

TECHNICAL NOTE

Ethyl chloride spray for musculoskeletal ultrasound-guided injections: An alternative to subcutaneous injection of local anesthetic solution

Amit Shah FRCR | Alessandro Vidoni MD  | Sharon McGarry PGD |
Mark Davies FRCR | Steven James FRCR | Rajesh Botchu FRCR

Department of Musculoskeletal Radiology,
Royal Orthopaedic Hospital, Birmingham,
B31 2AP, United Kingdom

Correspondence

Amit Shah, Department of Musculoskeletal
Radiology, Royal Orthopaedic Hospital,
Birmingham B31 2AP, UK.
Email: doctigs@gmail.com

Abstract

Ultrasound-guided injections such as steroid injections are common procedures involving the musculoskeletal system. They are usually performed after a subcutaneous injection of local anesthetic (LA), which can be painful. In 126 consecutive patients, local anesthesia was performed using ethyl chloride spray prior to a therapeutic ultrasound-guided injection in joints, tendons, or bursae. Ninety-nine (78.5%) patients found the use of ethyl chloride spray helpful. The use of ethyl chloride spray is an effective, patient-friendly alternative to the standard injection of local anesthetic for ultrasound-guided therapeutic musculoskeletal injections with the advantage of a lower cost of \$0.18 per procedure.

KEYWORDS

ethyl chloride spray, local anesthetic, musculoskeletal system, ultrasound guided injections

1 | INTRODUCTION

Ultrasound (US)-guided therapeutic injections are performed routinely in the musculoskeletal system. Administration of local anesthetic is usually performed prior to performing the definitive therapeutic injection and has been well documented to reduce subsequent pain.¹ Ethyl chloride spray (ECS) is a fast-acting vapo-coolant spray that provides rapid, transient, topical anesthesia. It has been used as an alternative to subcutaneous local anesthetic injection for skin tag excisions,² venipuncture/cannulation, Port-a-cath insertion, lumbar punctures, and bone marrow aspirations.³ ECS is used routinely in pediatric patients to reduce discomfort of injection-associated pain.⁴⁻⁶ We performed a prospective study to assess the efficacy and patient experience of ECS in US-guided soft tissue and intra-articular injections.

2 | MATERIAL AND METHODS

This study was conducted in accordance to local clinical governance guidance and institutional review board approval was obtained. The study included 180 consecutive patients having US-guided injections performed at a tertiary orthopedic hospital. All injections were

performed under US guidance and aseptic conditions by a single fellowship trained musculoskeletal radiologist. An Acuson S3000 scanner (Siemens Medical Solutions, Malvern, PA) with either a 12 MHz or 14 MHz probe was used. The application of ECS (Axongesic, Ennogen Pharma, UK) was performed by an assistant. The vapo-coolant was sprayed until a thin white film appeared (during approximately 5 s). The therapeutic injection was then performed immediately. After the procedure, all patients were given an ECS evaluation form. The cost of the spray per injection was calculated and compared to the cost of standard injection of local anesthetic.

3 | RESULTS

One hundred twenty-six patients of 180 responded to the survey with an average of 60 years of age (range, 28-90 years). There was a female predominance. Injected sites included foot joints ($n = 41$), trochanteric bursa ($n = 22$), ankle joint ($n = 21$), Morton's neuroma ($n = 20$), knee joint ($n = 9$), extremity tendon ($n = 8$), hip joint ($n = 2$), acromioclavicular joint ($n = 1$), retrocalcaneal bursa ($n = 1$), and plantar fascia ($n = 1$). Ninety-nine (78.5%) patients reported that ECS was helpful. Thirteen patients (10%) did not comment, 12 (9%) reported no difference compared to prior experiences of US-guided injections performed without

ECS. Two (1.6%) patients reported that they found the spray very uncomfortable.

The average cost of ECS per injection was calculated as 0.18 US\$. The total cost of using standard anesthetic injection, which, in our institution includes the use of a 5 mL vial of 1% lidocaine, a syringe, and a hypodermic needle is 0.29 US\$. There is a saving of 0.11 US\$ per injection using ECS.

4 | DISCUSSION

ECS is a topical anesthetic and is widely used while performing a variety of percutaneous procedures. The spray causes a sudden drop in the surface temperature via rapid evaporation resulting in an instant but temporary anesthetic effect with the effect lasting between 3 and 7 s.⁷ ECS has also been shown to improve patient satisfaction and decrease pre-procedural pain by decreasing the nerve conduction of the C and A delta pain fibers and thus reducing nociceptive input to the spinal cord.⁸⁻¹⁰ The patient workflow can be more efficient as ECS produces an instant anesthetic effect compared to the time required to draw up the injectable anesthetic, to give the injection and to wait (a few minutes) for the anesthetic to take effect. Furthermore, a number of studies have demonstrated that ECS does not contaminate a sterile field,¹¹⁻¹³ with some studies demonstrating ECS to have disinfective and antimicrobial properties.¹³⁻¹⁵ In that regard, Azar et al.¹⁴ have shown ECS to be as effective as the antiseptic povidone iodine.

Patient experience and satisfaction are improved by using an anesthetic agent prior to an invasive procedure as it decreases anxiety, fear and pain. 78.5% of our patient had a positive experience with ECS and did not find the procedure painful. However, two (1.6%) patients found the coolant effect of ECS painful, and it is therefore important to remember to inform the patient of what to expect prior to its use. Lidocaine is the commonest agent used for rapid subcutaneous anesthesia, however, there are potential risks of drug allergy and toxicity.¹⁶ These risks are avoided with the use of ECS. Furthermore, it is well known that infiltration of lidocaine, itself may be painful due to either skin penetration by the needle or tissue distension by the anesthetic injectate.¹⁷⁻¹⁹

We have demonstrated the successful use of ECS for musculoskeletal injections. ECS could also be used for fine needle aspirations of the breast, thyroid or lymph node. ECS could also be used during blind injections performed by orthopedic surgeons, pain consultants, family physicians, rheumatologists and other allied specialists.

We acknowledge that this study was performed at a single institution, by a single radiologist and without a control group. Side effects related to ECS application are extremely rare and include cutaneous sensitization and alteration of the skin pigmentation.

The aim of this study was to determine if ECS was both a clinically and cost-effective alternative to the use of subcutaneous local anesthetic.

With an average of 50 US guided injections performed per week in our institution, our results have also demonstrated that ECS is cost-effective. There is a potential cost saving of 5.6 US\$ per week and 295 US\$ per year.

ORCID

Alessandro Vidoni MD  <http://orcid.org/0000-0003-1394-1400>

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