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Smart-Draping -A Validated Novice Technique to Prevent Drapes Peeling off During Hip Fracture Fixation Surgery: A Prospective Randomised Controlled Study

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Abstract

The contamination of the surgical field can be a potential risk of infection that can be devastating to patients undergoing hip fracture fixation surgery. Drapes peeling off during such operation is a recognised challenge that can lead to such a contamination. We describe and validate a simple technique to prevent drapes peeling off the operative field during hip fracture fixation surgery using the smart-draping technique. The smart-draping entails applying a sterile disposable single large adhesive op-sheet to the inferior aspect of the thigh, just under the proposed surgical incision, followed by applying the usual plastic vertical isolation drape. Fourteen neck-of-femur fracture patients undergoing dynamic hip screw (DHS) fixation were recruited and randomised into study and control groups to measure fluid leakage, as an indirect measurement of the vertical drapes peeling off the surgical site. Incontinence pads were placed on the floor to collect all leaked fluid in all patients. The average weight of the fluid collected in the study groups was 11.4 gm (SD ± 12.1) while that of the control group was 354.3 gm (SD ± 175). There was a statistical significant difference between the two methods favouring the smart-draping method over the control one. (P<0.001) We conclude that smart-draping technique will make it harder for the drapes to peel off thus, avoiding the potential contamination of the surgical field and ultimately avoiding potential infection of the surgical site in hip fracture fixation surgery.

Keywords: Hip fracture; Neck of femur; Drapes; Peeling off; Smart-draping; Adhesive op-sheet; Vertical isolation drape

Introduction

Infection can be devastating to patients undergoing hip fracture fixation, [1-6] and contamination of the surgical field can potentially precipitate this. Drapes peeling away, becoming loose, or falling off altogether during such an operation is a recognized challenge that can lead to such potential contamination, particularly when such an occurrence happens well into the indexed procedures. In this situation recovering from contamination can prove not only difficult but impossible at times, exposing the surgical sterile field to direct contact of potential harmful microorganisms arising from the under surface of remote parts of the vertical isolation drapes (Steri-Drape TM, 3M Health Care, Neuss, Germany).

Despite all the above challenges; very little is documented in the English literature about this dilemma. We describe and validate a simple and effective smart-draping technique that can secure all drapes in place throughout the procedure.

The smart-draping technique

The patient is placed on the operation table, positioned as appropriate and the skin is prepared using the default preparation technique (Figure 1). Smart-draping can now ensue by applying a sterile disposable single large (175 × 150 cm) adhesive op-sheet (Barrier®, Mölnlycke Health Care, Göteborg, Sweden) to the inferior aspect of the thigh, just under the proposed surgical incision (Figure 2). Finally, the plastic vertical isolation drape is applied making sure it is securely adhered to the intervening adhesive op-sheet drape and to the patient's skin (Figure 3). The intervening adhesive op-sheet drape will be sandwiched between the skin of the patient and the vertical isolation drape. Just like extra anchorage wings it will secure itself to the patient's skin all along the operative field and beyond on either side of the patient's body, thus increasing the combined adhesive surface area, making it much harder for the drapes to peel off.

Patients and Methods

In a prospective randomised and controlled study carried out in the orthopaedic theatres in our hospital and following ethics committee approval, fourteen neck-of-femur fracture patients undergoing dynamic hip screw (DHS) internal fixation were recruited and assigned randomly into two groups. The patients were randomised into study, and control groups using sequentially numbered, opaque sealed envelopes that were accessed at the indexed procedures [7].

The inclusion criteria for this study included all patients with two parts extra-capsular neck-of-femur fractures admitted to our unit and awaiting DHS internal fixation. Patients underwent other forms of fixation were excluded from the study.

Female to Male ratio was 5:2 and 6:1 in the study and control groups respectively with average age of 80.1 years (SD ± 12.3) and 81.7 years (SD ± 9.1) in the study and the control groups respectively (Table 1). The same surgeon performed all procedures between July 2015 and July 2016.

