

Novel Strategy of Local Infiltration Anaesthesia for Cyst Removal

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The management of subcutaneous masses, including conditions like epidermal cysts, represents a significant component of dermatological surgery. These lesions, while often benign, can present aesthetic concerns or discomfort to patients, thereby necessitating surgical intervention. A cornerstone of successful surgical outcomes, particularly in the excision of such masses, is the effective application of local infiltration anaesthesia. This technique not only facilitates a more comfortable experience for the patient but also provides the surgeon with several intraoperative advantages. Properly administered, local anaesthesia helps in meticulously dissociating the surrounding skin from the cyst, enabling complete removal. This approach is crucial as it significantly reduces the risk of residual cyst material, which can lead to recurrence. Furthermore, adequate anaesthesia contributes to minimizing intraoperative bleeding, a factor that can obscure the surgical field and complicate the procedure. Perhaps most importantly, it reduces the likelihood of cyst rupture during surgery, an event that can cause inflammation, infection, or even the spread of cystic content, complicating patient recovery.

Several studies have highlighted the importance of this surgical principle. For instance, Ohlsson et al. (1) emphasized that precise local anaesthesia techniques are fundamental to improving surgical outcomes in dermatological procedures involving subcutaneous lesions. Another study by Sahutoglu (2) demonstrated a correlation between the meticulous application of local infiltration anaesthesia and a decreased incidence of complications such as cyst rupture and postoperative infections. Moreover, the research by Kietabl et al. (3) further supports the notion that enhanced visualization and reduced operative bleeding, as facilitated by effective anaesthesia, are pivotal in the successful removal of epidermal cysts and similar dermatological conditions.

These insights underscore the importance of mastering local infiltration anaesthesia in dermatological surgery. As such, the development and refinement of anaesthesia techniques continue to be a focal point of research within the field. By focusing on these areas, dermatological surgeons can significantly improve patient outcomes, reduce the occurrence of complications, and enhance overall patient satisfaction.

MATERIALS AND METHODS

In this study, we introduce a novel method of surrounding local infiltration anaesthesia designed to enhance the efficacy of cyst removal procedures. The procedural schematic is depicted in **Fig. 1**, while **Fig. 2** presents typical clinical manifestations observed during the application of this technique. As illustrated, the procedure is initiated with the insertion of the first needle at the central point directly above the cyst, which is then inclined slightly upwards following skin penetration. Subsequently, a local anaesthetic solution, specifically a sterile-prepared mixture of lidocaine and adrenaline, is administered into the interstice between the skin and the cyst to achieve uniform distribution, resulting in the superficial whitening of the skin. This pallor not only serves as a visual indicator for the adequate spread of the anaesthetic but also signifies effective vasoconstriction facilitated by adrenaline, minimizing intraoperative bleeding and enhancing surgical visibility (4).

The subsequent step involves the insertion of another needle beneath the cyst from an inferior angle. Prior to anaesthetic injection, aspiration is performed to ensure the absence of vascular entry, evidenced by the lack of blood return in the syringe. Following this precaution, the anaesthetic mixture is dispersed evenly.

This anaesthetic solution is prepared under stringent hygienic conditions in collaboration with our hospital pharmacy. The mixture utilizes thermally sterilized stock solutions of lidocaine and adrenaline, ensuring both stability and adherence to hospital-required hygiene standards. This methodological innovation aims to mitigate common procedural challenges, such as incomplete cyst removal, excessive bleeding, and the risk of intraoperative cyst rupture, by optimizing local anaesthetic delivery. Furthermore, the inclusion of adrenaline in our protocol follows recent evidence

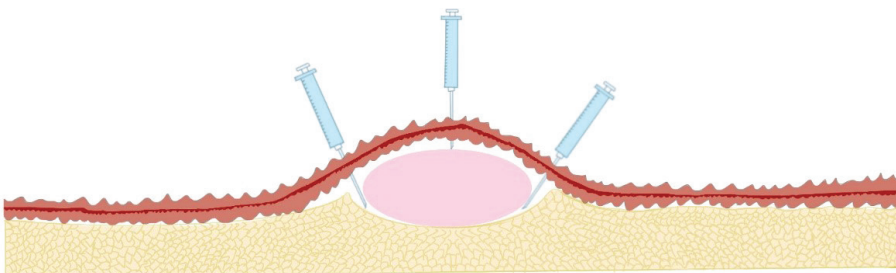


Fig. 1. Schematic diagram of the surrounding local infiltration anaesthesia technique for cyst removal.

