Original Article

COMPARISION OF HEALING OF THE EXTRACTION SOCKET IN DIABETIC VS NON-DIABETIC PATIENTS

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ABSTRACT

Objective: *To compare the healing of the extraction socket following dental extraction in diabetic versus non-diabetic patients.*

Material and Methods: *This prospective clinical trial consists of two hundred patients that were recruited into two groups having 100 known diabetic (type 1 and type 2) and 100 non-diabetic. All Patients above ten years and both genders were included in this study through consecutive sampling. Patients with any other systemic illness and those on anticoagulants and steroids were excluded from the study. Atraumatic extraction was carried out for all patients under aseptic conditions, and these patients were recalled after one week for a clinical and radiological examination of the extraction socket assess its healing status.*

Results: *Out of total 200 patients n=95 (47.5%) were males and n=105 (52.5%) females. The mean age was 35.47±10.03 years. Among total 100 diabetic patients, 61 had controlled diabetes and n=39 had uncontrolled diabetes. Diabetic patients had significant greator abnormal healing of the extraction sockets than in non-diabetic patients (p=0.000). The frequency of non-healing of the extraction socket among Type 1 diabetic patients was more (38%) as compared to type 2 (2%) (p=0.000). Similarly, non-healing of the extraction sockets was seen more in uncontrolled than controlled cases of diabetes mellitus which was also statistically significant (p-value=0.003). Dry socket (alveolar osteitis) was observed as common feature in abnormal healing.*

Conclusions: *Type 2 diabetic patients had a normal pattern of healing of the extraction sockets, while uncontrolled cases of type 1 diabetes had significantly abnormal healing.*

Keywords: *Extraction, socket healing, Delayed healing, Diabetes Mellitus.*

INTRODUCTION

Diabetes mellitus is a common metabolic disorder where the body is poor in regulating blood glucose level due to an Absolute insulin deficiency (Decreased production of insulin; Type 1 diabetes) or Relative insulin deficiency (increased resistance to insulin by the tissues; Type 2 diabetes).[1] Chronic hyperglycemia in diabetes mellitus is dangerous and may derange the functions of various vital organs of the body including nervous system (neuropathies); eyes (retinopathy); an orogastric system with increased periodontitis, chronic stomatitis; cardiovascular diseases including ischemic heart diseases, micro and macrovasculopathies; kidneys (nephropathies) and extremities (gangrenous necrosis)[2].

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The normal socket healing after tooth extraction proceeds with blood clot formation that organizes into granulation tissue which is replaced by connective tissue that transforms into woven bone that matures into a lamellar bone.[3] Provisional connective tissue formation can be seen consistently within the first week of healing, but less bone formation occurs during this time.[4]

Delayed and nonhealing of soft and hard tissues of the body are well-known complications of oral surgeries in diabetic patients. Therefore, it is very difficult to manage these patients undergoing oral surgeries including extraction procedures.[5] Mozzati M. et al. reported a delay in healing of oral wounds in diabetic patients is due to sluggish blood flow (due to increased viscosity of blood and thickening of the vessels wall), low growth factors and antibodies production (less protein is available for them as protein is mostly utilized for energy consumption in these patients), question-

able immunity, poor angiogenesis and psychological stress.[6] Kolluru G K. also reported chronic Hyperglycemia as causing leukocytes dysfunction (neutrophils chemotaxis defect) and delayed healing potentials.[8] Priya BM categorized complications in diabetic as microvascular, macrovascular and neuropathic.[9] Thickening of the basement membrane of the capillaries results in microcirculatory deficiencies and altered permeability with the poor migration of leucocytes and more chances of infections in diabetic patients. Poor tissue nutrition and waste products removed from the wound site due to abnormal microcirculation are other causes of poor wound healing in diabetic patients as reported by Gould L. et al.[10]

Aggressive periodontitis more carries and poor oral hygiene in diabetic patients prone them comparatively more to dental extraction and delayed / nonhealing of these oral wounds.[9] Extraction of teeth is one of the commonest oral surgical procedures in this medically compromised condition as reported by Pacheco-Vergara M J.[7]

Alveolar osteitis [16], Suppurative osteitis[17], Gangrenous osteitis and cellulitis.[18] are the most common complications that are responsible for the abnormal healing of the tooth socket.

Literature shows that most of the abnormal healing of extraction socket among diabetic patients is seen in uncontrolled type 1 diabetes. Huang et al.[5] conducted a study on Australian population to determine whether there was a difference in delayed healing following dental extractions for Type 2 diabetics on oral hypoglycemic and non-diabetic patients. They reported that Type 2 diabetics on oral hypoglycemic should be treated the same as non-diabetic patients for extractions.

