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Outcome of Elective Surgery in Patients with Controlled Diabetes versus Non-Diabetic Patients

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ABSTRACT

Objective: To assess the outcome of elective surgery in patients with controlled type II diabetes versus patients without any diabetes

Study Design: Prospective Comparative Study.

Place and Duration of Study: Combined Military Hospital, Rawalpindi Pakistan, Mar 2020 to May 2021.

Methodology: A prospective study was conducted on 400 patients undergoing elective surgery at surgical unit of combined military hospital Rawalpindi during the study period. They were divided into two groups. One with controlled type II diabetes mellitus and other without type II diabetes mellitus. Patients were followed up for one month to look for the complications. Presence of surgical site infections, seroma formation, abscess formation and wound dehiscence were compared in both the groups.

Results: A total of 400 patients who met the criteria for this study underwent elective surgeries during the study period. Mean age of patients who underwent the surgery 39.93±8.455 years. Out of 400, 296(74%) were male while 104(26%) were female. 261(65.25%) had no diabetes while 139(34.75%) had controlled diabetes. Abscess formation and wound dehiscence were the complications found statistically significantly more among the patients who had controlled diabetes mellitus as compared to those not having diabetes mellitus (p-value<0.05).

Conclusion: Patients undergoing elective surgery though did not have much serious complications but still the patients having diabetes mellitus even well controlled at the time of surgery were more at risk of post-surgical complications like abscess formation and wound dehiscence.

Keywords: Complications, Elective Surgery, Type 2 Diabetes Mellitus.

How to Cite This Article: *Tariq SH, Sheikh IA, Asif M, Masud M, Tariq SZ, Masud AB. Outcome of Elective Surgery in Patients with Controlled Diabetes versus Non-Diabetic Patients. Pak Armed Forces Med J 2025; 75(Suppl-5): S665-S668. DOI: https://doi.org/10.51253/pafmj.v75iSUPPL-5.7010*

INTRODUCTION

Elective surgeries involve all the regions of body and usually well planned and coordinated in all the surgical units of secondary or tertiary care centers.[1] Due to their elective status, usually all parameters which could lead to peri or post-surgical complications are controlled to the best extent and recovery in most cases occurs within days to weeks without any significant complications.[2,3] Bleeding, wound herniation, wound infection and seroma formation are some of the common complications encountered by surgeons even after the clean and uneventful surgeries.[4] Systemic illnesses including diabetes predispose the individual towards the wound complications undergoing the various types of surgeries.[5] Control of diabetes is an additional factor in this regard which may influence the post-surgical recovery.[6]

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Received: 03 Jul 2021; revision received: 13 May 2022; accepted: 14 Jun 2022

Type II diabetes has been an area of interest for surgeons in relation to complications it may produce in patients undergoing various surgical procedures. A study was published in 1983 in USA which concluded that those patients suffering from diabetes mellitus were at a greater risk of developing the post-operative complications as compared to those who were not suffering from this metabolic condition.[7] A recent paper highlighted the importance of control of diabetes in the patients suffering from this condition in relation to post-operative complications.[8] Data from our neighboring country India was not different as well. Mangrulkar *et al.*, in 2009 came up with the findings that patients undergoing elective surgeries were more at risk of wound complications if they ha type II diabetes mellitus as compared to those who did not have this chronic metabolic condition.[9]

Whole effort of surgical team gets destroyed if patient develops any serious complications after the surgery. Even if the complications are minor it poses a lot of burden on patient and health care system.

Prevention of these complications involves less effort and money as compared to treatment. Complication rate of surgeries is considerable in our part of the world affecting the quality of life of patients as well as involve extra effort from the treating team.[10] We therefore planned to identify one of the risk factors and planned this study with the rationale to assess the outcome of elective surgery in patients with controlled type II diabetes versus patients without any diabetes.

