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# CLINICAL EVALUATION OF EFFECT OF EARLY EXPOSURE OF WOUNDS AFTER MINOR SURGICAL PROCEDURES

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## ABSTRACT

**Introduction:** Application of dressings to surgical wounds is a custom as old as history and has become a ritual marking the completion of surgery. Under certain circumstances, a surgical dressing might, in fact, predispose to the development of wound infection. This study evaluates the clinical outcome of clean minor surgical wounds without the use of surgical dressing.

**Material and methods:** 100 consecutive patients are presenting on an outpatient basis for minor soft tissue surgical procedures studied with respect to wound infection and wound disruption due to avoidance of post-operative surgical dressings.

**Observations:** There was only one case of wound infection which subsequently developed wound dehiscence as well.

**Conclusion:** The results suggest that in clean surgical wounds where good haemostasis, optimal coaptation of wound margins and gentle handling of tissue achieved, there is no increase in the wound complications with respect to wound infection and wound dehiscence when the dressings are removed early and wounds allowed to heal.

**KEYWORDS:** wound, early exposure, surgical procedures

## Introduction

Since time began, the human has had to deal with open wounds due to injuries or diseases. The “three healing gestures” were described (circa) in 2200 BC on an ancient clay tablet:

1. Washing the hand
2. Making plasters (mixtures of herbs, ointments, and oils that were applied to wounds to aid in the healing process).

3. Bandaging the wound [1], Hippocrates believed, nature is the best healer for the wound, preferred leaving wounds dry once they washed and recommended the use of wine or vinegar for washing [2].

The custom of dressing surgical wounds is as old as the history of surgery. Wound dressing of the primarily sutured surgical wound immediately after its closure with a sterile dressing is considered a routine, essential to an aseptic operation and dressing left for a minimum of 3 to 5 days [3]. The functions of a dressing are to protect wound from trauma, contamination by bacteria, foreign material, absorb exudates from the wound, provide mechanical compression to minimize edema, obliterate dead space, prevent fluid loss, nonadherence and provision of a warm, moist environment which is desirable to maximize healing. Neither single dressing can provide all of these functions optimally, nor all functions required for all wounds. Different dressing materials provide various functions to variable degrees and attributes of each dressing material need to be matched to the specific wound on which it is placed. Experimental studies have shown that a precisely sutured incision with good hemosta-

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sis gets sealed with fibrin within 6 to 24 hours, and wounds become adequately protected against outside moisture and bacterial contamination [4]. The gauze dressing on a clean wound becomes wet with perspiration resulting in maceration of skin edges, disruption of firm crust and increased capillarity of the skin sutures needing frequent change, imposing a significant strain on the medical and nursing time. In climates where summer temperatures are high, this is a rather critical problem during the warm months of the year. The warmth, darkness and moisture that all prevail beneath surgical dressing are optimum conditions for bacterial colonization [5]. It is thus obvious that a surgical dressing might, in fact, under certain circumstances, predispose to the development of a wound infection [6]. An attempt, keeping these factors in mind, is thus made to evaluate the postoperative care of clean minor surgical wounds clinically without the use of surgical dressing in terms of wound infection and wound dehiscence.

### Material and Methods

The present study was conducted on 100 consecutive patients (with an entirely written and informed consent) presenting for minor surgical procedures on an outpatient basis in the outdoor surgical clinic. Prior to surgery, a detailed history, especially in the regard to any drugs that might increase bleeding risk, was obtained, and a physical examination performed. Patients with the following criteria: either sex, age > 15 years ≤ 60 years presenting for common minor soft tissue surgical procedures for lesions like cysts, neurofibroma, lipoma, ganglion, lobuloplasty, circumcision, lymph node biopsy etc. in all parts of the body whether exposed or unexposed were included in the present study. Patients who were known case of diabetes mellitus, clinical evidence of preoperative infection, i.e., redness, tenderness, raised the temperature or those who were on immunosuppressive drugs excluded.

The procedures were performed in the small operation theater on an outpatient basis by a single consultant surgeon. Gentle tissue handling, careful hemostasis and use of fine suture material strictly adhered. No perioperative antibiotic was used. For local anesthesia, 0.5% Xylocaine with epinephrine 1:20000 used unless there was a contraindication in which minimum safe dose was used. The area cleaned with povidon iodine and draped. The lesion excised, and proper hemostasis obtained. All wounds were closed using monofilament nylon (3-0 reverse cutting). A 3 layer dressing was used. The first i.e. the contact layer was a gauze wet with betadine. The second layer, a dry piece of gauze and the third layer, a tape or bandage. The dressing used on the sites where adhesive tape could not be applied to the scalp. The purpose of this dressing was to create a wet-to-dry environment that would induce capillarity to draw the blood away from the wound.

The patients were advised to restrict their activities for at least the first day and remove the dressing next day. If the dressing was adhering to the stitches, they were informed to wet it with lukewarm water and to dry the wound with a clean, soft towel. On the day of follow-up for suture removal (5th-7th day), injuries were assessed for infection and disruption if any.

