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ORIGINAL ARTICLE

Does the Usage of Drains Create a Risk of Surgical Site Infection During Breast Surgery?

Meme Ameliyatlarında Dren Kullanımı Cerrahi Alan Enfeksiyonu Riski Oluşturur mu?

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ABSTRACT

Aim: Drains are used to avoid hematoma, seroma and infection in breast surgery. A topic of debate in breast surgery research is the probability of surgical sites becoming infected through retrograde contamination. In this study, we aimed to determine whether drains cause surgical site infections by using drain tip cultures.
Material and Methods: This study included 99 patients 162 breasts of whom had undergone breast surgeries, including augmentation, reduction, reconstruction and gynecomastia, by the same surgeon. Data on the patients' demographic characteristics, clinical findings, antibiotherapies, types of surgeries and drain features such as type, duration of use, output volume and tip cultures were collected.
Results: The study included 99 patients—3 male, 96 female—with a mean age of 37.84. The mean body mass index was 24.5. Seven breast augmentations, three gynecomastia surgeries, 37 breast reconstructions with implants, three breast reconstructions with latissimus dorsi flaps and 49 reduction mammoplasties were performed. We did not observe infectious symptoms such as fever, hyperemia, abscess or hematoma in any of the patients. Fifty-six Jackson–Pratt® drains and 106 Hemovac drain tip cultures were evaluated. The mean follow-up duration was 7.16 days, and the mean output volume was 224.66 cc. The drain tip cultures of all the patients were negative.
Conclusions: According to our analysis, drains did not cause retrograde contamination or surgical site infection.

Keywords: Breast surgery, Drain, Surgical site infection

ÖZ

Amaç: Meme cerrahisinde hematom, seroma ve enfeksiyondan korunmak için drenler kullanılır. Drenlerden ters akım yoluyla cerrahi alanın kontamine olma olasılığı meme cerrahisinde tartışılan konulardandır. Bu çalışmada dren ucu kültürleri kullanılarak drenlerin cerrahi alan enfeksiyonuna neden olup olmadığının tespit edilmesi amaçlandı.
Gereç ve Yöntemler: Bu çalışmaya aynı cerrah tarafından opere edilen meme büyütme, meme küçültme, meme rekonstrüksiyonu ve jinekomastiyi içeren meme cerrahilerinin yapıldığı 99 hastanın 162 memesi dahil edildi. Hastalara ait demografik özellikler, klinik bulgular, antibiyoterapiler, ameliyat tipleri ve dren özellikleri (dren tipi, dren kalış süresi, toplam drenaj hacmi ve dren ucu kültür sonuçları) verileri incelendi.
Bulgular: Çalışmaya yaş ortalaması 37.84 olan 3 erkek, 96 kadın olmak üzere 99 hasta dahil edildi. Ortalama vücut kitle indeksi 24.5 idi. Mart 2022 ve Şubat 2023 tarihleri arasında 7 meme büyütme, 3 jinekomasti, 37 implant ile meme rekonstrüksiyonu, 3 latissimus dorsi ile meme rekonbstrüksiyonu ve 49 meme küçültme cerrahisi uygulandı. Hiçbir hastada ateş, hiperemi, apse, hematom gibi enfeksiyöz semptomlara rastlamadık. 56 Jackson-Pratt® dreni ve 106 Hemovac dren ucu kültürü değerlendirildi. Ortalama takip süresi 7,16 gün, ortalama çıkış hacmi 224,66 cc idi. Tüm hastaların dren ucu kültürleri negatif olarak geldi.
Sonuç: Yapılan analizler sonucunda drenlerin geriye akım ile kontaminasyona ve cerrahi alan enfeksiyonuna neden olmadığı görüldü.

Anahtar Kelimeler: Cerrahi alan enfeksiyonu, Dren, Meme cerrahisi

Introduction

Reconstructive and aesthetic breast surgeries are popular in this era, and patients come to clinicians with high expectations. Nevertheless, undesirable results can occur in such surgeries, due to complications such as hematoma, seroma and infection. Many methods are used to avoid complications. Drains, for instance, are used to avoid hematoma, seroma and surgical site infection (SSI). It is believed that drains decrease SSI by preventing hematoma and seroma. Harish et al. found that SSI was reduced by using subcutaneous closed suction drains (1). On the other hand, it is debated whether these drains increase the probability of infection due to retrograde contamination (2,3). Therefore, surgeons are divided into two groups: those who use drains and those who do not. For detecting SSI, drain tip culture is one of the less harmful method. It is applied while the routine drain removal. It is detected that positive drain culture results are correlated with SSI (4). For this reason drain tip cultures were used besides clinical signs for detecting SSI. In this study, we aimed to determine whether drains are a source of retrograde contamination in patients undergoing breast surgery by analyzing drain tip cultures.

