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Research Article

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Postoperative Healing in Renal Failure Patients after Teeth Extraction

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ABSTRACT

Aim: To compare the postoperative course between the CRF patients and the control group in terms of postoperative pain, bleeding, and healing.
Materials and Methods: Prospective cohort study. Study group: CRF patients referred for dental extraction who fit the inclusion criteria. Control group: healthy patients referred for teeth extraction. Perioperative management was recorded, and postoperative pain, bleeding, and healing were assessed on postoperative days 2, 4, and 7 as outcomes.
Results: forty patients were included in the study. Demographic variables were comparable between control and study patients; pain, bleeding, and healing were not statistically different between the two groups. Only the number of dialysis sessions per week was linked to improved healing in the study group.
Conclusion: When prophylactic antibiotic and local hemostatic measures are used in CRF patients undergoing extraction, postoperative healing is comparable with healthy controls. Within the CRF group number of hemodialysis sessions per week is linked to improved healing outcomes.

Key words: *CRF, CKD, teeth extraction, postoperative healing.*

INTRODUCTION

The kidney has a critical role in maintaining sodium balance and body fluid volume [1]. Chronic kidney disease (CKD) also called chronic renal failure (CRF) is defined as glomerular filtration rate (GFR) < 60 mL/minute/1.73 m^2 and/or markers of kidney damage, of at least of 3 months duration. Worldwide, CKD represents a major health crisis because it has elevated incidence during early and final (renal failure) phases, and also due to the elevation in hospital coasts beside improper response to the therapy [2, 3]. End-Stage Renal Disease (ESRD) is the last and final stage of CRF. The prevalence of CRF in Saudi Arabia was 5.7% in 2010 [4], however, it rose up to 9.4% in 2014 [5]; by the end of 2017 around 19,659 patients were on hemodialysis and peritoneal dialysis, of which 4,820 were new patients. The two main causes of renal failure among hemodialysis patients are diabetic nephropathy and hypertensive nephropathy. Moreover, around 82% of renal failure patients on dialysis have either hypertension (HTN), Diabetes Mellitus (DM) or both [6].

Over the years, the survival of renal failure patients has improved; advances in renal replacement therapy, transplant techniques, and antimicrobial therapy, has provided patients with the opportunity for survival in the face of a complete loss of renal function [7].

Given the increased prevalence of renal failure and the improved survival of these patients, it is expected that the number of CRF patients undergoing oral and maxillofacial surgery procedures will increase. Despite that CRF patients are considered to be in a hypercoagulable state they are still at risk of increased bleeding due to platelet

dysfunction and impaired platelet-vessel wall interaction [8]. Therefore, it is prudent for the maxillofacial Surgeon to be informed of the perioperative management of CRF patients.

The aim of this study is to present our experience in the perioperative management of CRF patients undergoing teeth extractions and compare the postoperative course between the CRF patients and the control group in terms of postoperative pain, bleeding and healing.

METHODS

The present work is a prospective cohort study based on patients suffering from CRF who are referred for dental extraction. The inclusion criteria were patients on maintenance dialysis therapy for at least one year and have one or more teeth indicated for extraction. Exclusion criteria involved patients known for either chronic diseases other than CRF or if they were on immunosuppressive therapy. Patients included in this study were divided into two groups as follows:

Group I (study group): Patients with CRF; a total of 25 patients were included.

Group II (control group): Consisted of 15 healthy patients who were selected with comparable age groups to the group I. They were all free from any systemic disease and they all had one or more teeth indicated for extraction.

A- **Perioperative management**

1. Study group patients were instructed to come for the procedure on the day following hemodialysis to ensure optimal correction of hydration, serum electrolytes, urea, nitrogen, creatinine, and coagulation effects, while the effect of heparin has worn off.
2. An intraoral clinical examination was carried out to assess the condition of the teeth and oral tissues.
3. Laboratory investigations: Complete blood count, prothrombin activity clotting and bleeding profiles were done on the day of the extraction. Hepatitis B surface antigen test was performed.
4. Radiographic examination: Panoramic and periapical x-ray were taken to depict the presence or absence of any associated pathology or abnormality that would complicate the procedure.
5. Prophylactic antibiotics: Erythromycin tablets 259 mg, 4 times/day, one day before extraction, on the day of extraction and the day following extraction.
6. Proper infection control measures and complete aseptic technique.
7. Monitoring blood pressure before, during and after extraction.