Definition of wound infection adapted from standardized surveillance criteria for defining surgical site infections developed by the Center for Disease Control's National Nosocomial Infection monitoring system. Wound disruption defined as the separation of any or all layers of a surgical wound.

**Table 1.** Type of lesions.

Type of lesion	No. of lesion
Sebaceous cyst	47
Lipoma	24
Cervical LAP	06
Split ear lobe	12
Dermoid cyst	01
Mole	01
Ganglion	06
Wart	01
Foreign body	01
Papilloma	01
Total	100

It may be partial and superficial only with exposure of epidermis and dermis or complete with disruption of all layers with exposure to subcutaneous tissue and separation of edges.

### Observations

Of the one hundred consecutive patients included in the study who presented in the outdoor clinic with minor lesions which were operated on an outpatient basis the age varied from 16 years to 60 years and the mean age of patients was 38 years. The procedures performed for the lesions irrespective of the part of the body where they were present, whether exposed or not. The primary sites were a face, upper limb and neck (Table 1).

Postoperative complications evaluated in the form of:

- Wound infection
- Wound dehiscence

All the patients were advised to come for strict follow on the next day of surgery to check whether the dressing had been removed, and the wound washed. Subsequently, they were followed up for one week to assess for wound infection and suture removal. Moreover, finally, they were followed up two weeks after the suture removal. However, they were also told to come if there was any evidence of wound discharge or wound disruption during the follow-up period. There was only one case of wound infection which subsequently developed wound dehiscence as well. This patient operated for lipoma nape of the neck. The wound was found to infected with the presence of purulent discharge on the seventh postoperative day. Suture had to be removed, and oral antibiotic started.

### Discussion

Wound management is fundamental to the practice of surgery. Bandaging had become an art by the fifth century BC [2]. In the modern times, wound dressing of the primarily sutured surgical wound immediately after its closure with a sterile dressing is considered a routine and essential conclusion to an aseptic operation. The main reasons for applying dressings are: absorbing secretions, aiding hemostasis, splinting, obliterating dead spaces, protection against trauma and contamination [7].

**Table 2.** Early exposure of wounds and its effect on wound complications

AUTHOR	TIME OF WOUND EXPOSURE	WOUND INFECTION/WOUND DEHISCENCE	
		EARLY EXPOSURE	TRADITIONAL
Meylan et al.	Within 48 hours	2% (n=50)	2% (n=50)
Palumbo et al.	6 to 48 hours	None (n=111)	1.7% (n=111)
Kleitsch et al.	24 to 48 hours	None (n=62)	NA
Chrintz et al.	After 24 hours	4.7% (n=569)	4.9% (n=633)
Dosseh et al.	After 48 hours	2% (n=51)	2% (n=51)
Present study	After 24 hours	1% (n=100)	NA

Since the time first antiseptic dressings were introduced in 1867 by Lister [2], there has been a transition from providing simple protection to the development of hi-tech synthetic or natural dressing materials. However, no single dressing material has proved ideal for every kind of wound. Each dressing has its advantages and disadvantages. The warmth, darkness, and moisture, all of which prevail beneath a surgical dressing are optimum conditions for bacterial proliferation. It is thus evident that a surgical dressing might, in fact, predispose to the development of a wound infection rather than protection [6].

The experimental work by various authors has clearly shown that when edges of an incised wound brought into apposition with carefully placed skin sutures, they immediately become glued together by a coagulum of blood and fibrin which seals the wound cleft and protects the thick layers from the external environment. Further, they have also shown that bacteria cannot penetrate the coagulum [4]. On the other hand, it has also been proved that conventional dressings are not capable of preventing the access of bacteria to the wound [6]. Despite this dressing is still the rule in surgical practice today and the “mystique of the dressing” is still very prevalent in surgical education and practice. Surgeon thinking away from dressings on postoperative wounds is indeed a difficult concept to accept in the face of a tradition of centuries.

Long back in 1920 Berkeley et al. recommended routine exposure of undrained carefully sutured gynecological laparotomy wounds and claimed that exposed wound heals with less discomfort to the patient than an injury covered by conventional dressing [6]. Similarly in another clinical study of laparotomy wounds with one-half of the wound dressed and other half uncovered it noted that there tended to be more pathogenic bacteria underneath the dressing than on the open portion [8]. Similarly, various studies conducted to compare the infectious local risk when the clean surgical wounds were dressed or left exposed without covering after the completion of wound closure showed that keeping the wound exposed does not increase the risk of local infection significantly suggesting that dressings on clean surgical wounds are unnecessary after 24 hours [3,6,9-11].

Several authors have compared early wound exposure as early as 6 hours and ranging upto 48 hours after the surgical procedures with the traditional practice of keeping the dressing till day of suture removal with respect to postoperative wound complications (Table 2)[12-16]. However, in these studies the wound was kept dry till the day of suture removal that is in contrast to the present study, where the wounds were made wet with soap and water after 24 hours of the procedure. Wound infection was in the range of 0% to 4.7% in these studies whereas;

the incidence of wound infection in the present study was 1%.

