A Bed for Burn Wound Care: A Stainless Steel Grating-Top Table as a Moveable Sterilized Burn Wound Cleansing and Operating Table

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ABSTRACT

A bed for burn wound care: a stainless steel grating-top table is used as a moveable sterilized table for burn wound cleansing or an operating table. Its top can be sterilized by autoclaving and after sterilization; burned patients can lie on this sterilized area for burn wound cleansing or surgical manipulation. The grating-top table can be moved room to room like a trolley by the wheel and its brake at each leg. In Prapokklao hospital, the grating-top table has been used for burn wound cleansing (using sterile solutions: warm saline, sterile water, and chlorhexidine scrub), and as an operating table when there is an indication for surgical manipulation. This study covered a total of 88 inpatients (during October 2009 - August 2012), and there were 213 times of wound cleansing (bathing and dressing) and 141 times of surgical manipulation (excision debridement and skin coverage operations). Follow with standard burn wound care principles: the grating-top table has been shown not only to be easy to use and comfortable for patients, but also results in less infection rate with good healing resulting in 86 success healing cases (97.73%) and 2 death cases (2.27%). The bed provides very cheap cost in burn wound care with appropriate outcomes.

Keywords: Burn wound care, burn wound care device, burn wound cleansing, and burn wound dressing

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INTRODUCTION

Burn wound care has undergone a change in the past few decades; resulting in increased incidence of patient suvival.[1-4] Greater understanding of burn injury introduces better aspects of burn care that have substantial advantages in a hospital burn clinic. The particular aspects in the hospital burn clinic cover: to improve acute care (such as resuscitation),[5] early burn wound excision, early evolution of effective skin bank, infection control, and alternative wound-closure materials and strategies.[3] Strict infection control practices[6-8] (isolation, use gloves and gown during patient contact) are necessary to prevent incidence of infection. Early excision of burn tissue is needed mainly to control wound- related infection in burns.[9,10] Prapokklao hospital, a local public hospital in eastern Thailand, has no burn unit, so burn patients with stable overall conditions are

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admitted in regular surgical wards and burn patients with unstable overall conditions are admitted in a critical care unit. There are few types of equipment for severe burn care, so many types of equipment have been adapted for serving this problem. For burn wound care, a sterilized moveable stainless steel-grating table has been adapted for burn wound cleansing, dressing and as a sterilized operating table since 1990.

MATERIALS AND METHODS

Burn wound care makes a significant role in improvement of total burn care, in a hospital burn clinic. In Prapokklao hospital, there were all kinds of burn patients the same as hospitals with burn units have. Before burn wounds were cleansed and dressed on a bed where it was extremely difficult to control burn wound contamination and infection. Since 1990, in a ward, an author has used a 60 by 70 centimeters stainless steel grating-top with sink below [Fig 1] for cleansing the burn wound on extremities, but this method was limited for severe burns or burn wounds at trunk. The author has consequently made a larger table [Fig 2] for taking care of these burn patients, of all sizes and in all locations. The new grating-top table size is 70 by 200 centimeters with an upside down pyramid stainless sink below for waste solution drainage and wheel with lock at all four legs.

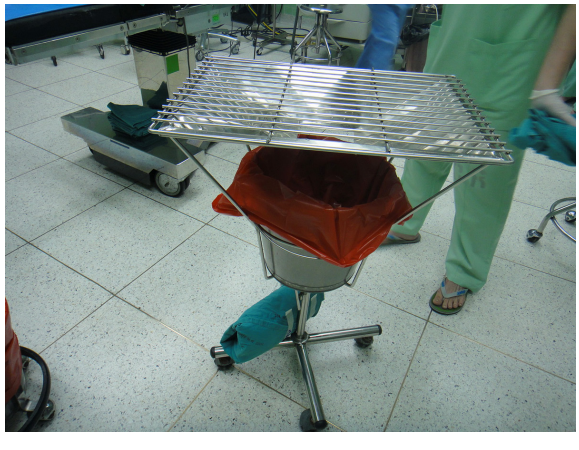

Fig 1. Small sterilized grating top table.

