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Negative Impact of Postoperative Early Surgical Incision Dressing: A Prospective Observational Study

Postoperatif Erken Cerrahi İnsizyon Pansumanının Negatif Etkisi: Prospektif Gözlemsel Bir Çalışma

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ABSTRACT

Introduction: Povidone-iodine (Betadine®) is a commonly used solution to prevent surgical site infection in the postoperative period. In this study, time of first dressing after surgery was investigated. Early (second day) povidone-iodine dressing was compared with late (fifth day) dressing in terms of wound healing or inflammation.

Methods: The study was conducted in a gynecology clinic between June 2017 and June 2018. The patients who underwent surgery were divided into two groups as early and late dressing. The two groups were compared in terms of wound healing or inflammation. Inflammation was defined as the presence of redness, swelling and serous discharge (non-purulent) at the wound site.

Results: The study included 49 women with median incision. Inflammation was observed in 11 patients (22.4%). Mean age (45.7±11.3 vs 49.3±9.5), Body mass index (29.02±5.6 vs 30.89±4.0), rate of diabetic patients (21% vs 36%), rate of hypertensive patients (34% vs 36%), rate of smoking (13% vs 34%), operative time >4 hours (32% vs 63%), and operation category (malign or benign) were not statistically different between patients with normal wound healing and patients with inflammation. Twenty-two patients were dressed with povidone-iodine on postoperative day 2 (early group) and 27 patients were on postoperative day 5 (late group). The incidence of wound inflammation was significantly higher in the early group (11% vs 36%, p=0.035).

Conclusion: According to this study, early dressing had no advantage compared to late dressing. In addition, the rate of inflammation in the incision line was higher in the early dressing group. Before epithelialization of the surgical wound is completed, contact of povidone-iodine with the surgical incision wound and subcutaneous penetration of povidone-iodine may adversely affect the wound healing process.

Keywords: Povidone-iodine, inflammation, epithelialization, surgical site infection

ÖZ

Amaç: Povidone-iodine (Betadine®), ameliyat sonrası dönemde cerrahi alan enfeksiyonunu önlemek için yaygın olarak kullanılan bir solüsyondur. Bu çalışmada cerrahi sonrası ilk pansuman zamanı araştırıldı. Erken (ikinci gün) povidion iyot pansumanı, yara iyileşmesi veya enflamasyonu açısından geç (beşinci gün) pansumanla karşılaştırıldı.

Yöntemler: Çalışma Haziran 2017-Haziran 2018 tarihleri arasında bir kadın hastalıkları ve doğum kliniğinde yapıldı. Cerrahi uygulanan hastalar erken ve geç pansuman olarak iki gruba ayrıldı. İki grup, yara iyileşmesi veya enflamasyonu açısından karşılaştırıldı. Enflamasyon, yara bölgesinde kızarıklık, şişme ve seröz akıntı (pürülan olmayan) varlığı olarak tanımlandı.

Bulgular: Çalışmaya medyan batın insizyonu olan 49 kadın alındı. Enflamasyon 11 hastada gözlendi (%22,4). Ortalama yaş (45,7±11,3 ve 49,3±9,5), vücut kitle indeksi (29,02±5,6 ve 30,89±4,0), diyabetik hasta oranı (%21 ve %36), hipertansif hasta oranı (%34 ve %36), sigara içme oranı (%13 ve %34), uzun ameliyat süresi (>4 saat) (%32 ve %63) ve ameliyat kategorisi (malign veya bening) enflamatuvar grupta istatistiksel olarak anlamlı değildi. Yirmi iki hastaya ameliyat sonrası ikinci günde (erken grup) povidon-iyot ile pansuman yapılmış, 27 hastaya beşinci günde (geç grup) yapılmıştı. Yara enflamasyonu insidansı erken grupta anlamlı olarak yüksekti (%11'e karşılık %36, p=0,035).

Sonuç: Bu çalışmada, erken pansumanın geç pansumanla karşılaştırıldığında avantajı gözlenmedi. Erken pansuman yapılan grupta, insizyon hattındaki enflamasyon oranı daha yüksek gözlendi. Cerrahi yaranın epitelizasyonu tamamlanmadan önce, povidon iyodinin cerrahi yara ile teması ve povidon iyodinin subkütan penetrasyonu yara iyileşmesi sürecini olumsuz etkileyebilir.

Anahtar Kelimeler: Povidon iyot, enflamasyon, epitelizasyon, cerrahi alan enfeksiyonu

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Introduction

Povidone-iodine irrigation is a commonly used solution to prevent surgical site infection. The most commonly used commercial form is a 10% solution in water yielding 1% available iodine (1). The effects of povidone-iodine on wound healing are not clear. Some studies have shown that wound healing is adversely affected by povidone-iodine (2,3).

Povidone-iodine solution is usually used for postoperative wound dressing in clinics. In our clinic, the incision dressing is opened on the second postoperative day. The incision is closed back after wiping with povidone iodine solution. In this study, we investigated whether wound healing was affected if the first dressing was postponed to the fifth day. We have chosen the fifth day because granulation tissue in an incision line begins to form approximately four days after the lesion (4-6). Our aim was to investigate whether dressing after epithelialization and granulation tissue formation would be more advantageous.

