

Simple kitchen cling film, an affordable alternative as ultrasound probe cover for peripheral nerve blocks: A prospective cross-sectional observational study

INTRODUCTION

The use of ultrasound (US) in anaesthesia and intensive care has evolved over time to become an unavoidable component of modern practice. Evidence corroborating its use is accumulating day by day. In modern anaesthesia practice, peripheral nerve blocks, central venous cannulation, airway assessment, intragastric volume assessment, point of care US (POCUS), and focused assessment with sonography in trauma (FAST) are examples of its widening horizons.^[1]

Some authors have averred that the US probe is a potential vector for the transmission of pathogens such as methicillin-resistant *Staphylococcus aureus* and *Pseudomonas*, among others. The sterilisation principles, which are a basic prerequisite for invasive interventional procedures, may not be respected sometimes during ultrasonography-guided interventions, with the routine practice of simply wiping off the gel from the probe head after scanning using dry soft tissue paper. Therefore, the authors have expressed doubt if this cleaning protocol confers adequate disinfection.^[2-6] There appears to be an urgent need to strengthen the current antimicrobial cleaning techniques and consider newer ones in the light of the recent emergence of severe, lethal infections.

The European Society of Radiology Ultrasound Working Group has advised using sterile gel for treatments that are semicritical and critical.^[7] Nevertheless, the use of gels to prevent probing surface damage with pre-ultrasound-guided attenuation (UGA) probe cleaning, the agents used, and methods of preservation of US probes are currently topics of research.

The price of the material used to cover the probe during peripheral nerve block is a significant issue in a setup with limited resources. The crucial elements include visibility and asepsis, in addition to the cost

aspect. Transparent and adhesive camera covers and ready-to-use sterile probe covers are frequently used.^[1,7] The price seems to be out of reach in a situation with scarce resources. Sterile gloves are the less expensive choice, but visibility is sacrificed.^[2] This research was done to assess the visual appeal, practicality, and affordability of using a cling film (a thin plastic film often used to seal food items) to cover ultrasonic probes.

METHODS

The study was approved by the institutional ethics committee (DMMC (DU)/IEC/2021/15 dated 30.10.2021). The study was conducted from November 2021 to April 2022 in centres where US-guided peripheral nerve blocks/fascial plane blocks were routinely practised. A written informed consent was obtained from the patients and the study was conducted in accordance with the principles of the Declaration of Helsinki.

To cover the ultrasonography (USG) probe with 'Cling Film' for peripheral nerve blocks in 100 patients who were enrolled for surgical intervention requiring regional anesthesia and deemed fit for it were included in the study. The sample size for the study was calculated using the formula: $N = (Z_{\alpha/2})^2 P (1-P) * 1/E^2$ (where P is the prevalence or proportion of event of interest for the study, E is the Precision (or margin of error) = $(1.96)^2 * 0.35 * (1-0.35) / (0.07)^2 = 98.75 = 100$). All the study subjects were administered alprazolam 0.5 mg and pantoprazole 40 mg tablets orally the night before surgery.

We found the plexus with a typical routine scan using ultrasonic coupling gel after securing the intravenous line and attaching the standard routine monitors to get an idea of the image for comparison and the location of the plexus. An expert investigator measured the linear US probe of the ultrasonic device in the supine position for peripheral nerve blocks and fascial plane blocks using the USG machine. Later, the assistant holding the probe applied ultrasonic gel and sterile lignocaine gel to the transducer's contact area and another assistant applied the probe cover using cling film in such a way as to avoid any air bubble at the interface [Figure 1]. The operator then held the probe using a sterile towel.

The probe transducer was then cleaned with alcohol and then dipped in povidone iodine 5% so as to provide

aseptic protocol during the procedure. The nerve block was then administered after following the asepsis protocol for skin preparation. The images obtained from the respective anatomical regions were recorded and observed by five different anaesthesiologists for its quality.

The variables that were assessed included the following:

- (1) Complaint of injection site pain on a 0 to 10 Numerical Pain Rating scale (a score less than 3 was considered as normal).^[8]
- (2) Injection site examination for increased local tenderness, redness, and swelling (I-Mild local tenderness: Score 1-3; II-Tenderness with redness: Score 3-5; III-Tenderness with redness and swelling: Score 5-10).
- (3) Evaluation of the quality of the images obtained. This was done by five anaesthesiologists who were experienced in ultrasound guided regional anaesthesia. Likert scale was used for evaluation (Score: 1: insufficient image, 2: reasonable image, 3: good image, 4: fairly good image, 5: ideal/optimal image–Likert scale).
- (4) The convenience of the application in terms of the ease of application and the convenience of use which was graded as: 1 = poor, 2 = fair, 3 = moderate, and 4 = good. The cost of each of the different membranes for a single use was calculated.

