COMMENTARY

Exploration of Cancer Pain Treatment by Morphine Infusion through an Embedded Device

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Abstract

Cancer pain treatment with morphine presents particular problems in patients with renal failure needing haemodialysis. We here explore the various possibilities of intrathecal opioid administration for intractable chronic and acute cancer pain. Morphine, as the only opioid approved by the Food and Drug Agency for administration, has been increasingly utilized for this purpose. For over 3 decades, there have been numerous reports on non-nociceptive side effects associated with ever increasing long-term intrathecal morphine usage. Our review of the literature and our own experience suggests that a subarachnoid device allows good pain control effect after patient controlled intravenous infusion failure at the time of haemodialysis.

Keywords: Cancer pain - haemodialysis - subarachnoid infusion - embedded device

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Introduction

Once specific opioid receptors were discovered in the central nervous system in the 1970s, spinally mediated analgesia became a possibility (Goldstein et al., 1971). Over 30 years ago, Yaksh and Rudy (1976) demonstrated the efficacy of direct spinal action of narcotics in abolishing pain in animal models, and subsequently Wang et al (1979) reported the first case of intrathecal administration of morphine used effectively for pain relief in humans. Since the 1980s, intraspinal drug delivery therapy has been increasingly utilized in cancer patients failing to respond to more conventional treatments or unable to tolerate systemic therapy due to adverse side effects. The advantage with infusing a small amount of morphine into the cerebrospinal fluid so that they can directly interact with receptors in the spinal cord is obvious in that side effects associated with systemic applications can be avoided.

Morphine is the only Food and Drug Administration (FDA) approved opioid for such intrathecal administration. It is inexpensive, and well tolerated by the majority of patients although clinical side effects are not totally lacking (Chaney, 1995). For example, priritis may occur in many cases, along with nausea and vomiting, constipation, fluid retention and edema, sexual dysfunction and respiratory depression. We recently experienced a female Chinese patient with cancer pain syndrome, plasmacytic lymphoma, chronic renal failure (uremia stage) and hypertension who experienced severe worsening of pain during haemodialysis. We here propose that the problems of intrathecal administration of morphine may be overcome by opting for embedding of a drug dosing device for such cases as long as the potential for adverse effects is borne in mind.

Mechanisms

When morphine is injected into the subarachnoid space, it will effect like endogenous endorphin and enkephalin by binding to its receptor in spinal dorsal horn which inhibit the release of P material to block the transmission of pain signals (Lamotte et al., 1976), and reduce analgesic activity by binding to receptors in centre through cerebrospinal fluid circulation. Considering the opioids are injected directly near the receptors, the dose of intrathecal morphine is equivalent to 1/300 of the oral dose, thus could lighten the related adverse effects of systemic administrations including nausea, vomit, constipation, respiratory depression and drug addiction. Few influences are observed on the sensory and motor function, as well as sympathetic reflexes. It has been verified in clinical trials that opioids delivered through the intraspinal pathway can provide good control ofcancer pain (Krames, 1999). Rauck reported that, in 119 patients suffering from cancer pain who were treated with continous intrathecal morphine injection, 91% of them had a good analgesic effect (NRS decreased more than 50%) and less adverse effect than systematic administration because of the reduction of dose (Rauck et al, 2003).

However, several disadvantages have been noted: first, patients need to come to the hospital to replace the infusion kit, inserted needle and fixation materials regularly (generally once in two weeks) in hospital. Second, without correct maintainance, prolapse of the needle may occur. Third, it is not convenient for personal hygiene. In order

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for a patient to take a bath, replacement is necessary. Fourth, contamination may occur and cause infection of local and subarachnoid space. Of course, if the patient could be treated through totally embedded pathway in subarachnoid space with program control infusion pump, these disadvantages could be avoided.

From our experience, the advantages of the embedded device method to deliver morphine to treat patients suffering from cancer pain with renal failure are as follows: first, analgesic activity is not affected by haemodialysis. Second, sensations, movement and the function of gangliated nerve are not affected. Third, the dose of morphine is small and side effects are limited compared with other means of administration. There are certain possible complications which need to be taken into account, including scar fomation associatied with pump emplacement (Protopapas et al., 2007), catheter migration (Li et al., 2008) and fracture (Dawes et al., 2003). However, in one overview, acceptable pain relief was obtained with programmable pumps in approximately 70% of patients, with no differences between pain types, but with a significant difference in favor of male gender (Rieg and Abejón, 2009).

Therefore, with the exception of low resource environments where subcutaneous and intravenous routes of administration may continue to be of advantage (Koshy et al., 2005), in cases where particular interventions may need patient activation of extra palliative therapy, an emedded device may be the best option.

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