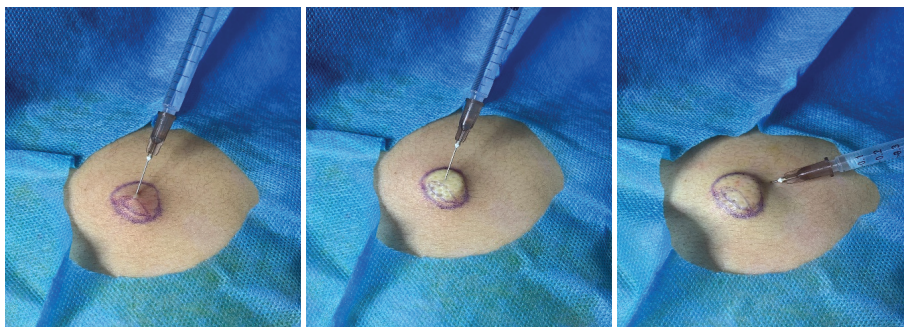


Fig. 2. Clinical images demonstrating the application of surrounding local infiltration anaesthesia technique in cyst removal. [Video 1.](#)

supporting its safety and efficacy in reducing bleeding without the risk of necrosis, even in sensitive surgical sites (5).

DISCUSSION

The novel surrounding local infiltration anaesthesia technique introduced in this study offers significant advantages for the surgical removal of subcutaneous masses, particularly those with well-defined boundaries. First, by enveloping the cyst with liquid anaesthetic that includes both lidocaine and adrenaline, this method provides dual benefits: it safeguards the surrounding vascular and adipose tissue against shear damage and maintains the cyst's integrity to a considerable extent. The addition of adrenaline enhances this effect by inducing vasoconstriction, which further minimizes intraoperative bleeding and maintains a clear surgical field. This is a critical advancement over traditional methods, where the risk of tissue damage and cyst rupture is notably higher due to less precise anaesthetic application (6).

Second, the technique ensures the uniform distribution of the anaesthetic around the cyst, optimizing its efficacy and potentially reducing the required dosage to achieve maximal effect. This aspect not only enhances patient comfort by minimizing the amount of anaesthetic used but also contributes to reducing intraoperative bleeding, a factor that can significantly improve surgical outcomes and recovery times. The presence of adrenaline in the anaesthetic mixture prolongs the duration of anaesthesia and contributes to this reduction in bleeding, aligning with recent studies that have validated the safe use of adrenaline in local anaesthetics, even in sensitive areas.

Our findings suggest that this anaesthesia technique, particularly with the incorporation of adrenaline, is effective for treating subcutaneous masses with clear demarcations, such as cysts, calcified epitheliomas, and pilomatrixomas. The precise application facilitated by this method is critical for these types of lesions, as it allows for complete removal while minimizing damage to surrounding tissues. Given these advantages, we advocate for the broader adoption of this technique in

dermatological surgery, where such masses are commonly encountered.

Further research could explore the technique's applicability to other types of lesions and its potential benefits in reducing postoperative complications, such as infections or recurrences. Additionally, comparative studies assessing patient outcomes, including pain, satisfaction, and healing times, between this and conventional anaesthesia methods could further validate its effectiveness and patient benefits.

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REFERENCES

- Ohlsson A, Shah PS. Paracetamol (acetaminophen) for prevention or treatment of pain in newborns. *Cochrane Database Syst Rev* 2020; 1: CD011219.
- Sahutoglu C. Anesthesia for ophthalmic surgery. *Eur Eye Res* 2024; 4: 90–102.
- Kietaibl S, Ahmed A, Afshari A, Albaladejo P, Aldecoa C, Barauskas G, et al. Management of severe peri-operative bleeding: Guidelines from the European Society of Anaesthesiology and Intensive Care: Second update 2022. *Eur J Anaesthesiol* 2023; 40: 226–304.
- Schnabl SM, Ghoreschi FC, Scheu A, Kofler L, Häfner HM, Breuninger H. Use of local anesthetics with an epinephrine additive on fingers and penis: dogma and reality. *J Dtsch Dermatol Ges* 2021; 19: 185–196.
- Volc S, Maier JCP, Breuninger H, Hund V, Häfner HM, Kofler L. Manufacture and use of tumescence solution meeting hospital-required hygiene conditions: practical implications. *J Eur Acad Dermatol Venereol* 2019; 33: e434–e435.
- Gleeson C, Hussain W, Spreadborough J, Mortimer N, Salmon P. Local anaesthetic preparation in dermatological surgery: a labour- and time-efficient approach. *Br J Dermatol* 2011; 164: 888–890.
- Roerden A, Neunhoeffer F, Götz A, Häfner H-M, Kofler L. Benefits, safety and side effects of tumescence local anaesthesia in dermatologic surgery in infants. *J Dtsch Dermatol Ges* 2021; 19: 352–357.