Statistical analyses were performed with Statistical Package for the Social Sciences version 15.0 software (SPSS Institute, Chicago, IL, USA). Continuous data were tested for normality. Normally distributed data were summarised using mean and standard deviation and were compared using one-way analysis of variance test. Bonferroni correction was used. A *P* value less than 0.05 was considered to be statistically significant.

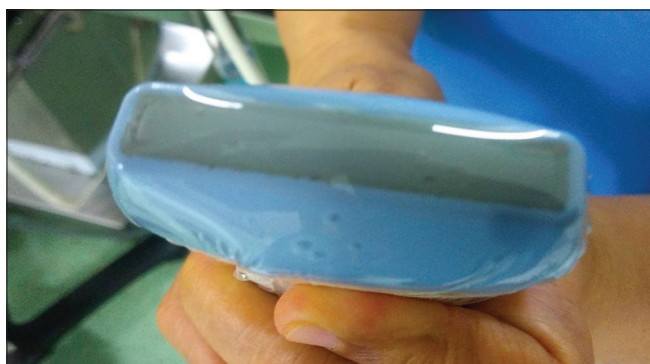


Figure 1: Cling film fitting snugly to US probe

RESULTS

In our study, the mean age of the patients was 32 ± 7.65 years and majority of them were males (66%).

The probe cover was used for the administration of 69 supraclavicular blocks, 16 interscalene blocks, 3 axillary blocks, 7 transversus abdominis plane (TAP) blocks, and 5 popliteal sciatic nerve blocks [Table 1].

During postoperative follow-up, on the assessment of pain at the injection site, 88% of patients had only mild pain (0-3), whereas only 12% complained of pain (3-5) [Table 2].

There were no local signs and symptoms of inflammation and all patients (0-3) exhibited only mild tenderness.

On subjective feedback, 77% patients rated the experience as good (G), whereas 23% rated it as Fair (F), and no one rated it as Bad (B).

We found a good inter-rater reliability among the anaesthesiologists for visibility and ease of application of the cling film cover [Table 3 and Figure 2].

DISCUSSION

Our objective was to find out a cost-effective and safe alternative with clear visibility for US probe cover. For procedures like peripheral nerve blocks, central venous cannulation, and central neuraxial blockade, strict asepsis is mandatory. There are reports of bacterial infections transmitted by US probe and coupling gel.^[1]

Table 1: Distribution of cases as per selection of block

Type of regional block	Number	Total
Supraclavicular block	69	
Interscalene block	16	100
Axillary block	03	
Transversus abdominis plane (TAP) block	07	
Popliteal sciatic block.	05	

Table 2: Postoperative follow-up

Corresponding scale	Count/Value		
Numerical Pain Rating (NPR) score (0-10)	0-3	3-5	5-10
Number of patients	88	22	0
Local inflammation scale (1-10)	1-3	3-5	5-10
Number of patients	100	0	0
Feedback	Good	Fair	Bad
Number of patients	77	33	0

Table 3: The cost, visibility, and ease of application

	Cling film	Inter-rater reliability Cohen's Kappa score
Cost/use	0.20 INR Approx	NA
Visibility (mean score±SD)	4.85±0.30	0.88
Ease of application (mean±SD)	3.20±0.45	0.82

NA, Not Applicable; INR, Indian Rupee; SD, Standard Deviation

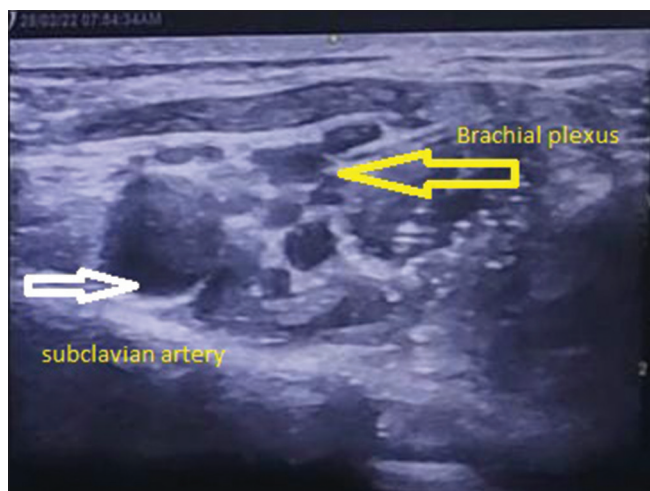


Figure 2: US image quality

The idea of using simple kitchen film surfaced in search of the 3 'A's, that is, Availability, Affordability, and Appropriateness. There are many commercial US probe/transducer covers available in the market. Options available at our disposal were camera cover, sterile gloves, coupling gel, and transparent adhesive dressing.

The camera cover and transparent adhesive dressing are good alternatives in terms of visibility, but they are relatively costly. Also, their regular availability in rural setups is an issue. Tight adherence to the probe is also an issue with these alternatives.^[2]

Sterile gloves are readily available but are relatively costlier and the issue is also of compromised visibility. Nevertheless, Suresh *et al.*^[2] have demonstrated the improvised use of the glove barrier.

