



Is Subcutaneous Rifamycin Application Superior to Saline Application in Hip Hemiarthroplasty?

Kalça Hemiartroplastisinde Subkütan Rifamisin Uygulaması Salin Uygulamasına Üstün mü?

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ABSTRACT

Objective: The effect of subcutaneous rifampicin administration on postoperative early wound discharge in patients undergoing hemiarthroplasty after femoral neck fracture was investigated.

Methods: Between 2013 and 2015, 58 (36 female, 22 male) patients aged 65-94 (mean 79.29±7.99 years) who underwent hemiarthroplasty for hip fracture were included in the study. Two of the patients were Garden type 2, 21 were Garden type 3 and 35 were Garden type 4. The patients were followed from the postoperative period until discharge, and the length of stay was recorded. The subcutaneous rifamycin-administered group (group 1), saline irrigation-only group (group 2), and saline solution-added rifamycin group (group 3) were examined in 3 groups.

Results: The duration of discharge was statistically significant according to age ($p<0.05$). The mean duration of wound discharge was significantly higher in patients older than 75 years ($p=0.02$). The operation duration of RIF + SF irrigation was significantly higher than that of SF irrigation ($p=0.037$). There was no statistically significant relationship between operation duration, incision length and additional diseases, and discharge time ($p>0.05$).

Conclusion: There was no significant difference between the groups in terms of postoperative discharge times. The operative time was longer in patients who received subcutaneous rifamycin and were older than 75 years. Additional or isolated rifamycin application for hip hemiarthroplasty irrigation has no superiority over the saline solution.

Keywords: Hemiarthroplasty, hip fracture, rifamycin, surgical wound infection, collum femoris fracture

ÖZ

Amaç: Femur boyun kırığı sonrası hemiarthroplasti uygulanan hastalarda subkütan rifamisin uygulamasının postoperatif erken yara iyileşmesine etkisi araştırıldı.

Gereç ve Yöntem: 2013-2015 yılları arasında kalça kırığı nedeniyle hemiarthroplasti yapılan, yaşları 65-94 (ortalama 79,29±7,99 yıl) olan 58 (36 kadın, 22 erkek) hasta çalışmaya dahil edildi. Hastaların ikisi Garden tip 2, 21'i Garden tip 3 ve 35'i Garden tip 4 idi. Hastalar postoperatif dönemden taburcu oluncaya kadar takip edildi ve hastanede yatış süreleri kaydedildi. Deri altı rifamisin verilen grup (grup 1), sadece salin irrigasyon yapılan grup (grup 2) ve salin solüsyon eklenen rifamisin grubu (grup 3) olarak 3 grupta incelendi.

Bulgular: Taburculuk süresi yaşa göre istatistiksel olarak anlamlıydı ($p<0,05$). Ortalama yara akıntı süresi 75 yaş üstü hastalarda anlamlı olarak daha yüksekti ($p=0,02$). RIF + SF irrigasyonunun operasyon süresi, SF irrigasyonundan anlamlı derecede yüksekti ($p=0,037$). Ameliyat süresi, insizyon uzunluğu ve ek hastalıklar ile taburculuk süresi arasında istatistiksel olarak anlamlı bir ilişki yoktu ($p>0,05$).

Sonuç: Ameliyat sonrası taburculuk süreleri açısından gruplar arasında anlamlı fark yoktu. Subkütan rifamisin alan ve 75 yaşından büyük hastalarda ameliyat süresi daha uzundu. Kalça hemiarthroplastisi irrigasyonu için ek veya izole rifamisin uygulamasının salin solüsyona üstünlüğü yoktur.