	Control group	Smart-Draping group	P value
Gender (F:M)	6:1	5:2	
Mean age (SD)	81.7 ± 9.1	80.1 ± 12.3	>0.39
Operation time (min)	56.9 ± 8	58.4 ± 16.6	>0.41
Fluid leaked weight (gm)	354.3 ± 175	11.4 ± 12.1	<0.001
min: minutes; gm: grams; SD: standard deviation			

Table 1: Particulars of participants in both control and study groups are shown in this Table.

Following patient positioning and just before skin preparation, two Inco-Pads (incontinence absorbent pads) (Tena®, SCA Hygiene Products UK Ltd, Dunstable, England, The United Kingdom) were placed on the floor to collect all leaked fluid in all patients. The pads were weighed before and after the operative procedure using same digital scales that were sensitive to minimal of 10 gms of weight. The pads measured 60 × 90 cm with absorbency of 1400 ml and a net dry weight of 85 gm each.

Surgical wounds were washed out at the end of procedures with one litre of warm normal saline in all patients.

Drapes in the study group were visually controlled at the end of the procedures for peeling off by observing any fluid leaking patches on the intervening adhesive op-sheets.

For the purpose of this study, the operative time was calculated from the start of the skin preparation to skin cover by post-operative dressing.

The data was tabulated and analysed using Excel software (Microsoft® Excel® for Mac 2011). Student t-test was used to detect a difference of 5% or more change in amount of fluid soaking the floor Inco-Pads with the new method as compared to the control method. With 80% power, a sample of size 3-4 in each arm is needed to test the hypothesis at the 5% significance level with p-value set to 0.05.

Results

The operative time including draping and preparation was in average 58.4 minutes (SD ± 16.6) and 56.9 minutes (SD ± 8) in the study and the control groups respectively. The difference in operative time between the two groups was not statistically significant (p>0.41). Similarly, there was no statistical significant difference in age between the two groups (p>0.39). Thus, the two groups were matched for age and for operative time duration.

The average weight of the fluid collected in the study groups was 11.4 gm (SD ± 12.1) while that of the control group was 354.3 gm (SD ± 175). There was a statistical significant difference between the two groups (p<0.001).

All adhesive op-sheets in the study group remained adherent to the patients at the end of the operation and were all visually dry.

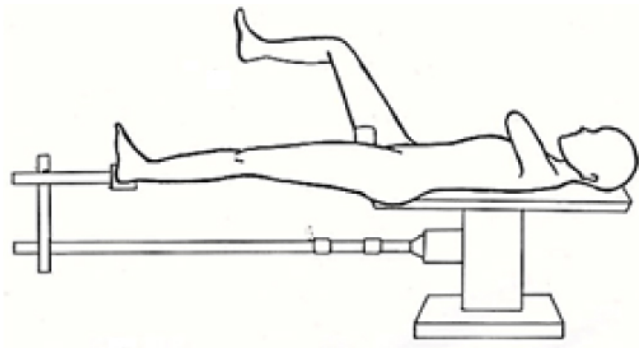

Figure 1: An artwork illustration showing a hip fracture patient positioned, prepared and ready for draping.

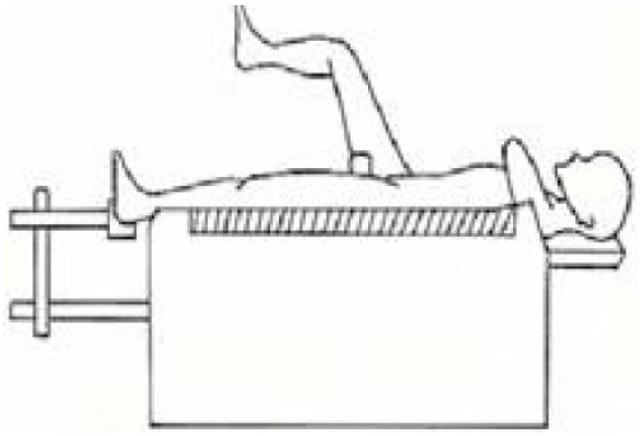

Figure 2: An artwork illustration showing the operative field draped using a large adhesive op-sheet positioned just below and parallel to the proposed surgical incision. The shaded areas represent the adhesive strip part of the op-sheet.

