

# Comparison of infection rate after facial melanocytic nevi excision with and without exposure to water within the first 48 hours

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**Background:** Preexisting guidelines about clinical management of cutaneous wounds are based on wound dressing and avoiding water exposure for at least 48 hours. In this study, infection rate in the patients who underwent melanocytic nevus surgery with dressed dry wounds were compared with the patients who allowed their wounds to become wet.

**Method:** In a controlled randomized clinical trial study, the incidence rate of infection in facial melanocytic nevi surgery in the wounds that became wet 24 hours after surgery (234 wounds) were compared with similar wounds that were kept dry for at least for 48 hours (234 wounds).

**Result:** The infection rate was 3.4 % (8 wounds) for the dry wounds versus 2.6 % (6 wounds) for the wet wounds; comparison of these two rates showed no statistically significant difference (P=0.548, odds ratio= 1.345, CI 95%: 0.459-3.939).

**Conclusion:** The results of this study showed that it was safe to remove the dressing of the wounds within 24 hours after minor surgery without concern about infections and allow wounds to become wet after 24 hours under normal circumstances.

**Keywords:** dry wound, melanocytic nevus, postoperative infection, wet wound

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## INTRODUCTION

Outpatient dermatologic surgeries are one of the most common surgeries all over the world and in Iran. These operations include excision of benign and malignant tumors and lesions as well as repairing cutaneous lesions caused by cutaneous injuries. Wounds are generally classified as four groups including clean, clean-contaminated, contaminated and dirty wounds. Statistics show that 75% of all dermatological surgeries are clean and the risk of infection in clean wounds is as minimal as about 1-2% in comparison with non-clean wounds<sup>1</sup>. According to the results of meta-analysis studies on more than 6000 minor dermatological surgeries, the risk of infection

has been estimated as 1.3%<sup>2</sup>. The majority of microorganisms that contribute to these infections originate from the skin flora and mostly include coryneform bacteria, anaerobes, coagulase negative staphylococcus such as staphylococcus epidermidis and also staphylococcus aureus<sup>3</sup>.

Current guidelines about postoperative wound care put emphasis on keeping wounds clean, prevention from trauma, wound dressing and keeping suture sites dry within 24-48 hours after surgery<sup>4-5</sup>. It is recommended to keep wounds dry because suture sites are the best route for the bacteria to find their way to the depth of the wound and it is probable that wet wounds and sutures transfer bacteria more and quickly<sup>6-11</sup>. However, despite keeping wounds dry routinely

and traditionally, it is not proved that this care is necessary for decreasing the risk of infection<sup>5</sup>. Studies that have been designed and performed dispersedly have not shown that moistening the wounds increases the risk of infection. According to a novel and extensive investigation that has been performed on 857 persons as a multicentre study, getting wounds wet within the first 12 hours after surgery does not increase the infection rate<sup>5</sup>.

In this study, we tried to evaluate the infection rate after dermatological surgeries (facial melanocytic nevi) in the patients whose wound were kept dry or became wet. Since facial nevi surgeries are the most common surgeries performed by dermatologists, we intended to determine the risk of infection in this group. Because a short time is required for dressing surgical wounds along with applying an ointment for keeping the wound wet in order to accelerate reepithelization, we considered at least 24 hours for dressing; and because the majority of the recommendations are based on covering surgical wounds for 48 hours, we compared the two groups of 24 and 48 hours.