Anahtar Kelimeler: Hemiarthroplasti, kalça kırığı, rifamisin, cerrahi yara enfeksiyonu, femur boyun kırığı

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INTRODUCTION

Surgical wound infections are one of the most important postoperative problems that change the course of the disease after surgery and prevent healing (1). Surgical wound infections, especially in elderly patients with osteoporotic hemiarthroplasty, have emerged as the cause of more problematic cases. Mortality rate increases in elderly patients due to the presence of comorbidities, low physical capacity, prolonged hospital stay, and recurrent surgeries (2). In addition, decreased blood supply, additional diseases, and biofilm formation of implants in the elderly may facilitate the development of infection in the postoperative period (3). Antibiotic prophylaxis reduces the incidence of infection (4). In a study performed by Kerveshi et al. (5), they reported that infection rates decreased when they used amikacin sulfate by diluting in patients who underwent disc herniation operation. Cordero-Ampuero and de Dios (6) reported that prolonged wound discharge may lead to infection in the future. After orthopedic surgeries, irrigation is performed by applying various antibiotics such as rifamycin to washing fluids (7,8). Irrigation with saline is the most common form of irrigation. In this study, we aimed to reduce the risk of discharge and infection in the postoperative period by adding rifamycin (RIF) to the saline solution during irrigation or by applying RIF subcutaneously after fascial closure in patients undergoing hemiarthroplasty. The effect of RIF administration on wound discharge in the early postoperative period in patients who underwent hemiarthroplasty due to femoral neck fracture was investigated.

METHODS

After University of Health Sciences Türkiye, Bakırköy Dr. Sadi Konuk Training and Research Hospital Ethics Committee approval (decision no: 2015-16/08, date: 12.10.2015), medical records of patients who underwent hemiarthroplasty after femoral neck fracture between 2013 and 2015 were retrospectively reviewed. Patients who underwent osteosynthesis with cannulated or dynamic hip screws, who underwent total hip arthroplasty, who underwent irrigation due to infection after hemiarthroplasty, revision surgeries, and patients with insufficient medical knowledge were excluded from the study. Fifty eight patients (36 females, 22 males) who met the inclusion criteria were included in the study. Femoral neck fractures of the patients were classified according to the Garden classification.

Surgical Technique and Postoperative Care

A standard posterolateral incision approach was applied to the patients after general or regional anesthesia. After

passing through the skin, subcutaneous, and fascia, the trochanteric bursa was excised. The external rotators were suspended, and the capsule was reached and opened by a T-shaped incision. The femoral head was removed and the femoral canal and neck were prepared. After deciding on the appropriate size of the prosthesis, cemented hemiarthroplasty was performed. Soft tissue repair was performed anatomically. First-generation cephalosporins were administered 3x1 g in 24 hours postoperatively. Drains were removed once the drainage stopped or became less than about 25 mL/day. During the postoperative period, the discharge of the patients was monitored. Three groups were evaluated according to RIF administration or not during hemiarthroplasty. Subcutaneous RIF was treated in group 1 (Figure 1), saline alone (SF) in group 2, and RIF was added to the irrigation fluid in group 3 (SF + RIF). RIF is used only in perioperative. Group 1 was irrigated with saline and after the closure of the fascia, 500 mg RIF was added subcutaneously. Group 2 was irrigated with saline. Group 3 was irrigated with saline and added 500-mg RIF. Postoperative discharge time and discharge types of the patients in three groups were evaluated.

Statistical Analysis

NCSS (Number Cruncher Statistical System) 2007 (NCSS, LLC Kaysville, Utah, USA) was used for statistical analysis. Descriptive statistical methods (mean, standard deviation, median, frequency, and ratio) as well as quantitative data showing normal distribution were used to evaluate the study data. Kruskal-Wallis test and Mann-Whitney U test were used in the comparison of the groups that did not show the normal distribution and in the determination of the group causing the difference and in the evaluation of the two groups. Fisher-Freeman-Halton test was used to compare qualitative data. The results were evaluated with 95% confidence interval and $p < 0.05$ significance level.



Figure 1. Application of subcutaneous rifamycin

Table 1. Demographic and clinical characteristics of patients

	Min-max	Mean ± SD	
Age (years)	65-94	79.29±7.99	
Hospitalization (days)	5-33	16.94±6.71	
Duration of operation (minutes)	55-135	94.48±23.20	
Drain withdrawal time (hours)	20-48	26.86±5.88	
Postop wound discharge time	1-9	3.31±2.02	
Length of skin incision	8-23	17.03±2.61	
	n	%	
Irrigation type	RIF + SF	10	17.2
	Subcutaneous RIF	12	20.7
	Only SF	36	62.1
Age group	≤75 age	20	34.5
	>75 age	38	65.5
Gender	Female	36	62.1
	Male	22	37.9
Length of skin incision	≤16 cm	21	36.2
	17-18 cm	23	39.7
	>18 cm	14	24.1
DM	Yes	10	17.2
	No	48	82.8
Other additional diseases	Yes	42	72.4
	No	16	27.6