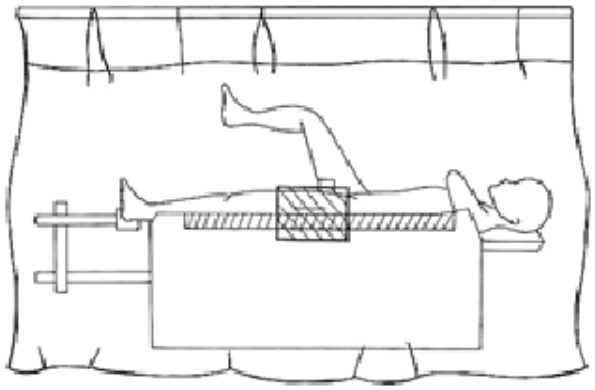

Figure 3: An artwork illustration showing the finished smart-draping in place. The shaded areas represent the combined adhering parts of the adhesive op-sheet and the vertical isolation drape. Notice the distance between the adhesive op-sheet and the surgical incision.

Discussion

The reason why drapes peel away, become loose, or fall off altogether during hip fracture surgery can be multifactorial. Surgeons draping prior to allowing the skin to dry off, can be one of the reasons. We therefore recommend using alcoholic Betadine® and let dry for four minutes, or wash it off with alcoholic Chlorhexidine 4% WV as this will tend to allow adhesive drapes to stick better to the operative field [8]. (Must wait for one minute after the latter preparation).

Another reason drapes peel off is the development of possible creases and bubbles during inaccurate application of the vertical isolation drapes. We recommend that the drapes to be applied by the surgeon by holding the drapes ready to have the adhesive protective paper strips removed by the scrub nurse or the assistant surgeon, thence applying the drape on the patient's skin starting from the center part of the adhesive rectangle part of the vertical isolation drape wiping outwardly to reduce the possibility of bubble forming under.

Heavy drapes can cause the adhesive part of the vertical isolation drape to peel away slowly, but surely thanks to gravitational forces formed by debris accumulating in the designated pouch. This is often made worse if the surgeon leaves tools and drenched swabs in the pouch, or fails to achieve hemostasis.

The C-arm tube of the X-Ray machine can cause the drapes to peel off in two ways. The first is at the start of the procedure when the XR machine is pushed in place for anteroposterior view of the hip fracture. The machine will push on the vertical isolation curtain especially when applied tight between the patient's skin and the horizontal curtain bar. We recommend that this part of the drape should be let loose when applied. This can be achieved by applying the drapes, then deliberately placing the surgeon's forearm over and along the patient's thigh forcing the drapes to remain loose before the horizontal bar part of the drapes are secured in place, or by leaving the operating table a couple of inches lower than the final desired height until draping is concluded, then raising the table up to the appropriate height. The second way is when the XR tube is caught on the drapes when rotated to perform a lateral radiograph thus peeling the drapes away from the patient's skin.

Expired drapes by date can affect the adhesive efficacy of the drapes, but this is unlikely to take place as all expiry dates are checked and rechecked by at least two qualified theatre staff.

Other patient related factors like too hairy a skin in men could also interfere with the security of the adhesive parts of the drapes.

In addition to the primary benefit of preventing drapes peeling off; smart-draping can also help to avoid theatre floor soiling as the wound oozing and wash debris will not sneak behind the drape, instead they are collected in the available built in pouch. In our study the leaked fluid on floor in the study group must have escaped the fluid collection pouch to the floor, as the intervening adhesive op-sheet remained dry in all the seven cases.