## PATIENTS AND METHODS

This controlled randomized clinical trial was performed in Razi Hospital (Tehran, Iran) during 2009-2010. The investigated population included patients with facial melanocytic nevi who were candidates and volunteers for nevus excision. Patients were included if they facial melanocytic nevi, were candidates or volunteers for nevus excision, gave consent for participation in the study and their follow-up was possible after surgery for evaluating wound infection. Exclusion criteria were patients with recent burn in the lesion sites, very obese patients (BMI more than 35), patients who were receiving antibiotics for any reason, patients who were under treatment with systemic antibiotics after surgery, diabetic patients; patients with a history of pulmonary disease, patients who had taken immunosuppressive drugs within the recent 3 months, patients who were under phototherapy in the recent three months; patients who needed flap for lesion reconstruction and finally patients who needed suturing of the subcutaneous tissue at the time of nevi excision. All patients who met the inclusion criteria were enrolled in this study until the calculated sample size was completed;

so, available methods and census were used for selecting samples. Patients were divided in two groups by a simple randomized method. Accordingly, recruitment continued until the required sample size was achieved. The sample size was calculated to be 234 nevi in each group using cohort studies formula. In addition, type 1 and type 2 errors and the infection rate in the wet and dry groups were considered 0.05, 0.20, 5%, and 5%, respectively. Moreover, the difference between the rates of the two groups was supposed to be 5%.

Initially, patients were informed of the aims and the method of our investigation. Then, informed written consent was obtained from each patient. All patients underwent surgery via ellipse or punch techniques under sterile conditions and cleaning the surgical site by povidine iodine in the outpatient operating room in Razi Hospital. Then, dressing was done without applying any topical antibiotics using only vaselinated gauze and finally, a dry piece of gauze was placed on the suture site. Patients were asked to keep their wounds dry for 48 hours, as the routine care in the hospital. Patients in the wet group were asked to remove the wound dressing after 24 hours. All patients in both groups were asked to wash the suture site after dressing removal and apply ophthalmic sterile ointment on the suture site two times a day until suture removal. The simple ophthalmic ointment contained 80% yellow soft paraffin and 20% lanolin (wool fat) embedded in liquid paraffin. The simple ophthalmic ointment was selected to keep the wound surface wet for the acceleration of the epithelization process since it is sterile and also because paraffin causes less contact dermatitis in comparison with topical antibiotics. We asked all patients in both groups not to use topical or systemic antibiotics, antiseptics, nutritional and vitamin supplements, and reconstructive creams until the time of suture removal.

All patients were asked to return to the hospital if any change suggestive of infection including pus discharge from the suture site, induration of the wound borders, severe erythema, abscess formation, wound dehiscence and severe pain occurred. In addition, all patients were required to return for wound evaluation and suture removal within 4-6 days after surgery. Two dermatologists confirmed the diagnosis of infection. All required information such as age, sex, lesion site, lesion size, surgical

technique and clinical history were recorded in data collecting forms.

After collecting data from all patients, data were entered in computer sheaths and analyzed with SPSS-11.5 software. Rate and frequency were used for qualitative variables whereas mean and standard deviation were employed for quantitative variables. Chi-square and T test were used for comparing rates and means, respectively. The relationship between quantitative variables was determined by correlation tests and P values less than 0.05 were considered significant in this study.

## RESULTS

In this study, 468 nevi were surgically excised from 222 patients and sutured. Among these 222 patients, 172 (77.5%) were female and 50 (22.5%) were male. There were 375 nevi (80.1%) in female and 93 nevi (19.9%) in male patients. The mean age of the patients was  $30 \pm 10.5$  years with a range of 14-63 years. The mean diameter of the

removed nevi was  $3.3 \pm 1.8$  mm with a range of 1-14 mm. From the total of 468 nevi, 428 (91.5%) were excised from non smoker patients whereas 40 (8.5%) was removed from smoker patients. The type of surgery was punch surgery in 141 nevi (30.1%) and ellipse in 327 (69.9%).

Dressing was kept until 48 hours in 234 (50%) nevi and wound washing was recommended after 48 hours while in 234 (50%) nevi, dressing was kept until 24 hours and wound washing was recommended after 24 hours. The frequency of the investigated variables in both 24 and 48 hours groups is summarized in Table 1.

