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EDITORIAL

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## Local Anesthetics in the Surgical Wound— Is the Pendulum Swinging Toward Increased Use?

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Surgical pain originates from the surgical wound, and a rational approach to perioperative pain treatment has therefore been directed toward the use of local anesthetics at the site of surgery. Although single-dose local anesthetic infiltration has been documented to be effective and remains the optimal anesthetic technique for certain minor procedures, a more widespread use has been hindered owing to the well-documented short duration for approximately 4 to 6 hrs and the limited effects in major procedures.<sup>1</sup> In recent years, efforts have therefore been made to improve local anesthetic wound analgesia with other approaches such as continuous local anesthetic wound infusion, high-volume local anesthetic wound infiltration, and development of different carrier systems for extended release of the local anesthetic from a single administration.

### CONTINUOUS LOCAL ANESTHETIC WOUND ADMINISTRATION

More than 45 randomized clinical studies performed during the last decade have shown improved and prolonged analgesia across surgical procedures with a subsequent potential for reduction of morbidity and hospital stay.<sup>2-5</sup> Because the reported studies with more than 4000 patients have not demonstrated increased wound problems<sup>2-5</sup> and because the technique is simple, the question is whether this approach should replace other more invasive regional techniques such as epidural analgesia,<sup>6</sup> continuous peripheral nerve blocks,<sup>7</sup> or paravertebral blocks,<sup>8</sup> all of which are effective but with inherent problems regarding adverse effects and needs for expertise. However, the continuous local anesthetic wound techniques have previously been rather costly because of catheter and pump equipment,<sup>2</sup> which may be less important in the future because of increased competition. Nevertheless, the clinician still needs answers on several important issues regarding the technique. First, what is the optimal concentration and volume for the local anesthetic administration where we presently have no conclusive procedure-specific dose-response studies available. Second, what is the optimal site of placement of the wound catheter? Although a catheter position in the deeper muscle and fascia layers seems rational and has been used in most studies,<sup>2,4,5</sup> the question must be addressed in further well-designed procedure-specific comparative studies.<sup>9</sup> In addition, although the risk of wound problems seems to be nonexistent or negligible,<sup>2</sup> a potential risk for local myotoxicity<sup>10</sup> or cartilage injury in orthopedic procedures<sup>11</sup> needs to be studied in more detail. Finally, the clinician is faced with the problem of choice of catheter where multihole catheters seem rational but so far without any documentation of improved analgesia and spread of local anesthetics in the wound compared with single- or few-hole catheters. Nevertheless, the balance seems in favor of an increased attention to and use of such continuous local anesthetic wound infusion techniques and can be further argued if additional benefits on outcome can be demonstrated.<sup>3</sup>

### HIGH-VOLUME LOCAL ANESTHETIC WOUND INFILTRATION

The concept of “tumescence” anesthesia, that is, a high-volume low-concentration local infiltration analgesia,<sup>12</sup> has been used in different plastic surgical procedures but with a lack of well-designed placebo-controlled trials. A renewed interest in the concept comes from the recent observations from Kerr and Kohan in Australia<sup>13</sup> where high-volume, low-concentration, multilocal infiltration analgesia has been administered in hip and knee replacement and with subsequent intermittent administration through a wound catheter. These uncontrolled observations are promising with improved analgesia and a 24-hr stay in approximately 60% of patients.<sup>13</sup> Although some

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randomized controlled trials on the concept are available,<sup>14</sup> several questions remain to be answered on the technique: Is there a need for concomitant epinephrine and nonsteroidal anti-inflammatory drugs in the solution? Is there a concentration-volume relationship? Is there improved quality and duration of analgesia compared with conventional infiltration? Is there a need for subsequent intermittent versus continuous administration and for how long? Nevertheless, the experience so far is promising, and the concept should be further investigated and compared with the criterion standard of peripheral nerve blocks.<sup>7</sup>

### SUSTAINED RELEASE LOCAL ANESTHETICS

An alternative to continuous local anesthetic wound techniques is a single administration of a controlled release local anesthetic formulation, which may be simpler and may therefore lead to improved compliance in daily practice. So far, several formulations have been developed.<sup>10</sup> However, although early results are promising, there is no conclusive published material and no approved formulation available for clinical use. Nevertheless, the concept is rational and of potential major clinical value provided that local adverse effects are absent.<sup>10</sup>

### IMPLICATIONS FOR CLINICAL PRACTICE

The study by Beaussier et al<sup>5</sup> in this issue of *Regional Anesthesia and Pain Medicine* together with previous data<sup>2-4</sup> supports the clinical potential for increased use of continuous wound administration of local anesthetics owing to its simplicity, efficacy, and apparent safety. However, costs for equipment may be prohibitive in surgeries where simpler alternatives are available with oral multimodal, nonopioid analgesic combinations. Thus, before more widespread use and general recommendations, we need procedure-specific studies to define the optimal anatomic placement of the catheter and the type of catheter and concentration-volume relationship. As to the high-volume low-concentration infiltration concept (tumescent analgesia), there is an urgent need for well-designed comparative studies against other regional anesthetic techniques to demonstrate its potential value regarding adverse effects (systemic and local) and especially on efficacy and duration of analgesia. So far, data on its simplicity and preliminary efficacy suggest this technique to have a major role in orthopedic procedures, hernia surgery, gynecologic surgery, and so on. Finally, hopefully within a few years, we will have sufficient data to demonstrate the role and place of extended release local anesthetic formulation in perioperative pain management.

Summarizing, it is fascinating that more than 60 years after the introduction of lidocaine for perioperative analgesia, we may foresee new applications and indications for local anesthetics in the surgical wound. The future is now for more investigators to provide the necessary high-quality data.

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