



## Overview

# Interventional Techniques for Cancer Pain Management

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## Abstract

Patients with cancer frequently experience pain, and even with increased modern knowledge and skills in drug and other therapy, this pain is poorly controlled in a significant proportion. For these patients, a range of interventional techniques can play a significant role in providing pain relief. These include neuraxial administration of opioids and other drugs, temporary or permanent blockade of nerve pathways and minimally invasive management of bony and other metastases. Those involved in the treatment of pain from cancer should be aware of the scope of these techniques and ready to call upon specialists in their use. © 2011 The Royal College of Radiologists. Published by Elsevier Ltd. All rights reserved.

*Key words:* Anaesthetic techniques; cancer pain; epidural; intrathecal; neuraxial techniques; vertebroplasty

## Statement of Search Strategies Used and Sources of Information

Literature searches were carried out using Embase and Medline via the NHS Evidence Healthcare Database in August and September 2009 and November 2010. Search terms included interventional pain cancer; epidural cancer pain; intrathecal pain cancer; nerve block cancer pain; radiofrequency cancer pain, as well as multiple individual searches for particular procedures and drugs. Further papers were included from the author's own database and selected references from authors' citations.

## Introduction

Since the publication of the World Health Organization pain ladder and with greater understanding of appropriate multimodal analgesia, the management of cancer pain has improved dramatically: the World Health Organization method is effective in most patients [1], but 5–14% do not have their pain controlled adequately, even with optimised

systemic medical therapy [2]. Even with further improvements in recent years, a significant proportion still remain poorly controlled, with recent surveys suggesting that the above figures are an underestimate [3–5]. This has led to the suggestion [6] that the World Health Organization ladder should be modified with a fourth step, that of interventional procedures and techniques. This overview focuses on interventional procedures commonly used in UK practice.

The specialty of pain medicine evolved out of the use of invasive approaches to provide permanent or temporary interruption of nerve transmission. Over the years, particularly from the point of view of destructive lesioning, this perspective has changed, in part due to increased awareness of the risks of deafferentation and post-block neuropathic pain, but also due to increased experience and skills in pharmacological management of pain and in implant and infusion techniques.

Nevertheless, interventional techniques remain an important and frequently underused part of the multimodal management of cancer pain – it has been suggested that 8–11% of cancer patients could benefit from interventional procedures [1,7].

One issue impeding this is the availability of time and resources for the involvement of pain medicine specialists, most of whom are anaesthetists, in this area. This has been revealed by surveys of palliative care and pain specialists

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[7,8]. Joint consultations with palliative care and regular resourced sessions in a palliative care facility are uncommon [8]. The availability of specialist pain input to the palliative care multidisciplinary team has been shown to result in an increase in referrals and procedures carried out [7]. The UK National Institute of Health and Clinical Excellence guidance on supportive and palliative care in cancer [9] highlighted that each local specialist palliative care multidisciplinary team should have access to pain specialists with expertise in nerve blocking and neuro-modulation techniques. Recent guidelines [10] recommend the assessment of patients with difficult to control pain by an anaesthetist with expertise in pain medicine.

## General Considerations

The main groups of patients in whom interventional procedures may be appropriate are those with pain responding poorly to systemic medications or those in whom adequate titration of these medications is prevented by adverse effects. The major pain types in this group are neuropathic and cancer-induced bone pain, although these techniques can be applicable to a wide range of other pain sources.

Interventional procedures will rarely give adequate benefit to be the sole treatment of the patient's pain, and must be viewed as a part of multimodal analgesia and patient care. Nevertheless, these procedures can give very substantial benefit and allow the reduction of other analgesic drugs and their side-effects [11].

Many of these patients will have been treated with high-dose opioids and other medications before an interventional procedure. This may lead to initial excessive sedation once the pain is reversed: conversely, over-rapid withdrawal of opioid treatment may lead to withdrawal phenomena. It is therefore necessary to observe these patients closely in the period after the procedure in order to prevent these problems, and to titrate systemic medications downwards according to their response – a common approach is to halve the systemic opioid immediately after the procedure and to continue to reduce it thereafter.

These large doses of medications may also lead to impairment of cognition. In preparation for carrying out interventions, it is therefore particularly important to ensure adequate consent, discussion of targets of treatment and potential side-effects and to involve relatives in decisions, with careful documentation of this.

Patients in this group will frequently have significant comorbidities and before carrying out interventional procedures it is important to be aware of, and to document, neurological examinations and investigations, including clotting, platelet and neutrophil count. However, the context in which these procedures and their risks are being considered is very different from the non-cancer population, and this will affect treatment decisions [12], relative contraindications and consent [13]. A number of the treatments discussed involve off-licence use of drugs, useful guidance for which is given elsewhere [14].

## Potential Interventional Techniques

There are a wide range of potential interventional procedures: this review concentrates mainly on those in common use in the UK. These include neuraxial delivery of analgesic drugs, and destruction of spinal and radicular nerve pathways; interruption of pain pathways travelling via the sympathetic nervous system, local anaesthetic and destructive techniques directed to peripheral nerves, and other procedures, including minimally invasive treatments directed at bony metastases and other pain sources.

## Neuraxial Analgesia

### *General Considerations*

In situations where pain control cannot be obtained using systemic opioid and other medications, or where control is limited by the side-effects of higher doses of systemic medications, it may be advantageous to target the dorsal horn mechanisms [15] of analgesia by administration of drugs by epidural or intrathecal routes. This may be with opioids, most commonly morphine, alone or in combination with other groups of agents. It has been estimated that 1–3% of patients with cancer pain may be suitable for spinal drug delivery [1,16].

Clinical spinal administration of opioids was introduced not long after the initial demonstration of spinal opioid receptors [17] and has been used increasingly commonly in recent years, with a substantial number of studies supporting its use: the use of spinal administration of opioids alone or combined with other drugs has been discussed in detail elsewhere [12,18–20].

### *Spinal Opioids*

The most common drug used for spinal administration is morphine [21,22], although drugs such as diamorphine, fentanyl, sufentanil and hydromorphone have also been used.

Spinal use allows targeting of action at opioid receptors on dorsal horn pre- and post-synaptic neurons to modulate pain impulse transmission. Concentrating actions at the spinal level allows the use of smaller doses with fewer adverse effects than are caused by systemic administration of higher doses.

With epidural administration, the opioid must cross the dura and spread via the cerebrospinal fluid (CSF) into the spinal cord. Particularly with lipid-soluble opioids, epidural administration will result in uptake into epidural blood vessels and loss into the systemic circulation. As a result of this, dose requirements of epidural opioids will be greater than intrathecal: dose equivalences for morphine of 1 intrathecal: 10 epidural: 100 intravenous/subcutaneous or 300 orally are often used.

Less lipid-soluble opioids, such as morphine, which take longer to penetrate the cord, have a slower onset and longer duration and allow greater rostral spread within the CSF, increasing the potential for analgesia and avoiding the need

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