Results of this study showed that post-operative infection occurred in 14 nevi (3%), six (2.6%) in the group of 24 hours and eight (3.4%) in the group of 48 hours. Comparison of these rates showed no statistically significant difference ( $P=0.548$ ; odds ratio= 1.345, CI 95%: 0.459-3.939). Table 2 shows the prevalence of infection based on investigated variables compared in the two studied groups. Contents of this table show no significant difference

**Table 1.** frequency of the investigated variables in both 24 and 48 hours groups

variables	Group of 24 hours	Group of 48 hours	sum	P-value
Age (mean)	31 ± 6.9	28 ± 8.1	30 ± 10.5	0.241
Gender (female ratio)	192 (82%)	183 (78.2%)	375 (80.1%)	0.473
Cigarette smoking	16 (6.8%)	23 (9.8%)	40 (8.5%)	0.549
Technique of surgery (ellipse)	158 (67.1%)	169 (72.2%)	327 (69.9%)	0.675
Nevus size	3.2 ± 1.4	3.4 ± 1.6	3.3 ± 1.8	0.278

**Table 2.** Comparison of the prevalence of infection based on investigated variables in the two studied groups

variables	Therapeutic groups	Incidence rate of infection	P-value
female	24	4 (2.1%)	0.751
	48	3 (1.6%)	
male	24	2 (4.8%)	0.359
	48	5 (9.8%)	
Age equal to or younger than 30 years	24	3 (2%)	0.728
	48	4 (2.7%)	
Age older than 30 years	24	3 (3.4%)	0.688
	48	4 (4.6%)	
Lesion diameter equal to or less than 5 mm	24	3 (1.4%)	0.483
	48	5 (2.4%)	
Lesion diameter more than 5 mm	24	3 (11.5%)	0.311
	48	3 (15%0)	
Smoker	24	0 (0%)	0.219
	48	1 (4.5%)	
Non smoker	24	6 (2.8%)	0.528
	48	7 (3.3%)	
ellipse	24	6 (3.7%)	0.682
	48	8 (4.8%)	
punch	24	0 (0%)	--
	48	0 (0%)	

in the incidence of infection between 24 and 48 hours groups based on the studied variables.

The mean age of the patients was  $30.8 \pm 10.8$  years for infected nevi and  $29.9 \pm 10.7$  years for non-infected nevi. Comparison of these means showed no statistically significant difference ( $P=0.789$ ). The mean size of the non-infected and infected nevi was  $3.2 \pm 1.7$  and  $5.5 \pm 1.9$  mm, respectively. Comparison of these means also showed a statistically significant difference ( $P<0.001$ ). From the total of 40 nevi removed from smoker patients, one nevus (2.5%) was infected whereas among 428 nevi excised from non smoker patients, 13 nevi (3%) became infected. Comparison of these rates showed no statistically significant difference as well ( $P=0.849$ , Odds Ratio= 0.819, CI 95%: 0.104-6.424). From the total of 375 nevi in female patients, 7 nevi (1.9%) became infected whereas out of 93 removed nevi from male patients, 7 nevi (7.5%) were infected; therefore, there was a statistically significant difference in the infection rate between female and male patients ( $P=0.004$ , Odds Ratio= 4.279, CI 95%: 1.462-12.520). None of the 141 nevi removed by the punch technique became infected whereas 14 infected nevi (4.3%) were detected among 327 nevi excised by ellipse. Comparison of the infection rate between these two surgical techniques showed a statistically significant difference ( $P=0.013$ , Odds Ratio= 1.045, CI 95%: 1.021-1.069).

Multivariate logistic regression showed that gender and nevus size had an independent correlation with the infection rate while there was a dependent correlation between the type of the surgical technique and the infection rate.

Wound status in the studied patients 24 and 48 hours after surgery is shown in Table 3. Information was available in 211 nevi and their related results are represented. This information shows no statistically significant difference regarding the wound healing status ( $P=0.611$ ).