B- **Operative procedure**

After the use of antimicrobial oral rinse, amide-type of local anesthesia "xylocaine" was given in conservative doses. Extractions were performed as atraumatically as possible. The patients were kept under observation for 1 hour. If the bleeding was detected local measures such as Gelfoam and sutures were used to control the bleeding.

C- Outcome

Postoperative pain, bleeding, and healing were assessed on postoperative days 2, 4 and 7. Healing of the extraction wound was estimated by clinical examination of the wound for any disintegrated clot or wound dehiscence. The pain was assessed as a categorical variable with four levels; absent, mild, moderate و and severe. Bleeding was assessed as present whenever the patient experienced a bleeding event that required medical or surgical intervention. Teeth condition (carious, mobile, and missing) was also documented.

D- Statistical analysis

The data were analyzed using SPSS version 23. Simple descriptive statistics were utilized in the form of percentages to describe the data. Two group means were compared using a two-sample t-test. As for categorical variables the chi-square test was used to assess relationships between categorical variables. The 95% confidence interval was used and a *P*-value of less than 0.05 was considered significant.

RESULT

A total of 40 patients were included in the study. The Study group consisted of 25 patients, where the control group comprised 15 patients. Table 1 shows the patients' demographics and baseline characteristics. There was no statistical difference between the two groups in age and gender distribution, nor clotting time. However,

significantly lower Platelets count prothrombin activity, and prolonged bleeding time were noticed in CRF patients compared to controls. The most common cause of renal failure was hypertension followed by Chronic glomerulonephritis and the majority of the study subjects tested negative for hepatitis. There were significantly more missing and mobile teeth in the study group.

i) Postoperative pain

None of the control group patients have experienced any sever or moderate pain postoperatively compared to the study group where five patients reported severe and moderate pain on the postoperative day 2. However, this difference was not significant.

Table 1. Socio-demographic and Baseline characteristics.

Variables		Total	Control group N (%)	Study group N (%)	P value
		40	15 (37.5%)	25 (62.5%)	-
Age (Mean ± SD)		40	39.83 ± 6.71	41.62 ± 6.05	> 0.05
	30-34	9	5 (33.33%)	4 (16%)	
	35-39	8	2 (13.33%)	6 (24%)	
	40-44	7	3 (20%)	4 (16%)	
	45-50	16	5 (33.33%)	11 (44.5%)	
Gender	Male	24	9 (60%)	15 (60%)	> 0.05
	Female	16	6 (40%)	10 (40%)	
Cause of renal failure	Hypertension	-	-	10 (40%)	-
	Chronic glomerulonephritis			7 (28%)	
	Chronic pyelonephritis			3 (12%)	
	Bilateral polycystic kidneys			3 (12%)	
	Renal calculi			2 (8%)	
Maintenance hemodialysis duration	Less than 5 years	-	-	11 (44%)	-
	More than 5 years			4 (16%)	
Platelets count			230,000-350,000	140,000-245,000	< 0.05
Bleeding time (Mean ± SD)			2.31 ± 0.3348	3.16 ± 0.4654	< 0.05
Clotting time (Mean ± SD)			6.1 ± 0.78	6.23 ± 0.92	> 0.05
Prothrombin activity %			85.87 ± 12.6766	70.68 ± 8.8493	< 0.05
Hepatitis B HBsAg	Positive	-	0	5 (20%)	-
	Negative		15 (100%)	20 (80%)	
Teeth condition	Missing		5 (33.33%)	23 (92%)	< 0.05
	Mobile		2 (13.33%)	23 (92%)	< 0.05
	Carious		10 (66.67%)	10(40%)	> 0.05
Gingival color	Pallor		1 (6.67%)	18 (72%)	< 0.05
	Normal		10 (66.67%)	2 (8%)	

Table 2. Postoperative pain

Variables	Control group N = 15 (%)			Study group N =25 (%)			P value
Pain	POD 2	POD 4	POD 7	POD 2	POD4	POD 7	
Absent	14 (93.33%)	14 (93.33%)	15 (100%)	21 (84%)	21 (84%)	25 (100%)	> 0.05
Mild	0	1 (6.7%)	0	0	4 (16%)	0	> 0.05
Moderate	0	0	0	1 (4%)	0	0	> 0.05
Sever	1 (6.7%)	0	0	3 (12%)	0	0	> 0.05

ii) Postoperative bleeding

No bleeding complications were observed in any patient of the control group. While in the study group, despite the local hemostatic measures, blood oozing was noticed 2 hours after extraction in 3 patients but stopped after vitamin K injection.

iii) Postoperative healing

Postoperative healing was comparable between the two groups. However, within the study group, delayed healing was correlated with the number of hemodialysis (HD) sessions per week. Patients who underwent HD 3 times/week experienced no complications during the healing process when compared to patients who underwent HD only twice/ week.