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Materials and Methods

This study was conducted in conformity with the World Medical Association's Declaration of Helsinki and approved by the local ethics committee (2023/020). We evaluated the patients underwent operation between March 2022 and February 2023. Demographic, clinical and microbiologic data were collected. As breast surgeries, we included reduction mammoplasty, breast augmentation, mastopexy, gynecomastia and breast reconstruction. A total of 128 operations were selected, but 29 patients were excluded because drains were not used during breast augmentation or gynecomastia, and two more patients were excluded because of wound dehiscence and direct contamination after breast reconstruction. Further exclusion criteria included the use of antibiotics in the previous month, presence of autoimmune diseases and cases in whom drain tip cultures were not performed.

We prepared the skin with chlorhexidine prior to each surgery. All operations were carried out in operating rooms with laminar ventilation. We applied one gr. of intravenous cefazolin 30 minutes before incision. In postoperative follow-up, we administered intravenous ciprofloxacin at the hospital and oral ciprofloxacin after discharge twice a day for one week. Antibiotherapy was prolonged until the drains were removed. Jackson–Pratt® drains were used in breast augmentation, mastopexy and breast reconstruction with implants. Hemovac drains were used in reduction mammoplasty, gynecomastia and mastopexy without implants. The drains were removed when the daily output decreased below 30 ml per day.

When the drains were removed (in sterile conditions), the drain tips were cut at three cm and placed into sterile culture containers along with 4 cc of sterile saline. The drains were evaluated one at a time using bilateral procedures.

The drain tip cultures were routinely evaluated by the department of microbiology. Samples were cultured in enriched solid media incubated under aerobic conditions.

Infection symptoms, such as fever, hyperemia, wound dehiscence, abscess and wound discharge, were evaluated in the first month after each operation. Drain type, duration and output volume were analyzed. Statistical values were calculated as means, minimum–maximum values and percentages using Excel (Microsoft Corp., Redmond, WA, USA). While quantitative variables are expressed as means (with standard deviations) and medians (minimum/ maximum) in the tables, categorical variables are shown as n (%). Comparisons could not be made because we could not refer to a control group with SSI.

Results

The study included 99 patients—3 male, 96 female—with a mean age of 37.84 ± 8.23 (Table 1). The mean body mass index was 24.52 ± 3.45. Eighteen patients were smokers (18.18%), eight had chronic anemia (8.08%), three had asthma (3.03%) and four had diabetes (4.04%). Seven breast augmentations, 3 gynecomastia surgeries, 37 breast reconstructions with implants, 3 breast reconstructions with latissimus dorsi flaps and 49 reduction mammoplasties were performed. In these procedures, 56 Jackson-Pratt® drains and 106 Hemovac drains were placed.

Table 1: Demographic and drain related-data of the patients

	Number	Percentage
Sex		
Man	3	
Woman	96	
Comorbidities		
Smoking	18	18.18
Chronic anemia	8	8.08
Asthma	3	3.03
Diabetes	4	4.04
Procedure		
Breast augmentation	7	7.07
Gynecomastia	3	3.03
Breast reconstruction with İmplant	37	37.37
Breast reconstruction with flap	3	3.03
Reduction mammoplasty	49	49.49
Drain type		
Jackson-Pratt®	56	34.56
Hemovac	106	65.43
Drain duration time (day)		
Total	7.16 ± 7.67	
Breast augmentation	3.2 ± 1.66	
Gynecomastia	1	
Breast reconstruction	18.6 ± 5.67	
Reduction mammoplasty	1.3 ± 0.65	
Complications		
Fever	0	0
Hiperemia	0	0
Abscess	0	0
Hematoma	0	0
Wound healing problems	4	4.04
Output volume (cc)		
Total	224.66 ± 235.02	
Breast augmentation	40.8 ± 57.57	
Gynecomastia	7.5 ± 4.18	
Breast reconstruction	528.91 ± 242.03	
Reduction mammoplasty	24.75 ± 29.07	
Tip culture		
Negative	162	100
Positive	0	0

We did not observe infection symptoms such as fever, hyperemia, abscess or hematoma in any of the patients. We observed mild wound-healing problems in four patients that healed secondarily.

In most cases, we removed the drains before discharge. The patients who did not want to be hospitalized were discharged with drains and visited until the drainage was lower than 30 cc. The mean duration was 7.16 ± 7,67 days in all patients: 1.3 ± 0,65 days in reduction mammoplasty, one day in gynecomastia, 3.2 ± 1,66 days in breast augmentation and 18.6 ± 5,67 days in breast reconstruction.

The mean output volume over the total follow-up was 224.66 ± 235,02 cc in all patients: 24.75 ± 29,07 cc in reduction mammoplasty, 7.55 ± 4,18 cc in

gynecomastia, 40.8 ± 57,57 in breast augmentation and 528.91 ± 242,03 cc in breast reconstruction.

The results of the 162 drain tip cultures were all negative.

Discussion

Surgical site infection is one of the most debated topics in breast surgery because it is linked with higher morbidity, increased costs, longer hospitalization and patient dissatisfaction. The most well-known risk factors for SSI are high body mass index, smoking, diabetes mellitus and immunosuppression. Besides these, there is debate over whether drain usage leads to SSI. While some authors believe that it decreases infection by preventing hematoma, others believe that it increases the infection rate through retrograde contamination (2,5,6,7,8). In a review, Reiffell et al. found a few studies indicating increased SSI risk with drains but no studies indicating decreased SSI with drains (9). Thus, it is unclear whether drains increase the risk of infection. In our study, drain-related factors were examined and evaluated with the cloud of current literature.