The author designed the stainless grating-top into three separated gratings, sized 66 by 69 centimeters. The autoclaved grating-top was changed for each manipulation time. A burn patient was gently placed on this sterilized grating table and started cleansing with warm saline and chlorhexidine scrub, beginning from their surrounding burned area. Using a large amount of warm saline a burn wound was washed until clean, shown by clear waste solution, and then necrotic tissue and debris was removed. If there was an indication for surgical manipulation; it could immediately be performed on the table. At the end of the manipulation, each patient was dressed in nanocrystalline silver dressing,[12,13] which was changed twice a week. Patients were allowed to shower at the ward when the patient could tolerate and was able to shower by themselves. Cleaning of the stainless grating-top table and sink used detergents and antiseptic solutions after manipulation was finished. The stainless steel medical instruments and grating top were sterilized by autoclaving technique. Culture specimens from equipment were regular obtained as usual according to standard infection control protocol. Retrospective open trial study was conducted in surgical wards at Prapokklao hospital and was approved by Prapokklao's Institutional Ethics Committee (No.18/December 24, 2012). During October, 2009 - August, 2012, there were 91 hospitalized

Fig 2. Burn Wound Care Device: A Movable sterilized stainless steel grating top table.

burn patients in Prapokklao hospital. The rule in this department was to include burn patients who needed admission for definite wound care by dressing and/or surgical manipulation, in an easily cleaned infection control room, or operating room. All burn patients were treated with these techniques, on the stainless grating-top table (Fig 3, Fig 4, and Fig 5). The wound inspection and clinical monitoring were regularly done following the standard guideline (CDC criteria) for wound infection with swab culture, tissue culture and hemoculture.

RESULTS

There were 88 burn patients who met the inclusion criteria (Fig 6), 61 males and 27 females, with average age 28.30612± 22.79721 years (8 months-86 years), and most of them (27 patients) were young with ages below 10 years of age, average %TBSA burn 26.04545± 19.3936 (10-90%) varied in all degrees of burn depth. Dressing meant as scrubbing with chlorhexidine solution, swabbing, low-pressure irrigation, cleansing with sterile solutions (normal saline and sterile water), and followed by nanocrystalline silver dressing. Surgical manipulations included debridement (surgical blade, free hand dermatome, and hydrosurgery device), negative pressure dressing, amputation, and skin coverage with flap and/or skin graft. Of the 88 patients, there were 354 times of manipulations, wound cleansing with dressing was 213 times and surgical manipulation was 141 times. There were 10 samples (9 patients, 10.23%) from 96 samples who demonstrated positive colony growth of organisms: Methicilin Resistant *Staphylococcus aureus* (MRSA) (4 samples), Methicilin-Susceptible *Staphylococcus aureus* (MSSA) (one sample), *Pseudomonas* (3 samples), *Acinetobacter* (3 samples), *Klebsiella* (2 samples), *Streptococcus* (one sample), and *Enterococcus* (one sample). One hemoculture was positive for MSSA. There was one severe burn wound sepsis, but few burn wound infections occurred and they responded well to systemic antibiotic treatment. There were two deaths (2.7%); the first an 8-month-old child with 25% TBSA with third degree burn which involved the scalp who died from accidental massive hemorrhage by arterial rupture,

Fig 3. Demonstration of burn wound dressing.

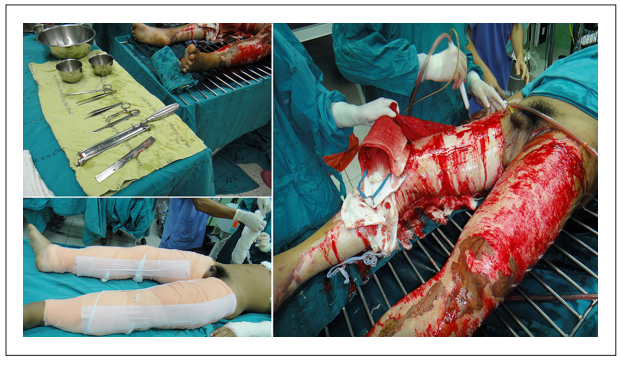

Fig 4. Demonstration of excisional debridement on the table.

