

Comparison of Pain Perception During Redon Drain Removal*

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ABSTRACT

Background. Redon drain has replaced Redi-vac drain and it is one of the common surgical drains that is inserted intra-operatively for the purpose of draining excessive haemoserous fluid at the operation site via the drainage tube into the pre-created Privac vacuum bottle. Upon drain removal, the release of the vacuum is achieved by either clamping the Redon drainage tube or unscrewing the drainage tube connector to ensure a vacuum free state during drain removal. This study aimed to compare any differences in the level of pain experienced by patients during drain removal using 2 different vacuum free methods.

Methods. A randomised comparative study was conducted from February to October 2001 on 90 patients who underwent abdominal surgery with Redon drain insertion. The subjects were randomised into 2 groups: control group (method 1 — clamping of the Redon drainage tube) and study group (method 2 — unscrewing of the drainage tube connector). Approval for the study was obtained from the SGH Ethics Committee. The determination of sample size was derived from a pilot study.

Results. The data was analysed using SPSS version 10. Analysis showed that the pain score between the control and study groups ($p=0.046$, two-sample t-test, 3.27 ± 1.83 vs 2.47 ± 1.91) was statistically significant. The mean difference of the pain score between the 2 groups was 0.8 (SD=0.394, 95% CI 0.02 to 1.58). A multiple regression was performed to adjust for the effects of relevant covariates and the mean difference of the pain score was still statistically significant ($p=0.035$).

Conclusion. This study showed that the method of creating the vacuum free state for removal of Redon drain did affect the patient's perception of pain.

Keywords: drain removal, vacuum suction drain

INTRODUCTION

The Redon drain (Fig. 1) has replaced the Redi-vac drain. It is one of the common surgical drains that is inserted intra-operatively for the purpose of draining excessive haemoserous fluid at the operation site via the drainage tube into the pre-created Privac vacuum bottle. Smith stated that vacuum should be released upon drain removal to prevent damage to the underlying tissues.¹ However, the method of releasing the vacuum was not stated. Werner stated that a higher degree of vacuum suction would result in bleeding and "secondary" haematoma after drain removal.² The unit policy states that the vacuum should be released upon

drain removal.³ The release of the vacuum is achieved by either clamping the Redon drainage tube or unscrewing the drainage tube connector to ensure a vacuum free state during drain removal. However, to date, there is no similar study on the method of ensuring vacuum free state during drain removal. The method for releasing vacuum in the drainage system upon drain removal should be clarified as nursing practice is directly related to patient's outcome. Kannusamy *et al* recommended that one of the strategies for facilitating evidence based nursing is to provide nurses with information on effective nursing practice.⁴ Hence, to support evidence based nursing within the local setting, this study was undertaken to compare any differences in the level of pain experienced by patients during drain removal using two different vacuum free methods.

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Fig. 1. Redon drain.

METHODS

A randomised single blind comparative study was conducted between February to October 2001. Approval for the study had been obtained from the SGH Ethics Committee and patients participating in the study gave written consent. Ninety patients who had undergone abdominal surgery with Redon drain insertion and had met the selection criteria were recruited. Patients who had undergone uncomplicated surgery with abdominal Redon drain, or had a drain that was inserted in either the left side, right side or central aspect of the incisional wound were included in the study. Patients who had complicated surgery, abdominal ascites, were on anti-coagulant therapy or on patient-controlled or epidural analgesia were excluded.

Surgery was defined as complicated if the patient required blood transfusion intra- and post-operatively, the duration of operation exceeded 2 hours or the patient required unplanned procedure post-operatively, such as a return to operating theatre. Throughout this study, the size of the Redon drain used was consistently the same and there was no more than 1 drain in all the subjects.

The determination of sample size was derived from a pilot study in which 4 patients used method 1 while 8 patients used method 2. Method 1 referred to clamping of the Redon drainage tube while method 2 referred to unscrewing of the drainage tube connector. The standard deviations for the 2 groups were 0.65 and 0.69, respectively. Anticipating that the mean difference in pain score between the 2 groups was 0.5 units with standard deviation of 0.8, a sample size of 90 subjects was sufficient to give a statistically significant result with a power of 80% and a 2-sided test of 5%.

Subjects were randomised into 2 groups — control group (method 1 — clamping of the drainage tube) and study group (method 2 — unscrewing the drainage tube connector). The randomisation list was prepared by a statistician. Subjects were blinded to the method of creating a vacuum free state during drain removal.