METHODOLOGY

This prospective comparative study was conducted at the surgical department of combined military hospital Rawalpindi from March 2020 to May 2021. Sample size was calculated by WHO Sample Size Calculator by using population prevalence of complications of surgery in patients with type II diabetes mellitus as 7.7%.[11] Non probability Consecutive sampling technique was used to gather the sample.

Inclusion Criteria: The patients between the age of 18 and 65 years who underwent procedures of general surgery under general anesthesia for not more than 90 minutes with uneventful surgery were included in the study.

Exclusion Criteria: Patients with any pre-existing cardiac, pulmonary renal or hepatic disease were excluded from the study. Patients with poor control of diabetes (HbA1C>7%) were excluded as well. Patients with history of sepsis 48 hour prior to surgery or not having clean or clean contaminated surgical wound were also excluded from the study. Patients undergoing cardiac or oncological procedures or those having any autoimmune disorder or were taking steroids or any cytotoxic drugs were not included in the analysis.

After ethical approval from the ethical review board committee (letter no: 163/6/21) and written informed consent from potential participants, patients undergoing surgery at surgical unit of CMH RWP fulfilling the above mentioned inclusion and exclusion criteria were included in the study. Type 2 DM diagnosis was confirmed by a consultant medical specialist and patients with controlled diabetes (HbA1C<7%)[12] were included in the study. All types of routine surgical procedures surgeries were included in the analysis. Antibiotic and anesthesia protocol also remained same for all the patients. Patients were discharged from hospital according to their clinical condition. They were followed up for four weeks to look for the post-operative complications like abscess formation, seroma formation, surgical site infection and wound dehiscence. The presence of these complications was compared in patients without diabetes and with controlled diabetes.

All statistical analysis was performed by using the Statistics Package for Social Sciences version 24.0 (SPSS-24.0). Frequency and percentages for gender, patients with controlled diabetes and all the complications were recorded during the study. Mean and standard deviation for age was also calculated for the study participants. Comparison of complications in both groups (with controlled diabetes and without diabetes) was done by using the Pearson chi-square test and keeping *p*-value less than or equal to 0.05 as significant.

RESULTS

A total of 400 patients who met the criteria for this study underwent elective surgeries during the study period. Mean age of patients who underwent the surgery 39.93±8.455 years. Out of 400, 296(74%) were male while 104(26%) were female. 261 (65.25%) had no diabetes while 139(34.75%) had controlled diabetes. Table-I showed the general characteristics of the patients. Cholecystectomy 126(31.5%) was the most commonly performed surgery followed by hernioplasty 77(19.25%). Superficial incisional surgical site infection 38(9.5%) was the commonest complication followed by seroma formation 29(7.25%).

Table-I: Characteristics of Study Participants

Study parameters	n(%)
Age (years)	
Mean+SD	39.93±8.455
Range (min-max)	19 years - 64 years
Gender	
Male	296(63.4%)
Female	104(36.6%)
Diabetes status	
Non diabetic	296(74%)
Controlled diabetes mellitus	104(26%)
Surgeries performed	
Lap/ Open cholecystectomy	126(31.5%)
Hernioplasty	77(19.25%)
Laparotomy	75(18.75%)
Modified radical mastectomy	72(18%)
Thyroid Surgeries	29(7.25%)
Others	21(5.25%)
Wound complications	
Superficial incisional SSI	38(9.5%)
Seroma formation	29(7.25%)
Abscess formation	25(6.25%)
Wound dehiscence	28(7%)
Others	09(2.25%)

Table-II showed the results of statistical analysis. Abscess formation (*p*-value-0.0125) and wound

dehiscence (*p*-value<0.001) were the complications found statistically significantly more among the patients who had controlled diabetes mellitus as compared to those not having diabetes mellitus while seroma formation (*p*-value-0.120) and surgical site infection (*p*-value-0.181) were not found statistically different in both the groups.