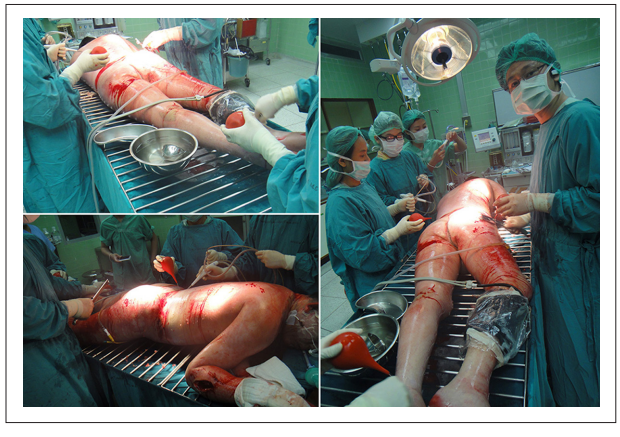

Fig 5. Demonstration of excisional debridement of burn wound.

Abbreviation

%TBSA= Total Body Surface Area

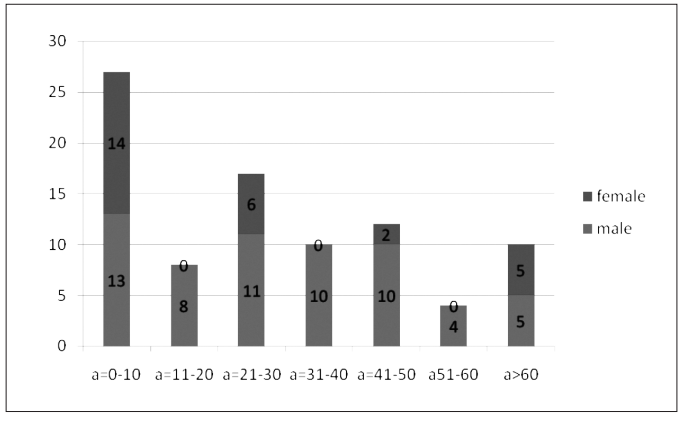

Fig 6. Age distribution of burn patients.
a = Age in years

and the second a 17-year-old man with 70% TBSA concomitant with inhalation injury who died from severe sepsis within a few days after admission. There were three cases who needed to be referred to the Burn Unit at Siriraj Hospital due to critical medical conditions with critical sepsis and after their general condition was stabilized. There was a 3-year-old boy with 45% TBSA that included scalp, chest wall, both upper extremities, and lower abdomen (third degree burn at the scalp and both upper extremities). Another was a 68-year-old man with 80% TBSA. The third was a 37-year-old man with 90% TBSA. There was a total recovery of a severely burned patient, who was a 13-year-old boy with 90% TBSA with toxic exfoliative necrosis. The average length of hospital stay was 26.66± 29.84 days, and the maximum with 60% second to third degree acid burns was 227 days (Fig 7).

DISCUSSION

Burn wound care is one of the factors that improve mortality and outcome of patients with severe burn injury.[3,14] Wound cleansing is a vital role in wound care to control burn wound infection and promotion of the healing process. Standard techniques used in burn wound cleansing include high-pressure irrigation, swabbing, and low-pressure irrigation, showering, bathing and washing the affected area under running liquid or immersion in a whirlpool bath. These techniques need a specialized team and equipment for serious burn patients that some hospitals do not have. To improve the quality of burn wound care, a sterile area, strict infection control, and new techniques in wound management help to improve outcomes. To create a condition like that in Prapokklao hospital, the author has adapted a sterilized stainless steel-

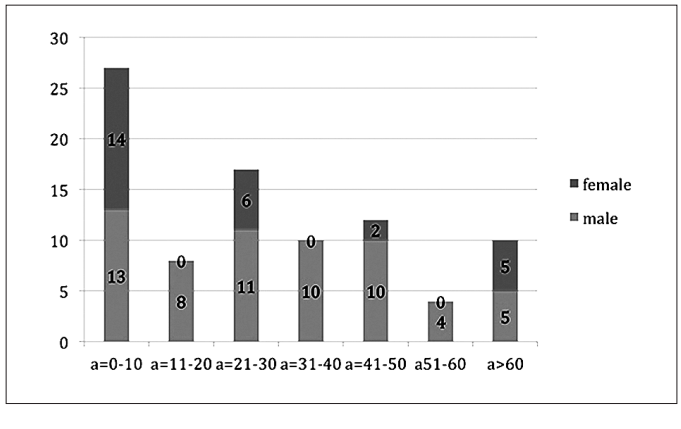

Fig 7. Frequency of length of hospital stay in all intervals of admission.

