

The cause of postoperative pain after laparoscopic procedures is multifactorial. It may be associated with the insertion of ports or due to the low abdominal incision for the extraction of the kidney. Pelvic organ nociception or diaphragmatic irritation from residual pneumoperitoneum (which could cause shoulder-tip discomfort) may cause pain, too. Ureteric colic and urinary catheter discomfort may also contribute to the development of postoperative pain in these patients.

Presented data highlighted several main conclusions. Firstly, although we already knew that pain perception is very complex and is influenced by many factors, reported studies had shown that postoperative pain following LDN is perceived differently amongst different populations. Secondly, NSAIDs, initially banned in this group of patients because of potential renal damage, have a significant role in decreased opioid consumption and early mobilization with minimal side-effects in well-hydrated laparoscopic kidney donors. Thirdly, surgical technique has implications on postoperative pain perception: our patients had intraperitoneal laparoscopic surgery, while low morphine consumption has been reported in retroperitoneal surgery. The future of postoperative pain treatment in laparoscopic LDN is in furthering the multimodal approach, including regional techniques like

paravertebral block, retroperitoneal surgical approach and bowel rest.

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Alcohol spray vs. intradermal lidocaine before intravenous cannulation

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EDITOR:

Pain at the site of injection is a major complaint from patients undergoing intravenous (i.v.) cannulation [1]. Ethyl chloride spray [1], topical anaesthesia [1], dermal injection of local anaesthetic and iontophoresis of lidocaine [2] have been used to reduce the pain during venipuncture. The dermal injection of local anaesthetic is an efficient method to decrease pain; however, it involves an additional needle prick, which may arouse fear and may be perceived as stressful and unpleasant [1].

Of the needle-free methods for topical anaesthesia delivery during venipuncture, the topical application of EMLA[®] cream (AztraZeneca PLC, London, UK) requires a minimum application time of 60–90 min for effective analgesia, which limits its usefulness in the operating room [2,3]. The needle-free technique of analgesia delivery by the application of ethyl chloride spray was first used as a local anaesthetic for minor surgical procedures [4] and during venipuncture [5]. However, Armstrong and colleagues [5] have shown that intradermal lidocaine was more efficient than ethyl chloride spray in reducing pain during venipuncture.

Alcohol, similar to ethyl chloride, is a volatile liquid and if sprayed onto the skin it rapidly evaporates. During evaporation, alcohol cools the

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skin and subsequently nerve impulses may not be generated in the sprayed area [6]. Also, alcohol spray before i.v. cannulation may significantly decrease the pain of venipuncture and hence allow the operator to insert an i.v. line without distorting the skin with dermal injection of local anaesthetic, or increasing the risk of repetitive needle pricks. Furthermore, generating a high-speed alcohol jet spray with the use of a high-pressure-driven Manujet may improve the vein visibility at the site of cannulation. We compared, in adult volunteers (29 ± 6 yr), the efficacy of alcohol spray administered by a Manujet vs. the intradermal lidocaine in decreasing pain and improving vein visibility during i.v. cannulation.

Twenty-five adult male/female volunteers (13/12) were randomly recruited. Volunteers who had taken prescription analgesics within the last 3 days, with pain from any source, with inflamed or infected skin at the site of cannulation, and/or with any significant health problem were excluded from the study.

The pain assessment score using a visual analogue scale was explained to each volunteer, with 0 representing no pain and 10 being the worst imaginable pain. Each volunteer served as his/her own control since each participant was subjected to venous cannulation on both the right and left dorsum of the hand. The alcohol spray was applied to one hand while the intradermal lidocaine injection to the other hand of each volunteer in a random order. After 30 min, the alternate technique was performed on the contralateral hand.

The venipuncture was performed by intradermal injection of lidocaine (0.5 cm^3 of 1% lidocaine) at the site of puncture, and i.v. cannulation was performed 30 s after the lidocaine injection by the same experienced anaesthesiologist using a 20-G i.v. cannula. When using the alcohol spray, the site of the venipuncture was sprayed using a reusable Manujet (Manujet III; VBM Medizintechnik, Sulz, Germany) filled with 10 mL of alcohol (Fig. 1) from a distance of 6 in for a period of 30 s. After applying the alcohol spray, the i.v. cannulation using a similar 20-G cannula was performed.

Upon completion of each cannulation, the anaesthesiologist performing the procedure recorded the ease of insertion, the number of attempts before success and any impairment on the visibility of the vein. A second anaesthesiologist blinded to the study obtained the pain score as reported by the volunteer for the alcohol spray and the i.v. cannulation methods. The success rate of i.v. cannulation was determined based on the first attempt only.