Table-II: Comparison of Complications between two Groups

Socio-demographic factors	Patients without diabetes	Patients with controlled diabetes	*p*-value
Seroma formation			
No	246(94.2%)	125(89.9%)	0.120
Yes	15(5.8%)	14(10.1%)	
Abscess formation			
No	250(95.8%)	125(89.9%)	0.025
Yes	11(4.2%)	14(10.1%)	
Wound dehiscence			
No	253(96.9%)	119(85.6%)	<0.001
Yes	08(3.1%)	20(14.4%)	
Surgical site infection			
No	240(91.9%)	122(87.7%)	0.181
Yes	21(8.1%)	17(12.3%)	

DISCUSSION

Diabetes Mellitus is a metabolic disorder affecting almost all systems of the body. Type II DM is a highly prevalent condition in our part of the world and around 1 out of 5 individuals in Pakistan has the chances of having this condition.[13,14] Medical professionals usually consider that well controlled diabetes mellitus doesn't cause much harm and end organ damage is minimum with good control of blood sugars. Alongside medical complications, patients undergoing surgical procedures are also at high risk for adverse effects if they are suffering from any systemic illness like Type II DM. We planned this study to look for the impact of well controlled diabetes on outcome of surgical procedures and compared it with the outcome in patients without having any such condition.

Lin *et al.,* in 2020 published a retrospective cohort study with an aim to look for the outcomes after surgery in patients with diabetes who used metformin.[15] They came up with the conclusion that among patients with diabetes mellitus, those who used metformin and underwent major surgery had a lower risk of complications and mortality compared with non-users. We did not study the type of treatment patients were getting to manage diabetes but concluded that patients with well controlled diabetes were more at risk of having post-surgical complications as compared to those who were not having diabetes mellitus.

Alfonso *et al.,* in 2019 published a study to examine the impact of diabetes on postoperative outcomes following surgical management of pressure ulcers using the American College of Surgeons National Surgical Quality Improvement Program database.[16] They concluded that wound dehiscence was found more in patients with diabetes mellitus and they warrant aggressive management strategies in this regard to prevent this complication. Our results supported the findings generated by Alfonso *et al.,* as wound dehiscence was a complication found significantly more among patients suffering from diabetes mellitus as compared to those who did not have this illness.

Surgical wound dehiscence with comorbid serious surgical site infection among the patients of diabetes was studied by Zardi *et al.,* in 2020.[17] They came up with the conclusion that team work and aggressive management and prevention strategies should be implied in patients having diabetes mellitus and undergoing elective surgeries. Wound dehiscence was not a very common complication found in our patients but still it was found more in patients with diabetes mellitus as compared to those who were not having this condition.

Kowan *et al.,* published a report in 2013 and emphasized on importance of perioperative glycemic control in general surgery.[18] They found out that irrespective of diabetes status; presence of hyperglycemia before, during or after the surgery was associated significantly with poor outcome. We studied same phenomenon from another perspective and concluded that no matter I the patient is having controlled diabetes, it still exerts negative impact on surgical outcome and may be due to unchecked hyperglycemic episodes around the time of surgery.

LIMITATION OF STUDY

The major limitation of our study is the lack of generalizability as patients from one surgical unit of a military hospital of Pakistan were studied instead of all hospitals of the country. Methodological issues due to study design also hinders in generalizability of results. Patients taking oral hypoglycemic and insulin should have been classed separately to look for outcome in each group. Immediate glycemic control prior to the surgery should also have been taken into account because that may also impact the surgical outcome.

CONCLUSION

Patients undergoing elective surgery though did not have much serious complications but still the patients having diabetes mellitus even well controlled at the time of surgery were more at risk of post-surgical complications like abscess formation and wound dehiscence.

Conflict of Interest: None.

Funding Source: None.

Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

SHT & IAS: Data acquisition, data analysis, critical review, approval of the final version to be published.

MA & MM: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

SZT & ABM: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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