There is scarce of literature on the healing of extraction socket in diabetic patients in Pakistan. So this study will be helpful to know the healing outcome in diabetic patients after extraction. The objective of this study was to compare the healing of the extraction socket in diabetic vs. non-diabetic patients.

MATERIAL AND METHODS

This prospective clinical trial was performed in the Oral and Maxillofacial surgery department, Khyber College of Dentistry, Peshawar from August 2016 to September 2017. We selected 200 patients through consecutive sampling for this study. Out of these 200 selected patients, 100 were diabetics, and 100 were non-diabetics. Appropriate ethical approval was obtained from the hospital authorities. Pakistan origin patients aged 15-80 years of both gender were included in the study. Patients with any other systemic illness and those patients on anticoagulants and steroids were excluded from the study.

Random blood sugar was performed on all patients with positive history of diabetes. 200 mg/ dl was the upper limit, and all patients above this level of blood glucose level were postponed with a written referral to a physician for management. A random blood sugar level of up to 170mg/ dl to 180mg/dl was considered as controlled level and a blood glucose level above 180mg/dl as uncontrolled diabetes mellitus. A thorough history was taken. A comprehensive clinical examination was carried out. Verbal consent was taken before the start of the procedure; vital signs were monitored. Patients well oriented in time and space were given local anesthetic 2% lidocaine with 1:80000 adrenaline. Atraumatic extraction was carried out under proper anxiety reduction protocol. The socket was squeezed with gentle manual pressure between thumb and 1st two fingers to reduce greenstick fracture of the buccal cortex, to achieve hemostasis, and to promote healing by bringing the margins of extraction socket closer. Proper post-operative instructions, painkillers, and antibiotics were advised. Patients were recalled after one week for a clinical and radiological examination of the extraction socket to know about the healing status. Data were analyzed using SPSS Version 20. Descriptive statistics like frequency and percentages were calculated for gender, type of extracted tooth, quadrant of the extracted tooth, the status of diabetes, controlled/uncontrolled, healing of extraction site (normal or abnormal). Mean, and the standard deviation was calculated for age. Chi-square test was applied to compare healing of extraction socket between diabetic and non-diabetic patients. P value < 0.05 was considered significant.

RESULTS

Out of total 200 patients, 95 (47.5%) were males and 105 (52.5%) females. The mean age was 35.47 ± 10.03 years. The age range was from 17 to 72 years. One hundred were diabetic patients, and 100 were non-diabetic patients. Among diabetic patients, 50 were type 1, and 50 were type 2. Out of 200, the abnormal healing (non healing) of extraction was found

in 40 (20%) cases. Among 100 diabetic patients, 61 had controlled diabetes, and 39 had uncontrolled diabetes. The maximum number of cases (36%) belonged to 21-30 years group followed by 31 to 40 years (41%). The details of the age distribution are given in Table 1. The patterns of extraction in different quadrants showed that the most frequent quadrant was lower left (64%), followed by upper right (16%).The details are given in Table 2. The most common extracted tooth was first molar (31%) followed by 2nd molar (29%). The central incisor the was least extracted tooth (2 %). The details are depicted in Table 3. Diabetic patients had statistically more abnormal healing of the extraction socket than in non-diabetic patients; the P value was 0.001. The healing status of extraction socket in diabetic was abnormal in 40% cases, while in non-diabetic 2% cases (Table 4). The frequency of non-healing of the extraction socket was more in Type 1 diabetic patients (38%) than in type 2 (2%). This was statistically significant (P value 0.000). The details are given in Table 5. Non-healing of the extraction socket was more in uncontrolled than controlled cases of diabetes (P=0.003). Among 42% of total abnormal cases, 33% had developed alveolar osteitis, 6% had suppurative osteitis, 2% had gangrenous osteitis and 1% had developed severe cellulitis (Table 6).

DISCUSSION

Table 1: Age distribution of the diabetic and non-diabetic patients.

Age (years)	Frequency	Percent
10-20	1	0.5%
21-30	72	36.0%
31-40	83	41.5%
41-50	24	12.0%
51-60	11	5.5%
61-75	9	4.5%
Total	200	100.0%

Table 2: Frequency of the quadrant involved in tooth extraction.