RIF: Rifamycin, SF: Saline, DM: Diabetes mellitus, Min-max: Minimum-maximum, SD: Standard deviation

RESULTS

Demographic and clinical characteristics of the patients are presented in Table 1. 17.2% (n=10) of the patients had RIF + SF irrigation, 20.7% (n=12) had subcutaneous RIF application, 62.1% (n=36) had SF irrigation. 17.2% (n=10) of the patients had diabetes mellitus (DM). There was a statistically significant difference between the age distributions of the groups ($p<0.05$). This is because the age of the patients who underwent subcutaneous RIF application was significantly higher than the RIF + SF irrigation group ($p=0.012$). There was no significant difference between the ages of the other groups ($p>0.05$). There was no statistically significant difference between the groups in terms of the hospitalization period ($p>0.05$).

The mean operation duration was 101.66 ± 15.27 minutes in patients with subcutaneous RIF application, 88.19 ± 25.24 minutes in patients with SF irrigation, and 107.68 ± 14.15 minutes in patients with RIF + SF irrigation. There was a

statistically significant difference between the groups in terms of operation duration ($p<0.05$) (Table 2). The operation duration of RIF + SF irrigation was significantly higher than that of SF irrigation ($p=0.037$). There was no statistically significant difference between the groups in terms of drain removal time, incision length, postoperative discharge time, comorbidities, and hospital stay ($p>0.05$) (Table 2). The duration of discharge was statistically significant according to age ($p<0.05$). The mean age of surgical wound discharge was significantly higher in patients older than 75 years ($p=0.02$) (Table 3). There was no statistically significant relationship between operation duration, incision length and additional diseases, and discharge time ($p>0.05$). It was observed that 75% of the patients did not contaminate the dressings after the 4th postoperative day.

DISCUSSION

Different antibiotics such as RIF have been used in the literature to prevent postoperative infections (9). Gentamicin, fusidic acid, and povidone-iodine are other known agents (10,11). RIF, gentamicin, fusidic acid, and high-pressure irrigation were applied against methicillin-sensitive Staf. In the study of Kaya et al. (9) consisting of 55 fresh frozen femoral head specimens (12). They found that RIF was more effective among the groups. RIF is a bactericidal agent that affects the beta subunit of RNA polymerase (13). To the best of our knowledge, this is the first study in the literature to compare RIF administration with SF and irrigation in patients with hemiarthroplasty due to femoral neck fracture. Wound infections after surgical incisions significantly affect the morbidity and mortality of the patient in the postoperative period (14). In our study, age was the most important criterion affecting discharge time. The duration of discharge was found to be more significant in patients over 75 years of age. There are different outcomes in the literature between age and sex and postoperative infection rates. Kurtz et al. (15) found that the infection rate was higher in males in their study, while Ridgeway et al. (16) found that the infection rate was higher in females and older ages. In our study, no difference was found between the genders in terms of the infection rate. There was no statistically significant difference in the postoperative discharge time of patients with additional disease.

In the present study, no significant difference was found between the duration of hospitalization, drain withdrawal time, incision length, and additional diseases such as DM and postoperative discharge time. Previous studies stated that prolonged surgical time increases surgical wound

