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The Effect of Vacuum Assisted Closure Treatment on Postsurgical Lower Extremity Groin Wounds and Secondary Lymphatic Complications

Vakum Yardımlı Kapatma Tedavilerinin Alt Ekstremitede Cerrahi Sonrası Kasık Bölgesi Yaraları ve Sekonder Lenfatik Komplikasyonlara Etkisi

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Öz

Giriş ve Amaç: Kapanması geciken kasık bölgesi yaraları ve sekonder lenfatik problemler hastanede yatış sürelerini uzatmaktadır. Femoral damarlardan girişim, kalp ve periferik vasküler cerrahi için en sık kullanılan erişim yollarındandır. Bu çalışmada femoral damarlara cerrahi girişimler sonrasında iyileşmeyen kasık yaraları ve alt ekstremitedeki sekonder lenfatik problemlerde vakum yardımcı kapatma (VAK) tedavilerinin iyileşme süresine etkisini araştırdık.

Gereç ve Yöntemler: Retrospektif özellikteki çalışmada, son iki yılda, kliniğimizdeki majör vasküler cerrahilerde femoral damarlara erişim için kasık insizyonu yapılmış 335 hasta dosyası tarama yapılarak incelenmiştir. Bu hastaların 32'sinde (%9,5) iyileşmeyen kasık yarası ve sekonder lenfore, lenfosel veya lenfödem gibi lenfatik problemler gözlenmiştir. İlk 10 günde yara iyileşmesi yetersiz olan ve ilişkili lenfatik problem gözlenen hastalara öncelikle femoral insizyonun cerrahi debridmanı, lenfatiklerin ligasyonu, lenfoselin çıkarılması uygulanmıştır. Sonrasında 16 hastada yalnızca cerrahi debridman ve yara bakımı (Grup 1) kullanılırken, 16 hastada ek olarak vakum yardımcı kapatma (VAC) cihazı da kullanılmıştır (Grup 2). Her iki gruptaki demografik veriler, risk faktörleri ve yara iyileşmesi için geçen tedavi süreleri karşılaştırılmıştır.

Bulgular: Gruplar arasında demografik özellikler açısından fark bulunmamıştır. Eşlik eden hastalıklar karşılaştırıldığında gruplar arasında fark olmadığı saptandı. Lenfore için etyolojik risk faktörleri karşılaştırıldığında; tekrarlayan operasyonlar, femoral bölgede prostetik greft bulunması, hipalbuminemi açısından fark olmadığı ancak VAC kullanılan grupta obesitenin daha fazla olduğu gözlemlendi. Yara iyileşme süresi Grup 2 de daha kısaydı ancak istatistiksel olarak anlamlı değildi.

Sonuç: Cerrahi sonrası sekonder lenfödem ve kasık yarası iyileşme probleminin temel tedavisi debridman ve optimal cerrahi yara bakımındır. VAC kullanımı, alt ekstremitede lenfatik akımın drenajını artırır ve granülasyon dokusu oluşumu ile yara tabanını güçlendirir. VAC tedavisi, alt ekstremitede femoral yaralarının ve sekonder lenfatik problemlerin iyileşmesini hızlandırmak için etkili bir tedavi seçeneği olabilir.

Anahtar kelimeler: Lenfore, sekonder lenfödem, vakum yardımcı kapatma (VAC), yara iyileşmesi

Abstract

Objective: Delayed wound closure and secondary lymphatic problems prolong hospital stay. The femoral exposure is one of the most commonly used access way for the cardiac and peripheral vascular surgery. In this study, we investigated the effect of vacuum-assisted closure (VAC) treatments on the recovery time in non-healing groin wounds after femoral vessel exposure and secondary lymphatic problems in the lower extremity.

Materials and Methods: In this retrospective study, we examined 335 patient's hospital records who had groin incision for access to femoral vessels in major vascular surgeries performed in our clinic in the last two years. We

observed non healing inguinal wounds and lymphatic problems such as secondary lymphorrhea, lymphocele or lymphedema in 32 of these patients (9.5%). The patients with insufficient wound healing in the first 10 days postoperatively and associated lymphatic disorders were primarily treated with surgical debridement of the femoral incision, ligation of lymphatics and removal of lymphocele. Afterwards, only surgical debridement and wound care was used in 16 patients (Group 1) and additional to these therapies vacuum assisted closure (VAC) device used in 16 patients (Group 2). Demographic data, risk factors and duration of the treatment for wound healing in both groups were compared.

Results: There was no difference in demographic characteristics between groups. When comorbid diseases were compared, there were no difference between the groups. There was no difference with regard to etiological risk factors for wound site complications such as prosthetic grafts in the femoral region, hypoalbuminemia, recurrent operations. But there were more obese patients in Group 2. The mean wound healing time was shorter in Group 2 but it was not statistically significant.

Conclusion: The basic treatment of postsurgical secondary lymphedema and groin wound healing problem is debridement and optimal surgical wound care. VAC usage enhances the drainage of the lymphatic flow of lower extremity and strengthen wound base by granulation tissue formation. VAC therapy may be an effective therapeutic option to accelerate healing of lower extremity femoral wounds and secondary lymphedema.