Similarly, the smart-draping can help to avoid the soiling of the C-arm tubes of the X-ray machine along with saving radiographers long laborious cleaning chores after surgery.

Moreover, the smart-drapes will allow the C-arm X-ray machine to glide easily over the intervening adhesive op-sheet paper-like-quality as opposed to having to glide on the plastic vertical isolation drape. This means it will less likely catch and lift the drapes off the patient's skin.

The smart-draping will help Negating the need to release the drape off the C-arm tube of the X-ray machine when performing lateral radiographs, which often involves the lower parts of the drape-ends nearing the floor with the potential of fouling the gloves of the operating surgeon, the assistant or even the scrub nurse.

In addition to its usefulness in dynamic hip screw fixation of neck of femur fractures; the smart-draping technique can also be used for internal fixation of hip fractures using cannulated screw fixation, *in situ* pinning of slipped upper femoral epiphysis, or even intramedullary nailing of proximal femoral fracture in both cephalo-medullary and antegrade nailing modes.

One of the weaknesses of our study is the lack of long term follow up to ascertain any evidence of deep sepsis or even superficial for that matter. None of the patients developed skin damage, blistering, or a reaction to the adhesive material of the intervening op-sheets; but follow up was not pre-planned in our study and some patients were discharged earlier than others and were not monitored. We did not measure blood loss for each patient as this was hard to capture giving the inherent difficulty of keeping drapes put especially in the control group; but despite that hemostasis was always secured and sought after in all patients to keep blood loss minimal. This is also why we elected to have seven in each group instead of three or four like it was advised by our statistician and the power analysis; to reduce the effects of the possible above non-confounding factors.

Until smart-drapes become commercially available as a single drape unit with all the characteristics described in our article, we think that our technique will be simpler, more affordable, and easy to master to stop drapes peeling off in hip fracture fixation surgery.

Conclusion

The smart-draping technique will make it much harder for the drapes to peel off, thus avoiding the potential contamination of the

surgical field during hip fracture fixation surgery and ultimately avoiding potential surgical site Infection.

Conflicts of Interest Statement

The authors confirm that we have not had any financial or personal relationships with other people, or organizations, that could inappropriately influence (bias) our work, all within three years of the beginning the work submitted.

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References

1. Duckworth AD, Phillips SA, Stone O, Moran M, Breusch SJ, et al. (2012) Deep infection after hip fracture surgery: Predictors of early mortality. Injury 43: 1182-1186.
2. Edwards C, Counsell A, Boulton C, Moran CG (2008) Early infection after hip fracture surgery: Risk factors, costs and outcome. J Bone Joint Surg Br 90: 770-777.
3. Mackay DC, Harrison WJ, Bates, Dickenson D (2000) Audit of deep wound infection following hip fracture surgery. J R Coll Surg Edinb 45: 56-59.
4. Noumi T, Yokoyama K, Ohtsuka H, Nakamura K, Itoman M (2005) Intramedullary nailing for open fractures of the femoral shaft: Evaluation of contributing factors on deep infection and nonunion using multivariate analysis. Injury 36: 1085-1093.
5. Partanen J, Syrjala H, Vahanikkila H, Jalovaara P (2006) Impact of deep infection after hip fracture surgery on function and mortality. J Hosp Infect 62: 44-49.
6. Pollard TC, Newman JE, Barlow NJ, Price JD, Willett KM (2006) Deep wound infection after proximal femoral fracture: consequences and costs. J Hosp Infect 63: 133-139.
7. Doig GS, Simpson F (2005) Randomization and allocation concealment: A practical guide for researchers. J Crit Care 20: 187-191.
8. Jacobson C, Osmon DR, Hanssen A, Trousdale RT, Pagnano MW, et al. (2005) Prevention of wound contamination using DuraPrep solution plus loban 2 drapes. Clin Orthop Relat Res 439: 32-37.