Quadrant of extraction	Frequency	Percent
Lower Left	129	64.5%
Lower right	33	16.5%
Upper left	26	13%
Upper right	12	6%
Total	200	100%

Table 3: Patterns of extracted teeth.

Tooth Extracted	Frequency	Percent
1st molar	62	31%
2nd molar	58	29%
3rd molar	32	16%
1st premolar	16	8.0%
2nd premolar	15	7.5%
Lateral incisor	9	4.5%
Canine	5	2.5%
Central incisor	3	1.5%
Total	200	100.0%

Table 4: Comparison of healing of extraction socket in diabetic versus non-diabetic.

Diabetes status	Status of extraction socket			
	Normal healing		Abnormal healing	
	Count	%	Count	%
Diabetic	60	60%	40	40%
non-diabetic	98	98%	2	2%

Chi-square test=43.520, df=1, p-value=0.000

Table 5: Comparison of healing of extraction socket in type 1 versus type 2 diabetes.

Type of diabetes	Status of extraction socket			
	Normal healing		Abnormal healing	
	Count	%	Count	%
Type 1	12	12.0%	38	38.0%
Type 2	48	48.0%	2	2.0%

Chi-square test=54.000, df=1, p-value=0.001

Table 6: Complications resulting in abnormal healing of extraction sockets.

Complications	Number of patients	Percent
Alveolar Osteitis	66	33%
Suppurative Osteitis	12	6%
Gangrenous Osteitis	4	2%
Cellulitis	2	1%
Total	84	42%

More diabetic patients were presented to oral surgeons for extraction of teeth as compared to non-diabetic patients.[11] This may be related to their high prevalence to oro-dental infection and poor immunity. Extraction sites in diabetic patients most often have abnormal healing as they have more chances of dental infections.[3] Considering the above statements, the current study was performed on diabetic patients. In this study, equal sample of diabetic and non-diabetic patients were selected, divided into equal number of patients. Diabetics were grouped into two, 50 type 1

and 50 type 2. This sampling was selected to ensure adequate comparison. In the present study, out of total 100 diabetic patients, n=61 patients had controlled diabetes and n=39 had uncontrolled diabetes. Alemany et al[12] carried out a study on the incidence of diabetes mellitus type 2 complications in Saudi Population. They reported about 44% of the diabetic patients had uncontrolled diabetes. Their results are consistent with the current above study.

In our study, most of the patients presented for extraction of the lower first molars. This may be due to earlier eruption of permanent first molar , at around 6 years of age. At this age children are less careful towards their oral hygiene, and their first molars are more prone to caries and need extraction.[13]

The present study showed that diabetic patients had statistically more abnormal healing of extraction socket than in non-diabetic patients ($P < 0.05$). But the non-healing socket was mostly seen in all type 1 diabetic patients. Huang et al.[5] determined whether there was a difference in delayed healing following dental extractions for Type 2 diabetics on oral hypoglycemics. They reported that type 2 diabetics heal normally after tooth extraction. Their results are consistent with our results. But our results are in contrast with the study of Fernandes S K [20], who reported an increase chance of abnormal healing in type 2 diabetes.

Karbassi et al.[14] conducted a study on 80 diabetics (type 2) and 80 non-diabetic patients in Yazd Dental School. All patients had a posterior tooth extraction. Lack of healing was studied at the end of the 7th day after extraction. They reported that healing of the extraction socket in type 2 diabetic patients was as normal as in a non-diabetic group of patients ($P > 0.1$). In another study, Devlin et al.[15] reported that blood clot and granulation tissues formed in dental sockets after extraction in uncontrolled insulin-dependent diabetes is weaker, and there is more chance of alveolar destruction in these medically compromised patients.

Dry socket (33%), Suppurative osteitis (6%), Gangrenous osteitis (2%) and cellulitis (1%) were the responsible complications of abnormal bone healing of extraction socket in this study. Our results are in contrary to the study by Chandran S et al. where the total incidence of the dry socket was 5.4%. A gross increase in a dry socket in our study is probably bec ause the study was carried out in diabetic patients including uncontrolled type1 diabetes and also by the fact that extraction of 3rd molars was also carried out in our study.

CONCLUSION

1. In Type 2 diabetes, the extraction healed normally and was safe for extraction up to a random blood glucose level of 200 mg/dl.

2. Most of the non-healing cases were noted in Uncontrolled Type 1 diabetes.

3. Alveolar osteitis (Dry socket), Suppurative osteitis, Gangrenous osteitis, and Cellulitis were the complications associated with abnormal extraction sockets healing.

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