Editorial

# Pain and discomfort management during central venous catheter insertion

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The insertion of a central venous catheter (CVC) is one of the most frequently performed invasive procedures in anesthesia and critical care settings. It may be associated with considerable discomfort in the conscious patient, as it requires him/her to stay in Trendelenburg position, head-extended with the neck fully turned to the opposite side and perfectly still. Local anesthetics such as lidocaine are commonly used to reduce pain during the procedure. However, even after the establishment of an effective field block, subsequent steps such as anchoring of the catheter to the skin by suture or the eventual catheter tunneling are a source of pain and distress. The field infiltration with local anesthetics may be associated itself with significant pain.

Pain is an unpleasant sensory and emotional experience arising from actual or potential tissue damage. Being a source of anxiety, it may negatively influence the patient's perception of his/her illness and the treatment received. It is a duty of the physician to alleviate this unpleasant feeling by providing adequate analgesia and sedation. Ensuring the patient's comfort is also important for increasing his/her cooperation and contributing to the ease of the procedure, thus decreasing the risk of insertion failure or catheter malpositioning.[1] The association of intravenous analgesics such as potent short acting opioids with local anesthetic agents is an effective therapeutic option during invasive percutaneous procedures, as it acts synergistically on peripheral pain fibers and central opiate receptors. However, the potential advantages of using intravenous opioids in the conscious patient must be weighed against their possible adverse effects, mainly cardiovascular events (hypotension and bradycardia) and respiratory depression. Ideally, the perfect analgesic strategy should provide adequate pain/discomfort relief while ensuring respiratory and cardiovascular stability and absence of side-effects for a prompt and safe recovery.

In this issue of the Indian Journal of Critical Care Medicine, Samantaray *et al*. reported a prospective, randomized, double-blind, placebo-controlled trial that evaluated the efficacy of fentanyl along with local anesthetic field infiltration in controlling pain and discomfort associated with CVC positioning.[2] In this study, 44 conscious patients scheduled for planned CVC insertion randomly received a 10-ml preprocedural infusion of either fentanyl (2 μg/kg) or 0.9% saline in addition to local lidocaine infiltration. Verbal numeric rating scales were used to quantify pain and discomfort. Patients in the fentanyl group reported lower pain than the placebo group after local anesthetic injection, during the procedure and 10 min after the completion of the procedure. Lower discomfort was observed for fentanyl group only 10 min after the procedure. Patients in the fentanyl group tended to be more sedated, although the majority was responding to verbal command and to experience more episodes of bradycardia (4/26 vs. 1/25 in the placebo group) and desaturation (4/26 vs. 0/25). However, atropine was required in only one patient; in three patients a simple head tilt - chin lift maneuver was sufficient to maintain adequate oxygen saturation, while a nasopharyngeal stimulation was required in only one case.

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Bosch and Schiltmans[3] performed an observational study to evaluate the efficacy and adverse effects of intravenous stepwise sedation during CVC insertion in dialysis patients. In addition, they compared 2 time periods in which midazolam + fentanyl or midazolam alone were used. Overall, stepwise intravenous sedation ensured no or minor movements of the patient in 94% of the procedures, adequate amnesia in 86% and no or only a small amount of pain in 93%. The combination of midazolam and fentanyl did not significantly improve ease of the procedure, amnesia and pain experience compared to midazolam alone, but it relevantly increased incidence of oxygen desaturation.

In a double-blind randomized controlled trial, Burlacu *et al*.[4] assessed the analgesic efficacy of three different rates of remifentanil infusion in 44 patients undergoing insertion or removal of long-term central venous access devices during monitored anesthesia care with propofol and local anesthetic field infiltration. Although equally effective for analgesia, the highest rate of remifentanil infusion (i.e., 0.075 μg/kg/min vs. 0.025 or 0.05 μg/kg/min) was associated with unnecessarily increased sedation scores; moreover, patients in the highest dose group more frequently required a reduction of the drug infusion rate, mainly because of respiratory depression.

Taken together, these findings indicate that short-acting opioids alone or combined with other agents (e.g., propofol or midazolam) are effective in ensuring adequate pain and discomfort relief during CVC positioning with local anesthetic infiltration, but may be associated with a significant number of adverse effects, mainly respiratory depression. Even if simple head tilt – chin lift maneuvers were sufficient to reverse the opioid-induced oxygen desaturation in the most cases; larger trials are needed to provide a more robust evidence of their safety in the conscious spontaneously breathing patient. In the meantime, intravenous opioids must be administered only under close observation of the patient and monitoring of oxygen saturation, respiratory rate, heart rate and rhythm.

Lastly, other drugs may be considered for pain and discomfort management during central line access. Dexmedetomidine was initially approved for clinical use as a sedative. Although it has analgesic effects and analgesic-sparing properties, its development in pain management has so far been limited. This selective short-acting $\alpha_2$-adrenergic agonist can act synergistically with opioid receptor agonists both systemically and locally. Its combination with local anesthetics may be a promising new use to enhance their effectiveness.[5] This could be explored in future studies, along with potential adverse effects.

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