Saroa R *et al.* used tailor-made cloth cover for the cord of the machine instead of the camera drape or other commercial shield which covers the cord. Nonetheless, we resorted to the use of a sterile towel in our study cases.^[3]

The simple kitchen cling film is a relatively affordable alternative and a single rim can comfortably be used for atleast 400 patients. Also, it fits snugly to the

probe and the visibility of the US image is at par with readily available probe covers.

We have been using cling film regularly because of its favourable cost and visibility. It is cleaned with 'Sterillium' (a hand disinfectant containing propan-2-ol, propan-1-ol, metronidazole, glycerol, etc) or alcohol/spirit^[4,5] and then dipped in 'Betadine' (povidone-iodine).^[6] This acts as a sterile coupling gel over the outer surface of the cling film, thereby improving the visibility. The added advantage is of sterility.

The recommendations from the European Society of Radiology Ultrasound Working Group were laid to prevent cross-infection by the US probe in radiology. The authors used sterile US coupling gel at the outer surface, with the aim of providing additional effects on aseptic working conditions. The concept of providing sterile US probe covers in combination with sterile single-use US coupling gel is promising in reducing the cross-infections produced by USG.^[7] In our case, we used the gel under the film, cleaned with Sterillium, and dipped in Betadine, thus getting the advantage of visibility at par with the sterile transparent dressing along with asepsis.

During follow-up, we looked for pain at the injection site; 88% patients in Group A had only mild pain (0-3) on a NRS of 0-10, whereas only 12% in Group B complained of pain (3-5) on the NRS. We asked leading questions and it was a subjective perception of pain. However, we observed that the patients were not able to distinguish between pain and discomfort and some confusion existed between the injection site and operating site. We considered it as a subjective variation related to the number of pricks due to operator variability in experience.

In most of the study cases, there were no local signs and symptoms of inflammation and there was only mild tenderness on the scale of 0-10. This is considered acceptable. On subjective feedback, 77% patients rated the experience as good (G), whereas 23% rated it as Fair (F), and no one rated it as Bad (B). We considered this as variability in experience of the operator and patient perception as well. Hence, it can be assumed that cling film did not cause any local inflammatory response on patients' skin.

This technique has been in use since the year 2020 and the results appear to be satisfactory and

encouraging. We were able to achieve asepsis along with good quality image with avoidance of contact between the probe and puncture site. We propose that cling film can be easily used in place of costly probe covers for performing single-injection US-guided nerve blocks.

Our study has some limitations. Being a prospective cohort study, there was no comparative group in the present study. We used this application only for peripheral nerve blocks/fascial plane blocks. Also, we did not use it for vascular access.

CONCLUSION

Cling film cover for USG-guided peripheral nerve blocks is cost-effective, avoids direct contact between US probe and puncture site, and thereby minimises infection risk with no alteration in image quality. Based on our prima facie observations, we propose that it can be easily used as a probe cover for performing single-injection USG-guided peripheral nerve blocks. We did not observe any local side effects of the cling film. Large-scale microbial studies are needed to prove its sterility.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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REFERENCES

1. Gaillot O, Maruéjols C, Abachin E, Lecuru F, Arlet G, Simonet M, et al. Nosocomial outbreak of *Klebsiella pneumoniae* producing SHV-5 extended-spectrum beta-lactamase, originating from a contaminated ultrasonography coupling gel. *J Clin Microbiol* 1998;36:1357-60.
2. Suresh V, Asish K, Devi PS. Improved glove barrier for ultrasound probe protection. *Anesth Essays Res* 2015;9:448-9.
3. Saroa R, Mitra S, Sinha S. Reusable ultrasound probe covers. *Indian J Crit Care Med* 2014;18:479-80.
4. Favero MS, Bond WW. Chemical disinfection of medical and surgical materials. In: Block SS, editor. *Disinfection, Sterilization, and Preservation*. Philadelphia: Lippincott Williams & Wilkins; 2001. p. 881-917.
5. Rutala WA, Weber DJ. Disinfection, sterilization, and control of hospital waste. *Mandell, Douglas, and Bennett's principles and practice of infectious diseases* 2015:3294.
6. Durani P, Leaper D. Povidone-iodine: Use in hand disinfection, skin preparation and antiseptic irrigation. *Int Wound J* 2008;5:376-87.
7. Nyhsen CM, Humphreys H, Koerner RJ, Grenier N, Brady A, Sidhu P, et al. Infection prevention and control in ultrasound—best practice recommendations from the European Society of Radiology Ultrasound Working Group. *Insights Imaging* 2017;8:523-35.
8. Marhofer P, Fritsch G. Sterile working in ultrasonography: The use of dedicated ultrasound covers and sterile ultrasound gel. *Expert Rev Med Devices* 2015;12:667-73.

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