Keywords: Lymphorrhea, Secondary lymphedema, Vacuum assisted closure, wound healing

1. Giriş

The femoral exposure is one of the most commonly used access way for the cardiac and vascular surgery. Surgical site complications related to lower extremity vascular surgery ranges from 5% to 10% [1,2]. Risk factors for groin wounds complications includes obesity, reoperation, emergent operations, diabetes mellitus, use of prosthetic grafts, renal failure, malnutrition, hypoalbuminemia and female gender [2,3]. Postsurgical non-healing wounds lead increased length of stay, rehospitalizations, reoperations, wound infections, graft infections, limb loss, lymphatic disorders, sepsis and mortality. Prolonged hospital stay causes increased healthcare costs [1,2].

Lymphedema can develop when lymphatic vessels are missing or impaired (primary), or when lymph vessels are damaged, or lymph nodes removed (secondary). Secondary lymphedema occurs as a result of surgery, radiation, infection or trauma. Secondary lymphedema tends to occur after specific surgeries that require removal of lymph nodes such as surgery for melanoma, breast cancer, gynecologic malignities or prostate and testicular cancer, bladder or colon cancer, head and neck cancer [4,5]. In cardiovascular surgery, postsurgical lower extremity lymphedema or lymphatic disorders frequently develop as a result of excision or mechanical obstruction of the collecting lymphatic trunks. In this study, we investigated the effect of vacuum-assisted closure (VAK) treatments on the recovery time in non-healing groin wounds after femoral vessel exposure and secondary lymphatic problems in the lower extremity.

2. Materials and Methods

We performed approximately 335 femoral exposure for the major vascular surgery in last two years in our tertiary health care service. We observed in 32 (9.5%) of them non healing groin wounds accompanying

lymphatic problems like lymphorrhea, lymphocele or lymphedema. Patients data are collected retrospectively from hospital records according to local ethical committee recommendations.

SPSS statistical software was used for the statistical analyses. The baseline characteristics were shown as mean \pm standard deviation and frequencies are shown as percentages (%). Categorical variables between groups were compared by chi-square test. Recovery time between the groups compared by Mann Whitney U test because the variables was not distributed normally.

All the patients who have defective wound healing in ten days after the operation were treated firstly by surgical debridement of the femoral incision, ligation of the lymphatics, removal of the lymphocele. Later, 16 patients were treated only by surgical debridement and wound care (Group 1) and 16 patients were treated additionally by application of the vacuum assisted closure (VAC) device. Genadyne XLR8 Negative Pressure Wound Therapy® device is used for negative pressure therapy (Figure 1).

3. Results and Discussion

We compared demographical characteristics, patients accompanying diseases, risk factors for wound healing complications as diabetes, obesity, hypoalbuminemia, reoperations, femoral prosthetic material usage, venous insufficiency, previous groin interventions. We also examined number of debridement and total wound healing time between two groups.

We observed wound complications related to lymphatic system in 32 of 335 patients (9.5%). Thirteen of them were female (40.6%) and nineteen of them were male (59.3%) patients. Mean age of the patients was 62 ± 12.8 years. The etiology of femoral vessels exposure was shown in Table 1 and the demographic characteristics of the patients are shown in Table 2.

Figure1. Wound care with vacuum assisted closure device.



A: Non healing wound after peripheral arterial bypass surgery at left groin with formation of lymphocele. B: vacuum assisted closure device therapy. C: Closure of wound edges after 4 weeks of treatment.

Table 1. The etiology of femoral vessels exposure

The etiology of femoral vessels exposure	Group 1 n (%)	Group 2 n (%)	Total n (%)
Peripheral Artery Disease	9 (56.3%)	4 (25%)	13 (40.6%)
Acute Arterial Occlusion	3 (18.8%)	4 (25%)	7 (21.9%)
Femoral Pseudoaneurysm Repair	2 (12.5%)	2 (12.5%)	4 (12.5%)
Aortic Dissection Repair	1 (6.3%)	2 (12.5%)	3 (9.3%)
Abdominal Aortic Aneurysm, Open Repair	0	2 (12.5%)	2 (6.3%)
Endovascular Aortic Aneurysm Repair	0	2 (12.5%)	2 (6.3%)
Venous Insufficiency	1(6.3%)	0	1 (3.1%)

n: number of patients, %: percentages within groups.

Table 2. Patients characteristics, risk factors for wound healing complications.

	Group 1	Group 2
Age, year	64.5±2.5	67.8±10.6
	n (%)	n (%)
Gender (Female/Male)	6/10 (37.5%/62.5%)	7/9 (43.75%/56.25%)
Diabetes Mellitus	10 (62.5%)	10 (62.5%)
Hypertension	12 (75%)	15(93.7%)
Smoking	10 (62.5%)	9 (56.2%)
Alcohol Usage	0	0
Chronic Obstructive Pulmonary Disease	2 (12.5%)	5 (31.2%)
Cardiac Failure	2 (12.5%)	4 (25%)
Coronary Artery Disease	4 (25%)	6 (37.5%)
Romatological disease	1 (6.2%)	3 (18.7%)
Venous insufficiency	1 (6.2%)	0
Peripheral Arterial Disease	12(75%)	10 (62.5%)
Obesity	4 (25%)	10 (62.5%)
Redo Operations	6 (37.5%)	3 (18.7%)
Prosthetic Graft Usage	5 (31.2%)	8 (50%)
Hypoalbuminemia	11 (68.7)	12(75%)

n: number of patients, %: percentages within groups.