Methods

The study was conducted between June 2017 and June 2018 in Gynecology and Obstetrics Clinic of İstanbul Training and Research Hospital. Informed consent forms were obtained from the patients. In this study, patients with median abdominal incisions were included in the analysis, as patients with Pfannenstiel incisions were not hospitalized long enough to be evaluated on the fifth day.

Incision dressing is routinely opened on the second postoperative day in our clinic. Dressing with povidone-iodine solution is done and then the incision is closed back. For this study, the first dressing days of some patients with median incisions were postponed to the fifth day. The patients who underwent surgery were randomly divided into two groups as early and late dressing. The two groups were compared in terms of wound healing or inflammation. Inflammation was defined as the presence of redness, swelling and serous discharge (non-purulent) at surgical incision site. In this study, the evidence for the presence of infection was not investigated. In fact, none of the patients had purulent discharge to support the presence of infection. This study was an observational clinical study and ethics committee approval was not required.

Statistical Analysis

Statistical analysis was performed using SPSS software. Data were expressed as median and interval for continuous variables. Binary variables were reported as numbers and percentages. Categorical variables were evaluated according to group size using the $\chi 2$ test or Fisher's exact test. $P<0.05$ was accepted to indicate statistical significance. This study was an observational clinical study and ethics committee approval was not required.

Results

The study included 49 women with median incisions (Table 1). Inflammation was observed in 11 patients (22.4%). Mean age (45.7±11.3 vs 49.3±9.5), body mass index (29.02±5.6 vs 30.89±4.0), rate of diabetic patients (21% vs 36%), rate of hypertensive patients (34% vs 36%), rate of smoking (13% vs 34%), operative time >4 hours (32% vs 63%), and operation category (malign or benign) were not statistically different between patients with normal wound healing and patients with inflammation. Twenty-two patients were dressed with povidone-iodine on postoperative day 2 (early group) and 27 patients were on postoperative day 5 (late group). The incidence of wound inflammation was significantly higher in the early group (11% vs 36%, p=0.035) (Table 2).

Table 1. General characteristics of 49 patients with median abdominal incision

Age, median (min-max)	46 (18-70)
BMI, mean ± SD (min-max)	29.4+5.2 (19-39)
Diabetes, % (n)	24.5% (12)
Hypertension, % (n)	34.7% (17)
Smoking, % (n)	18.4% (9)
Operation category	
Benign	46.9% (23)
Malign	53.1% (26)
Operative time	
<2 hours	20.4% (10)
2-4	40.8% (20)
<4	38.8% (19)
Inflammation, (presence of redness, swelling and serous discharge)	22.4% (11)

BMI: body mass index; min: minimum; max: maximum; SD: standard deviation

Table 2. Comparison of patients with normal wound healing and patients with inflammation

Feature	Normal wound healing	Patients with inflammation	p
Number of patients	38	11	-
Age, mean ± SD	45.7±11.3	49.3±9.5	0.335
BMI, mean ± SD	29.02±5.6	30.89±4.0	0.316
Diabetes			
Yes	8 (66%)	4 (33%)	0.427
No	30 (81%)	7 (19%)	
Hypertension			
Yes	13 (77%)	4 (23%)	1.000
No	25 (78%)	7 (22%)	
Smoking			
Yes	5	4	0.506
No	33	7	
Operative time			
<2 hours	9	1	0.150
2-4 hours	17	3	
>4 hours	12 (32%)	7 (63%)	
Day			
2	14	8	0.035
5	24	3	

Inflammation was accepted as presence of redness, swelling and serous discharge
BMI: body mass index, SD: standard deviation

Discussion

In this observational prospective study, the effects of early and late dressing with povidone-iodine on wound healing were compared. The absence of redness, swelling or discharge at the wound site was considered normal wound healing. According to the results of the study, wound healing was better in late dressing.

Povidone-iodine is a topical antimicrobial that has been shown to be effective against bacteria, fungi, several viruses, spores, protozoa and amoebic cysts (7-9). *In vitro* studies on this subject reported different results. Some *in vitro* studies have suggested that even dilute solutions of povidone-iodine are toxic to human fibroblasts (2,3). These authors stated that caution should be used when povidone-iodine is placed on an open wound, and that prolonged contact with viable uncontaminated tissue should be avoided. On the other hand, in vitro studies or meta-analysis of povidone-iodine in wound healing demonstrated that concentrations less than 10% generally do not inhibit the granulation and epithelialization processes (10,11). Several animal studies investigating the effect of povidone-iodine on wound microcirculation have shown inconsistent findings (1,12,13).

The stages of wound healing proceed in an organized way and follow four processes: hemostasis, inflammation, proliferation and maturation. The purpose of the proliferative stage is to form a viable epithelial barrier to activate keratinocytes (5). The closure of the lesion itself, which includes angiogenesis, fibroplasia, and re-epithelialization, occurs at this stage. These processes begin in the lesion within the first 48 hours and may continue up to the 14th day (6). Granulation tissue begins to form approximately four days after the lesion (5).

Conclusion

In our opinion, contact with povidone-iodine before epithelialization and granulation may adversely affect wound healing steps. Early opening of a surgical wound that has been closed in the operating room under sterile conditions does not provide an advantage. This observational prospective study may help clinicians in planning postoperative surgical incision dressing.

Ethics Committee Approval: This study was an observational clinical study and ethics committee approval was not required.

Informed Consent: Informed consent forms were obtained from the patients.

Peer-review: Externally peer-reviewed.

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