In the present study, the patients were told to remove the dressing the next day and wash the wound with soap and water gently. It was confirmed by asking the patient to come for follow up the next day. A number of studies have been conducted to compare the standard management of wound (keeping wound dry till suture removal) with washing the wound with soap and water or with water alone within or after 24 hours after minor skin excisions with respect to the postoperative wound complications. These studies suggest that getting suture wet does not increase the infection rate, which is again in conformity with the present study. There was no incidence of wound infection in these studies while our study had 1% incidence of wound infection (Table 3) [17-19].

Carragee et al. conducted a prospective clinical trial of 100 consecutive patients undergoing posterior spinal surgery with historical control to determine if early bathing (2-5 days after surgery) resulted in increased wound problems. They did not observe any wound infection in the experimental group, which is not significantly different from the present study (1%). However, in their study antibiotics were used prophylactically at the time of surgery and in the postoperative period also if implantation was done, whereas, in the present study no antibiotics were used [20].

Similarly Clare et al. in a prospective randomized control multicentric trial of 857 patients compared standard management of keeping the wound dry and covered with allowing wounds to be uncovered and wet in the first 48 hours after minor skin excision and showed that infection in intervention group (8.4%) was not inferior to the incidence in the control group (8.9%) ( $p < 0.05$ ). However, in the present study the wounds were exposed and made wet after 24 hours. The incidence of wound infection (1%) in the present study is significantly lower as compared to that reported by Clare et al. (8.4%) [21].

The findings of the present study reveal that patients are very well compliant and heed to the postoperative advice to prevent trauma to the wound that, in turn, suggests that one of the primary indications of dressing of a wound, i.e., protection from injury is not necessary. The 1% incidence of wound infection in clean surgical wounds in the present study suggests that dressings in the fresh surgical wounds may not be required in the context of preventing bacterial contamination. The third indication of dressing of surgical wound that it helps in absorption of secretion may also be done away with as the present study revealed that in the primarily closed surgical wounds, there was no appreciable flow after 24 hours; the wound being by then effectively sealed by fibrin and epithelium.

**Table 3.** Comparison of wound complications in the present study with other studies after exposure to water or soap-water.

AUTHOR	EXPOSURE WITH WATER/SOAP-WATER	WOUND INFECTION/WOUND DEHISCENCE	
		EARLY EXPOSURE	STANDARD
Joel et al.	Soap-water	None (n=100)	NA
Goldberg et al.	Soap-water	None (n=100)	None (n=100)
Koninger et al.	water	None (n=170)	0.6% (n=956)
Present study	Soap-water	1% (n=100)	4.9% (n=633)

Last but not the least, dressings also being used keeping in mind that pressure dressings may have a role in achieving meticulous hemostasis. But this role too seems negligible, as the use of pressure dressing in the minor lesion should be limited to those specific indications where they become a therapeutic procedure per se (surgery in the extremities; stabilization/immobilization: the benefits of splinting action of dressings after surgery of limbs is undeniable).

The present study although small in number, demonstrates that early exposure and wetting of clean surgical wounds does not increase the postoperative wound complications and gives further support to the view that the dressings of fresh surgical wounds may be unnecessary, mainly being rooted in tradition. However, larger studies involving patients particularly from tropical countries where the climate is hot and humid is warranted to generalize the findings. Besides, the early exposure of the wounds reduces the restriction on normal daily activities of the patients associated with the sight of dressing. The wound can also be examined quickly without causing any inconvenience to the patient and patients being allowed to wash their wounds after 24 hours also help in allaying their anxiety associated with dealing of surgical wounds.

Finally, the expense of the dressing materials and the time and effort spent by the hospital staff not only in the actual performance of dressing but also in the preparation of the dressing materials is a considerable factor. The removal and changing of dressings occupy much time of an increasingly hard pressed house surgeon and nursing staff, which can be utilized for other purposes. And from the findings of the study, the savings on the expense of tape, gauze and disinfectants when applied to larger wounds like laparotomy, thoracotomy, hernia repair wound, etc in the surgical wards can be huge. Indeed, the estimates of the amount of money that might be saved on a nationwide basis may be staggering. Moreover, in a developing country like India, this has an important bearing.

### Conclusion

The application of dressings to surgical wounds is a custom since time remembered. In clean surgical wounds where good haemostasis, optimal coaptation of wound margins and gentle handling of tissue achieved, there is no increase in the wound complications with respect to wound infection and wound dehiscence when the dressings are removed early and wounds allowed to get wet. A notable finding of the present study was the patient's acceptance of early exposure of wound and less disruption of their daily activities after surgery. The open treatment of clean surgical wounds is a real advantage in the postoperative care of surgical wounds by reducing morbidity, labor time and

material cost.

### Authors' Statements

#### Competing Interests

The authors declare no conflict of interest.

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