Table 2. Comparison of perioperative parameters between groups

RIF + SF irrigation (n=10)		Groups			P
		Subcutaneous RIF (n=12)	Only SF irrigation (n=36)		
Age (years)	Mean ± SD	74.4±7.47	83.83±7.46	79.13±7.63	ª0.016*
	Min-max (median)	65-85 (73)	65-94 (85)	65-92 (77)	
Hospitalization	Mean ± SD	17.70±6.79	16.50±6.80	16.88±6.83	ª0.916
	Min-max (median)	6-27 (19)	8-32 (159)	5-33 (17,50)	
Duration of operation	Mean ± SD	107.68±14.15	101.66±15.27	88.19±25.24	ª0.048*
	Min-max (median)	90-135 (110)	65-120 (100)	55-135 (95)	
Drain withdrawal	Mean ± SD	27.40±6.25	26.25±7.55	26.91±5.29	ª0.667
	Min-max (median)	22-40 (25)	20-48 (24)	20-40 (26)	
Postop wound discharge time	Mean ± SD	2.77±1.48	3.25±2.00	3.47±2.17	ª0.658
	Min-max (median)	1-6 (2)	1-7 (3)	1-9 (3)	
Length of skin incision	Mean ± SD	17.70±3.05	15.50±3.58	17.36±1.91	ª0.067
	Min-max (median)	12-23 (18)	8-20 (16)	13-22 (17)	
DM	No	7 (70.0%)	9 (75.0%)	32 (88.9%)	ª0.254
	Yes	3 (30.0%)	3 (25.0%)	4 (11.1%)	
Another additional disease	No	2 (20.0%)	2 (16.7%)	12 (33.3%)	ª0.587
	Yes	8 (80.0%)	10 (83.3%)	24 (66.7%)	

ªOne-Way ANOVA test, ºKruskal-Wallis test, ºFisher-Freeman-Halton test, *p<0.05
RIF: Rifamycin, SF: Saline, DM: Diabetes mellitus, Min-max: Minimum-maximum, SD: Standard deviation

Table 3. The relationship between postop wound discharge time and other variables

Mean ± SD		Postop wound discharge time		p
		Median		
Age (years)	≤75 age	2.36±1.01	2.0	ª0.020*
	>75 age	3.78±2.24	3.5	
Length of skin incision	≤16 cm	3.33±2.33	2	ª0.828
	>18 cm	3.48±2.06	3	
DM	Yes	2.50±1.58	2.5	ª0.161
	No	3.49±2.08	3	

ªKruskal-Wallis test, ºMann-Whitney U test, *p<0.05
DM: Diabetes mellitus, SD: Standard deviation

infections (2,14). In our study, no correlation was found between operation duration and discharge time. Although it has been reported in many papers that additional diseases such as DM increase the infection rate, the mean discharge time of patients with and without DM was similar (17-19). Kerveshi et al. (5) reported that DM did not affect infection rates in postoperative lumbar disk hernias. In the current study, it was found that DM did not affect the discharge

time between the groups. In our study, no effect of DM on discharge time was found between the groups. There may not have been a statistically significant change, as there were 10 patients distributed across three subgroups, accounting for only 17.2% of patients. In addition, regulated DM and blood glucose levels under control may not increase the risk of infection, as supported by the literature. It is known that long-term wound discharge may lead to infection in the future and that discharges exceeding 10 days require infection parameters and/or culture follow-up (6,20,21). In this study, no significant difference was found between the wound discharge period. The mean operation duration of the RIF + SF irrigation group was longer. It was determined that surgeons preferred to add RIF to irrigation fluid during prolonged surgeries. The limitations of the study include the retrospective nature of the study, lack of randomization, non-homogenized subgroups (comorbidities, obesity, smoking history, etc.), lack of standardization during surgery (primary surgeon, surgical approach, team size, etc.), and small sample size. On the other hand, the strength of this study is that it is the first study to compare the RIF administration method with SF and irrigation in patients undergoing hemiarthroplasty for femoral neck fractures.

CONCLUSION

Additional and isolated RIF applications do not provide superiority in hip hemiarthroplasty. In addition, the duration of surgery was found to be longer in the RIF + SF group, and it was observed that surgeons tend to add RIF to SF in cases with longer operating times. Prospective randomized studies with larger patient groups are needed.

ETHICS

Ethics Committee Approval: After University of Health Sciences Türkiye, Bakırköy Dr. Sadi Konuk Training and Research Hospital Ethics Committee approval (decision no: 2015-16/08, date: 12.10.2015).

Informed Consent: Retrospective study.

Authorship Contributions

Surgical and Medical Practices: M.Ç., N.Z., A.B., Concept: M.Ç., Design: M.Ç., N.Z., Data Collection or Processing: M.Ç., A.B., Analysis or Interpretation: M.Ç., A.B., Literature Search: M.Ç., A.B., Writing: M.Ç., N.Z.

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