The goal of any treatment is to achieve maximum satisfaction with fast recovery and minimum cost. Thus, it is important to prevent infection. In this context, prophylactic antibiotic usage is another controversial topic. Zapata-Copete et al. found prophylactic antibiotics advantageous for decreasing the incidence of SSI in reduction mammoplasty (10). A systematic review of the use of prophylactic antibiotics in aesthetic breast surgery recommended their use in reduction mammoplasty but could not find evidence of their efficacy in augmentation mammoplasty (11). Keramidas et al. did not find differences in wound infection between a group that used prophylactic antibiotics in breast augmentation and a group that did not (12). In our clinic, we routinely apply one gr of intravenous cefazolin 30 minutes before incision. Additionally, we recommend the usage of oral ciprofloxacin for one week postoperatively.

The necessity of drains in breast surgery is unclear. When performing reduction mammoplasty, Collis used drains at one site but not at the other; while abscesses were higher in the drained breast, minor infections were more common in the undrained site (13). Moreover, they did not detect differences in hematoma or other complications between the drained and non-drained sides and ultimately found drains unnecessary (13). In their review of drain usage in breast surgery, Khan et al. did not find significant differences between drained and non-drained groups in terms of infection, edema, seroma, fat necrosis, nipple loss or wound problems (14). They did not identify any benefits of drains but offered closed-suction drains if necessary. In our clinic, we do not use drains in breast augmentation if not necessary. However, we routinely place drains in reduction mammoplasty, breast reconstruction and mastopexy. According to our study, it can be opted not to use drains in reduction mammoplasty because we withdrew them on the first day in 30 of 49 (61.2%) patients; their mean duration of use was 1.3 days (1–3). Cost is always important when planning treatment. While drains increase costs due to the required equipment, they prevent additional costs by preventing hematoma, seroma and additional related problems such as long hospitalization (5). To prevent these complications, we use drains in most breast surgeries.

There are many drain types, including passive and active closed systems and suction drains such as those of Jackson–Pratt® and Hemovac. Closed-system drains are preferred in breast surgery due to the advantages of preventing infection and preventing seroma by decreasing dead space (3). Bascone et al. compared round and flat drains and recommended single, large, round drains in alloplastic breast reconstruction as they have the lowest rates of abscess and wound dehiscence (15). We always use closed-system drains in breast surgery. We prefer flat (Jackson–Pratt®) drains for operations with implants, such as augmentation and reconstruction. On the other hand, if we do not use implants, we prefer round (Hemovac) drains.

Longer drain use can increase wound infections in spinal surgery (5). It was also identified as a risk factor in abdominal surgery (6). It was shown that every week, infection risk increases by 72.6% in breast surgery (15). In oncologic breast surgery, SSI was found higher after 19 days with drains (9). In our study, we did not find differences between reconstruction patients and the others, except long durations in reconstruction such as two or three weeks. Thus, we can say that time is not the problem if the drains are placed in sterile conditions and followed up.

The criteria for removing drains are also unclear. While many authors remove the drains when daily output drops below 50 ml (15), Pennington et al. do so when the flow reaches 200 ml (5). They did not find any correlation between SSI and a daily output lower than 200 ml in degenerative spine surgery (5). It is recommended in most studies (87%) to remove the drains when the outflow is less than 30 cc/day (3). In our practice, we remove drains when the daily output drops below 30 ml. We did not observe hematoma or infection in any patients.

Drain tip cultures have been used in many studies. Sorenson found that a positive drain culture is associated with SSI (16). While culture positivity of drain tip was associated with 50% wound infection, negativity was related with uninfected wounds (2). Likewise, duration of drain usage was correlated with positive drain tip cultures and SSI in breast surgery (17) and clean orthopedic surgeries (16). In a series on liver transplantation, drain tip cultures were positive in 84.6% in patients with postoperative infection (18). Moreover, they found that the microorganisms in the tip culture were the same as in a previous culture from the infected wound (18). Thus, we use drain tip cultures to detect SSI. In our series, drain tip cultures were all negative. No patients had infection symptoms.

The main limitation of this study is the lack of a control group. We could not create a control group without drains because of routine placement. Moreover, we could not discuss the differences between positive and negative cultures because, fortunately, drain tip cultures were negative in all patients.

In conclusion, drains are used for decreasing and preventing infection, hematoma and seroma. Longer duration is the most significant factor in SSI stemming from drain usage. In our study, no significant reproduction in drain tip cultures was detected. Thus, according to our findings, when adequate antisepsis, prophylaxis, and postoperative conditions are followed, microorganisms are not detected in drains.

Ethics Committee Approval: The study protocol was approved by the local ethics committee (No. 2023/20).

Informed Consent: Written informed consent was obtained from all participants who participated in this study.

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Authorship Contributions

Surgical and Medical Practices: TGK., Concept: TGK, AG., Design: TGK., Data Collection or Processing: TGK, AG., Analysis or Interpretation: TGK, AG Literature Search: TGK., Writing: TGK

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