## DISCUSSION

As previously mentioned, surgical techniques as

well as wound status have a significant relationship with the prevalence of wound infection<sup>12-14</sup>. In other words, in patients with clean wounds, the rate of infection is minimal whereas the rate of infection has been reported up to 40% in dirty wounds<sup>15,16</sup>. In this study, all patients had clean wounds; thus, the results of our study can be generalized to patients with clean wounds. Further independent studies are required regarding wounds that are kept dry or come in contact with water in patients with contaminated and dirty wounds. The results of this study showed that there was no significant difference in sex ratio between 24 and 48 hours groups. In addition, age distribution was approximately similar in both groups. These two findings suggest that age and sex factors did not confound the results of the present study. Regarding age, it is considerable that the majority of the patients were young, suggesting that the surgery was indicated for cosmetic issues in most of the patients and therefore, it is important to pay attention to the cosmetic outcomes of the surgery in these patients.

The results of our study showed that the infection rate in the surgery of nevus excision, as a clean wound, is minimal; in other words, only 3% of the removed nevi were infected. It is similar to the results of other previous studies. An important finding in this regard was that making wounds wet did not increase the infection rate significantly and therefore, it seems that it is not a risk factor for infection.

In this study, we found that the male gender might be a risk factor for wound infection as the infection rate was four times higher in the male gender. In contrast to gender, we noted that age did not serve as a risk factor for wound infection according to our findings.

The results of the present study showed that the size of nevus was correlated with increased risk of wound infection. It can be the result of more manipulation and long and deep incisions. In addition, the ellipse technique was considered as a risk factor for infection. On the other hand,

**Table 3.** wound status in the studied patients 24 and 48 hours after surgery

	Close wound	Mature scar	Scab/scar	Open wound	Sum
24 hours	81 (76.4%)	19 (18%)	4 (3.8%)	2 (1.8%)	106 (100%)
48 hours	75 (71.4%)	23 (21.9%)	7 (6.7%)	0	105 (100%)
Total	156 (73.9%)	42 (19.9%)	11 (5.1%)	2 (0.9%)	211

other factors such as the size and site of the nevus and cigarette smoking were nearly similar in both groups and obtained results were not affected by these factors.

More investigations using multi-variables logistic regression indicated that the association between infection and surgical technique was not an independent association and that it was probably related to the nevus size. On the other hand, larger nevi were removed using the ellipse technique and for this reason, there was a significant association between the type of surgery and infection. However, the relationship between gender and the infection rate was independent based on multi-variables logistic regression.

The results of this study are rather similar to the findings of previous studies. Goldberg et al, showed that the risk of infection did not significantly increase in the groups that had been allowed to moist their wound within the first 8 hours after surgery in comparison with the other group<sup>17</sup>. Similarly, in a study by Noe, it was shown that regular wound washing during 24 hours post-surgery did not cause more infection and also, no difference was found between benign and malignant lesions groups<sup>18</sup>. Carragee et al, reported that in the visceral surgeries, the rate of superficial and deep surgical site infections did not increase with moistened wounds<sup>19</sup>. Likewise, in a study conducted by Neues on the wounds due to varicose veins in the lower extremity, there was no difference between surgical site infections in patients who kept their wound dry and those whose wounds became wet after 24 hours<sup>20</sup>. Similarly, in a study performed by Meri et al, there was no significant difference in the infection rate between the two groups of with and without wound dressing<sup>21</sup>. Heal et al, also found no statistically significant difference in surgical site infection between the two groups<sup>5</sup>. In the present study, no difference was detected in the occurrence of infection in smoker and non smoker patients while cigarette smoking has been mentioned as a risk factor for wound infection in the literature<sup>17</sup>. The reason for this finding may be enough attention to health issues in patients who received facial nevus removal so that even cigarette smoking did not increase the rate of infection.

In summary, findings of this investigation showed that there was no association between moistening

clean wounds and higher rates of infections. So, we can allow patients who have undergone facial melanocytic nevus removal and have clean wounds to moisten their wounds after one day for general daily activities without any concern regarding the probability of increasing the rate of infection.

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