All registered nurses (RN) were orientated on the research study by the researcher. The briefing notes comprising the purpose of study, inclusion and exclusion criteria, written consent, randomisation process, method of data collection and standard of drain removal were placed in the ward for reference.

The procedures for drain removal and the method of creating vacuum free-state during drain removal were as follows:

1. Removal of drain was carried out by RNs/doctors using an aseptic technique
2. Subjects were not given any additional analgesia at the time of drain removal unless they had requested for it.
3. Drain removal was performed at the subject's bedside with the subject comfortably positioned.
4. Vacuum was released according to the randomisation list.

The drainage tube connector was unscrewed till the Privac vacuum indicator was inflated. The drainage tube had to be clamped before the vacuum was released to prevent atmospheric air pushing the fluid back to the draining tubing. Once the vacuum had been successfully released, the drainage tube was unclamped to facilitate the fluid draining along the tubing into the Privac bottle (Fig. 2).

5. Subjects were advised to relax by taking a deep breath before drain removal.
6. After the anchoring stitch around the drain is cut, a piece of sterile gauze was placed over the drain site, and the drain was removed quickly and firmly.
7. After drain removal, pressure was maintained over the drain site for a few minutes, the drain site was cleaned and a transparent dressing was applied to the external wound.

The removal of the drain was in accordance to the unit policy.

The 100mm Visual Analogue Scale (VAS) has been identified as a proven, universally applicable pain assessment tool.⁵ Subjects were asked to rate their level

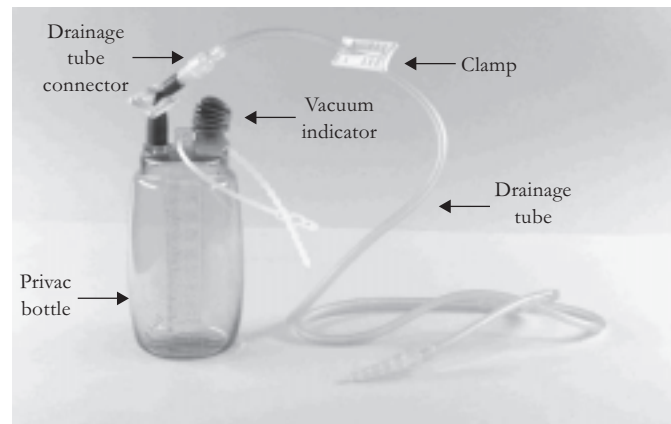


Fig. 2. Privac-Komplett-Set.

of pain immediately after drain removal using this scale. A scale of 0 indicated no pain while a score of 10 indicated severe pain.

Statistical analysis was conducted using SPSS version 10. To compare the mean pain score between the study and control group, 2-sample t-test was used to compare the mean difference between the groups. Multiple regression was carried out to adjust for relevant covariates where applicable.

RESULTS

Of the 90 patients recruited for the study, 19 had undergone gynaecological surgery while 71 had undergone urological surgery. The subjects were randomised equally into the 2 groups (Table 1). There were 19 males and 26 females in both groups. There were 36 Chinese and 9 non-Chinese in the control group and 37 Chinese and 8 non-Chinese in the study group. The subjects' mean ages were 54 (range 24 to 80) and 53 (range 18 to 77) years for the control and study groups, respectively (Table 2).

In the control group, the mean pain score was 3.27 (SD=0.138), and in the study group, the mean pain score was 2.47 (SD=1.91) (Table 3). The mean difference of the pain score between the 2 groups was 0.8 (SD=0.394, 95% CI 0.02 to 1.58). A two-sample t test showed that the pain score between the control and study groups was statistically significant ($t=3.27 \pm 1.83$ vs 2.47 ± 1.91 , $p=0.046$).

A multiple regression was performed to adjust for the effects of relevant covariates, such as demographic data and information on drain, in both groups. The main effects were gender, race (Chinese vs non-Chinese), age, day of drain removed, site of drain inserted (left vs right) and amount of drainage left in the bottle.

The main effect of staff who removed the drain was not included in our model as there were only 7 subjects for whom the removal of drain were performed by doctors (5 in control group and 2 in study group) (Table 4). Moreover, as there were only 3 subjects (1 in control group and 2 in study group) whose sites of drain inserted were central, these 3 subjects were excluded when the multiple regression was carried out (Table 5).

The results of the multiple regression showed that there was still a significant difference between the 2 groups in pain score ($p=0.035$). The study showed that female subjects displayed a higher pain score. This result indicated that male patients had generally higher pain threshold than female patients. The mean difference of pain score between the 2 groups was 0.9 (95% CI 0.06 to 1.74). The mean pain score for females was significantly higher than that for males ($p=0.025$), with a mean difference of pain score between females and males of 0.97 (95% CI 0.12 to 1.81).