The intradermal lidocaine injection was performed first in 12 patients, while the spraying of



Figure 1.
Alcohol spray Manujet.

alcohol was started first on 13 patients. With the alcohol spray, the pain scores were not significantly different following spraying of alcohol (2.0 ± 1.2) and during the insertion of cannula (1.9 ± 1.2); however, there was a statistically significant increase in the pain score during the threading of the catheter (4.2 ± 0.9). With the intradermal lidocaine injection, the pain score was significantly higher during the initial puncture (3.1 ± 1.4) in comparison with the insertion of cannula (1.6 ± 1.0) and threading of cannula (1.6 ± 0.8); no significant difference in the pain score was observed during the insertion and threading of catheter.

When comparing the two analgesic techniques, the pain score following spraying of alcohol (2.0 ± 1.2) was significantly lower than the pain score following the initial puncture during intradermal lidocaine injection (3.1 ± 1.4). However, the pain score during threading of catheter after using alcohol spray (4.2 ± 0.9) was significantly greater than the pain score during threading of the catheter after intradermal lidocaine injection (1.6 ± 0.8). No significant difference in the pain scores was observed during the insertion of cannula after either spraying of alcohol or intradermal lidocaine injection.

When using the alcohol spray, the vein visibility was adequate in 96% of volunteers and was significantly greater than the vein visibility (36%) when using the intradermal lidocaine injection. There was no significant difference in the ease of cannula insertion with either the alcohol spray or intradermal lidocaine injection. The operator's

overall evaluation of the i.v. cannulation was satisfactory in 24 out of 25 subjects when using alcohol spray vs. 16 out of 25 subjects when using intradermal lidocaine injection ($P < 0.05$).

The highest pain score was obtained during threading of the cannula when using the alcohol spray technique (4.2 ± 0.9) and was significantly higher than the pain score during the insertion of the cannula (3.1 ± 1.4) when using the intradermal lidocaine injection. When assessing the overall preference of the volunteers, 11 volunteers (44%) preferred the alcohol spray technique whereas 14 volunteers (56%) preferred the lidocaine injection technique.

We have shown that alcohol spray prior to i.v. cannulation is an effective means of analgesia and is associated with lower pain scores and increased vein visibility as compared with the intradermal lidocaine injections. With the alcohol spray, the highest pain was encountered during the threading of catheter, while with the intradermal lidocaine injection, the highest pain was encountered during the initial puncture. The anaesthesiologist performing the i.v. cannulation reported an overall higher rate of satisfaction when alcohol spray was used as compared with intradermal lidocaine injection.

There are several pharmacological effects of ethanol when applied topically on the skin. The antiseptic effect of alcohol spray is due to its direct contact with micro-organisms providing a bactericidal effect most likely by denaturing cell components particularly the proteins. For this purpose, a 70% concentration has been found to be most effective, probably because it has a longer contact time with the micro-organisms [7]. Ethanol remains the most commonly used skin disinfectant either alone or combined with other disinfectants for common invasive procedures across the skin [7]. The second topical effect of alcohol spray on the skin is cooling of the skin. Ethanol, particularly in a concentration over 95%, evaporates quickly at body temperature, carrying with it calories and leaving behind a cooler skin [7].

The process of applying alcohol over a restricted area of the skin to produce a transient local anaesthetic effect that may permit skin puncture without much discomfort to the patient may be explained by this transient cooling effect. The application of the alcohol using an oxygen-driven force through a Manujet may further accentuate its cooling effect, therefore producing a certain degree of stabilization of the superficial sensory nerves and pain-mediating receptors to interfere with the

process of receptor and axonal depolarization and consequently impede the conduction of the painful stimulus to a higher level of representation in the brain. However, it is unlikely that transient application of alcohol on the skin can lead to sufficient absorption across the skin to reach the deeper sensory nerves and exert a direct local anaesthetic effect on them.

The increased vein visibility may be secondary to the impact of high-speed alcohol spray on the dorsum of the hand. In the current study, using a reusable Manujet driven with high-pressure oxygen from a distance of 6 in generated a high-speed alcohol spray that can increase vein visibility upon impact of the high-speed spray with the skin.

In conclusion, this report suggests that in adult patients alcohol spray is an easy technique that can improve vein visibility and produce similar analgesic effect in comparison to intradermal lidocaine injection.

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