Table 3. Postoperative healing

Variables	Control group N = 15 (%)			Study group N =25 (%)			P value
Postoperative healing	POD 2	POD 4	POD 7	POD 2	POD4	POD 7	
Complete healing	14 (93.33%)	14 (93.33%)	15 (100%)	21 (84%)	21 (84%)	25 (100%)	> 0.05
Incomplete healing	0	1 (6.7%)	0	0	4 (16%)	0	> 0.05
No healing	1 (6.7%)	0	0	4 (16%)	0	0	> 0.05

Table 4. Complications in healing in CKD patients in relation to no. of HD/week

Number of HD session/week	Total N=25	Uneventful healing	Delayed healing	P value
2 times	12	8 (66.66%)	4 (33.33%)	< 0.05
3 times	13	13 (100%)	0	

DISCUSSION

Results from the present study showed an increased number of missing and mobile teeth in renal failure patients rather than carious teeth. This is in support of the findings of Sakhaee et al [9] and Fletcher et al [10], it could be explained by the osteodystrophy caused by the renal disease which led to pathological mobility, drifting, and teeth loss.

However, the most striking feature was the gingival pallor which is consistent with previous reports [11, 12] advocating that it is a common finding reflecting the underlying anemia. This is further supported by Precious [13] and Westbrook [14] who reported that pallor of the oral mucosa with the diminished demarcation of the mucogingival junction is a classic oral manifestation in chronic HD.

Moreover, postoperative bleeding requiring medical intervention was encountered only in the study group. This could be attributed to thrombocytopenia and platelet dysfunction associated with CRF [8]. Our results revealed a significantly lower platelet count in the CRF group in comparison to healthy controls with prolonged bleeding time. Uremic toxins in CRF plays a major role in platelet dysfunction that results in impaired platelet adhesion and aggregation [15]. In this work patients' coagulation profile and platelet count were monitored preoperatively; such tests function as important guides for the dental practitioner regarding treatment planning and risk assessment for postoperative bleeding in CRF patients and should be obtained before executing any invasive procedure [16]. According to a recent review discussing hemostasis in renal failure patients [17], bleeding tendencies are attributed to physiologic disturbances in the platelet granules, dysregulated arachidonic acid and prostaglandin metabolism, and impaired synthesis or release of thromboxane A2. The end results of these platelet physiological impairments are decreased adhesion and aggregation of platelets that in turn results in increased bleeding risk. Local hemostatic measures help in managing postoperative bleeding in most cases in our experience, and it is rare when further measures are needed. Among the study group, we have noticed better postoperative healing in patients undergoing hemodialysis three times a week compared to patients undergoing dialysis only twice a week. This could be linked also to the accumulation of uremic toxins and BUN as the negative effect of uremia and infrequent dialysis is well documented in the literature [18, 19].

In the present study, 20% of patients in the study group were tested positive for HBV infection. The implication of HBV infection on the survival of renal dialysis patients is very minimal and most patients become

asymptomatic chronic carriers [20]. The prevalence of HBV infection in hemodialysis patients varies from one geographical area to another depending on whether the virus is an endemic or not. Middle East is considered an area of low–intermediate endemicity according to the WHO [21]. In KSA, HBV has a prevalence of 3.2% [22]. The high prevalence of HBV in the study group could be explained by the high-risk status of the subjects involved to acquire the disease due to frequent manipulation of their hematological system, and a large number of blood transfusions required by most dialysis patients and altered immune response to hepatitis B virus infection [23].

CONCLUSION

In conclusion, using prophylactic antibiotics (dose adjusted by nephrologist) and local hemostatic measures equalizes the risk of comorbidities post-extraction between CRF patients on hemodialysis and healthy controls. Moreover, among patients on hemodialysis, the main factors contributed to the uneventful postoperative healing process was the number of hemodialysis sessions per week.

Disclaimers

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