DISCUSSION

Results of this study showed a significant difference in mean pain score between the 2 groups averaging about 1 unit. However the lower bound of the 95% CI for the mean difference of the pain score is less than 0.1, which meant that the difference of patients' perception of pain score between the 2 groups was very minimal. This suggests the result might not be clinically significant. Nevertheless, the sample size was sufficient to give a statistically significant result with a power of 80% and a 2-sided test of 5%.

The study showed that no patient required analgesia during drain removal. Analgesia, which was not routinely prescribed, seemed to be acceptable in the clinical practice. During the period of this study, it was

Table 1. Demographic data of subjects.

Characteristics	Method 1 — clamping (Control group — 45 subjects)	Method 2 — unscrewing (Study Group — 45 subjects)
	Frequency	Frequency
Department		
Gynaecology	11 (24%)	8 (18%)
Urology	34 (76%)	37 (82%)
Gender		
Male	19 (42%)	19 (42%)
Female	26 (58%)	26 (58%)
Race		
Chinese	36 (80%)	37 (82%)
Non-Chinese	9 (20%)	8 (18%)

Table 2. Age characteristics of subjects.

Characteristic	Method 1 — clamping (Control group — 45 subjects)	Method 2 — unscrewing (Study Group — 45 subjects)
	Age	
Mean	54	53
Median	52	52
Range	24–80	18–77
SD	14.11	14.17

Table 3. Pain score upon drain removal.

Characteristics	Method 1 — clamping (Control group — 45 subjects)	Method 2 — unscrewing (Study Group — 45 subjects)
	Pain score	
Mean	3.27	2.47
Median	3	2
Range	0–7	0–7
SD	1.83	1.91

Table 4. Site of drains inserted and staff who removed drains.

Characteristics	Method 1 — clamping (Control group — 45 subjects)	Method 2 — unscrewing (Study Group — 45 subjects)
	Frequency	Frequency
Site of drain inserted		
Left	22 (49%)	16 (36%)
Right	22 (49%)	27 (60%)
Central	1 (2%)	2 (4%)
Drain removal by staff		
Nurse	40 (89%)	43 (96%)
Doctor	5 (11%)	2 (4%)

Table 5. Number of post-operative drains removed and amount of drainage in Privac bottle at time of drain removal.

Characteristics	Method 1 — clamping (Control group — 45 subjects)	Method 2 — unscrewing (Study group — 45 subjects)
No. of POD drain removed		
Mean	2.8	2.7
Median	3	3
Range	1–6	1–6
SD	1.26	1.01
Amount of drainage		
Mean	11.4	4.73
Median	5	2
Range	0–100	0–50
SD	18.54	8.05

noted that psychological preparations through proper explanation and reassurance prior to drain removal and staff skills in drain removal were important aspects in minimising subjects' perception of pain. Thus, it is recommended that health care providers pay attention to the psychological needs of the patient while removing the drain.

In this study, subjects were only limited to patients being treated in the Departments of Obstetrics and Gynaecology, and Urology. The samples would have been more representative had patients from other department been recruited. More importantly, patient's perception of pain score might have been influenced by whether a doctor or nurse performed the procedure. The study did not specifically measure the aspects of skill performance as this study only focused on the patients' perception of pain using 2 different vacuum methods.

CONCLUSION

This study showed that the method of creating the vacuum free state for removal of Redon drain did affect the patients' perception of pain significantly. Unscrewing the drainage tube connector has been found to be a safe practice. The release of vacuum in the drainage bottle can be achieved to the maximum and the level of patients' discomfort was minimised as proven statistically in the study.

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REFERENCES

1. Smith L. Removal of a vacuum drain, practical procedures for nurses. *Nurs Times* 1999; 95:suppl 1-2.
2. Werner HP. Complications and risks of suction drainage. *Z Gesamte Hyg* 1990; 36:94-9.
3. Management of surgical drain. Ward 55A & B Policy. Singapore General Hospital, 1999.
4. Kannusamy P, Ayre TC. Evidence-based nursing practice. *Singapore Nurs J* 1999; 26:35-8.
5. Kaur K, Ong BC. Visual Analogue Scale vs Verbal Descriptor Scale for the measurement of pain in post-surgical patients in a population of Chinese, Malays and Indians. *ASEAN J Anaesthesiol* 2000; 1:3-8.