based on an eleven point scale from 0 to 10 where 0 is no pain and 10 is the worst possible pain imaginable by the given patient. It is, therefore, a subjective experience. We have loosely based the analgesic therapy on the severity of the pain in three groups to reflect an analgesic ladder starting from oral analgesics at one end to titrated intravenous opioids at the other. Since the VAS scale is a continuum, the final choice will depend on the trend of serial VAS observations: (is the pain getting better or worse?), and whether the oral route is feasible. The choice of therapy is meant to be dynamic and reflect the changes in pain severity. For example, if a patient has a VAS score of 9 and is given intravenous opioid titrated to response and his next score is 3; it may be more appropriate to use an intramuscular or subcutaneous opioid rather than oral analgesics. If the oral route is not possible, and the pain score is in the lower range it would be preferable to use an intramuscular or subcutaneous opioid.
 6. Enteral medication should be given regularly if possible, by the clock, to maintain a sustained-analgesic effect.
 7. Opioids are equally effective when given intramuscularly or subcutaneously (3); we prefer the latter as it is less painful for the patient and repeated doses may be given through an indwelling-subcutaneous cannula.
 8. Provided there is autonomic homeostasis (particularly intravascular volume) and that the urine output is at least greater than 0.5 ml/kg/hr then consideration should be given to the co-administration of a non-steroidal anti-inflammatory drug such as diclofenac or ketorolac.

9. We have included an anti-emetic in the advanced analgesic protocol because of the increased likelihood of nausea and vomiting after the administration of opioids. We have restricted the choice to drugs which are commonly available and listed them alphabetically since we feel that each drug may have advantages over the others in particular cases. The ultimate choice, therefore, rests with the administrator. If one agent is ineffective, we suggest checking the cause of the vomiting following which an alternative anti-emetic may be used.
10. The naloxone protocol is an extra safety-feature. The opioid antidote is titrated intravenously to a level that ensures a respiratory rate of at least 8 breaths per minute or a sedation score of alert or verbally responsive. By careful titration we aim to reverse overdose whilst preserving as much analgesia as possible. Since the plasma half life of naloxone (60 min.) is less than that of morphine (150-180 min.) or pethidine (180 min.) (4) it is important to be aware of the possible need for further doses of naloxone.

Conclusion

Effective analgesia on the battlefield attenuates the adverse pathophysiological responses to pain, aids evacuation and maintains morale. We have previously presented an algorithm to improve the safety and efficacy of self-administered, opioid-based analgesia by the serviceman prior to arrival at a medical facility (1,2). We have now expanded the protocol to assist those healthcare workers who may not have been trained in acute pain management but are called to administer analgesia to the serviceman in pain.

Acknowledgments

We would like to thank Brig IT Houghton late RAMC and Col PJF Baskett late RAMC(V) for critical appraisal of the manuscript. We would also like to thank Lt Col (Retd) C Pani RAMC and Capt N Bullock RAMC(V) for help with assessing the potential use of the protocol in the field.

REFERENCES

1. HOCKING G, DE MELLO WF. Battlefield Analgesia - A Basic Approach. *JR Army Med Corps* 1996; **142**: 101-102.
2. Battlefield Advanced Trauma Life Support handbook. Chapter 14. Army Code 63726.
3. SEMPLE TJ, UPTON RN, MACINTYRE PE, RUNCIMAN WB, MATHER LE. Morphine blood concentrations in elderly postoperative patients following administration via an indwelling subcutaneous cannula. *Anaesthesia* 1997; **52(4)**: 318-23.
4. JAFFE JH, MARTIN WR. Opioid analgesics and antagonists. In: Gilman AG, Goodman LS, Rall TW, Murad F, eds. *The pharmacological Basis of Therapeutics*. New York: MacMillan Publishing Co, 1992: 485-521.

Full Page/Full Colour
AVL Medical Instruments
Film Provided