In our study, the etiological factors for femoral vessels exposure were similar between groups (x2 test, p=0.18, Table 1). There was no difference between two groups in terms of associated comorbidities and risk factors for wound healing which was shown in Table 2. We observed recurrent lymphocele in two patients (6.5%), prolonged lymphorrhea in 29 patients (90.6%) and non-

healing groin wound with lymphedema of the limb in 7 patients (21.8%) in both groups. In Group 2 (VAC used) all of the groin wounds healed completely after negative pressure therapy and the duration of VAC therapy was ranged between 14 to 120 days. The mean wound healing time was 44.18±10 days for Group 1 and 27±6.4 days for Group 2. VAC therapy seems to

shorten wound healing time, but it was not statistically significant (Mann Whitney U test, p 0.075). In the treatment period, a similar rate of repeated debridement was performed in both groups (t test, p=0.55). Generally, lymphedema severity regressed in all patients from grade 1-2 to grade 0-1. After completion of the therapy, permanent lymphedema was observed only in 3 (9.3%) patients.

Delayed wound closure and secondary lymphatic problems prolong hospital stay and increase health expenditures. There are numerous factors influencing wound healing process such as poor nutritional status, impaired blood flow, hypoxia, various drugs and smoking [6]. Beyond these factors lymphatic disorders further complicate the wound healing. Secondary lymphedema can develop immediately after the operation, or weeks, months, even years later. Repetitive trauma to lymphatic vessels, seroma formation and bacterial contamination may complicate the situation in non-healing groin wounds. Swelling of the limb secondary to lymphedema further worsen the closure of strained wound edges. Various wound managements strategies are reported in the literature as different wound dressings, incisional negative pressure wound therapy (iNPWT) and vacuum assisted closure (VAC) devices [2,4, 6-11]. Negative pressure therapy, enables removal of interstitial fluid, enhances lymphatic flow, increases the blood flow to the wound site and promotes granulation tissue formation, regeneration of capillary endothelial cells and collateral lymphatic vessels [12-15]. It facilitates wound healing and reduces the risk of seroma formation and surgical site infections [4,7,8,16].

Patients with lymphedema after surgical interventions and lymph node dissections have an impaired quality of life in the long term and they suffer with a substantial workforce loss. Due to recurrent hospitalizations and outpatient visits, the healthcare costs increase tremendously. In a recent publication, international multidisciplinary experts recommended the use of negative pressure therapy for patients at high risk for developing surgical site complications or patients undergoing high-risk procedures or a procedure that would have morbid consequences in case of surgical site infection [17]. They described risk factors as diabetes mellitus, advanced age, obesity, tobacco use, hypoalbuminemia, corticosteroid usage, reoperations, emergency operations, prolonged operation, high perioperative blood loss, haematoma and incisions in ischemic areas [17]. In our study we observed that wound problems mostly seen in obese patients and hypoalbuminemic patients. Twenty-three (71.8%) of the patients who have wound recovery problem had hypoalbuminemia. Fourteen of the patients (43.7%) were obese and we observed that we tended to use more VAC therapy in this group. We also used nutritional supplemental therapy and high protein uptake diet to decrease recovery time in all patients. We used second generation cephalosporins for antibiotic prophylaxis. In patients who are diagnosed specific infectious agent we

used agent-specific antibiotherapy according to the recommendations of infectious diseases clinic.

Recent studies reported that negative pressure therapy is effective for the prevention of groin wound infection and complications in vascular surgery patients. Because the lymphatics which are close to femoral vessels are often transected and lymphorrhea may occur after femoral vascular exposures. Negative pressure decreases lymphocele formation in groin incisions related to vascular surgery and prevents skin edges from becoming macerated. Also, it promotes epithelization of the wound [18,19].

We observed that negative pressure therapy promotes granulation tissue formation, decreases lower limb edema and supports wound healing. We think that combination of optimal surgical wound care, elevation of the lower limb and negative pressure therapy (VAC) ranging approximately 4 to 8 weeks for non-healing wounds, enables groin wound healing and reduces surgical site complications.

4. Conclusions

The basic treatment of postsurgical secondary lymphedema and groin wound healing problem is debridement and optimal surgical wound care. VAC usage enhances the drainage of the lymphatic flow of lower extremity and strengthen wound base by granulation tissue formation. Negative pressure wound therapy may be an effective therapeutic option to accelerate healing of lower extremity femoral wounds and secondary lymphedema. Larger prospective randomised studies will provide more clear evidences about the efficacy of VAC therapies on wound healing.

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