grating table for burn wound cleansing (Fig 3) and surgical manipulation (Fig 4, Fig 5) in a sterile area in a clean room or operating room.[3] All methods of burned wound cleansing were done on the table except immersion and the main advantage of the table was that it could be used as a sterilized operating table for surgical manipulations. The author made an early burn wound excision, within a few days post burn, after cleansing to improve control of wound-related infection. Besides strict infection control practice (isolation, use of gloves and gown during patient contact), additive manipulation of burn wound(s) in a clean area took place and effective cleansing of the contaminated area on the sterilized table was used for reducing infection. Cleansing in this study used warm saline and chlorhexidine scrub, but it caused more pain for some patients, especially in this study, the young or unstable mood patients, so it may need anesthesia and/or mild sedation. There were no other pain control interventions. The duration of the procedure varied considerably from patient to patient, but this would not cause harm by using warm sterile saline solution keeping body regions warm by sterilized clothes to prevent heat loss. There was no limitation in using the table despite septicemia and/or unstable hemodynamic conditions. This moveable table was moved from room to room in Prapokklao hospital including the intensive care unit, operating theater, and wards. These manipulations were done several times a day, changing the sterilized stainless steel-grating top case by case, and cleaning its sink and legs like an operating table. During this study, there were dramatic reductions of burn wound related infections in Prapokklao hospital (one case with sepsis who survived) and acceptable mortality rate15 (2 deaths), 1-hemorrhage shock, and 1-pulmonary complication with sepsis (2.27%, acute phase outcome). The study had to exclude 3 serious cases because we referred these cases to the Burn Unit in Siriraj Hospital. The reason was because of their needs for critical medical advanced burn care. All of them were sent back to Prapokklao hospital after their conditions were stable. This bed costs about $ 700 and each autoclaving about $ 15 in Prapokklao hospital.

CONCLUSION

A bed for burn wound care which is a moveable sterilized stainless steel grating-top table is an extremely useful and inexpensive device that can improve burn wound care and promote wound healing process with most cleansing techniques and surgical manipulations. The bed can be widely used for basic to severe burn patients, and the main advantages of the table are that it is like a sterilized bed for all purposes in burn wound care with very cheap device. The bed can help in a large part of burn wound care, but the best systemic outcomes in burn care still need specialist burn center facilities.

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Effect of Abstinence Duration on Sperm Sex Ratio

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ABSTRACT

Objective: To evaluate the effect of abstinence duration and semen processing on sperm sex ratio and semen parameters.

Methods: 100 normozoospermic samples from men who had abstinence for 1 - 10 days were processed with combined Percoll gradients with swim-up method. The ratio of X- to Y-bearing spermatozoa was determined using fluorescence in situ hybridization. The ratio of X- to Y-bearing spermatozoa and semen parameters in fresh and prepared samples in correlation with abstinence duration were assessed.

Results: No statistically significant influence of abstinence duration on the mean ratio of X- to Y-bearing spermatozoa was detected in fresh or prepared samples. The mean values of total sperm count and total motile sperm in fresh samples were significantly increased after abstinence of more than 3 days. In the prepared samples, the peaks of total sperm count and total motile sperm were noted in day 4 of abstinence while the percentage of morphologically normal spermatozoa remained constant during 1-10 days of abstinence.

Conclusion: There was no statistically significant effect of abstinence duration on the sperm sex ratio in either fresh or prepared samples. The total motile sperm in fresh samples were significantly increased after 4 days of abstinence. After sperm processing, the peak of the total motile sperm was observed at day 4 of abstinence while the abstinence duration did not affect the percentage of morphologically normal spermatozoa.

Keywords: Abstinence duration, sperm sex ratio, Percoll gradients, swim-up

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INTRODUCTION

The objectives of sex selection in humans are to prevent sex-linked genetic disorders and to balance sex composition within the family. Many sperm sex pre-selection methods were studied. Flow cytometric separation is the most effective method,[1] but there were some studies which reported this method might cause mutation in the sperm.[2,3] For other selection methods,[4-9] swim-up, discontinuous albumin gradients, Sephadex filtration, or Percoll gradients technique, the sex ratio is not clinically significantly changed.

The natural method, the timing of intercourse in relation to ovulation has some influence on the sex ratio, but it is not a practical method.[10] For gender selection by setting some period of sexual abstinence before the sexual intercourse, the myth was the proportion of Y-bearing spermatozoa would be increased

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