Original Research

Evaluation of Postoperative Adverse Events in Diabetic Patients Undergoing Orthopedic and General Surgeries: An Institutional Based Study

Adey Aravind¹, Abhiram B.H.², T. Narayana Raju³, Pradeep Kumar. N⁴

¹Associate Professor, Department of Orthopaedics, Gouri Devi Institute of Medical Sciences & Hospital, Durgapur, West Bengal, India.

²Associate Professor, Department of Orthopaedics, Gouri Devi Institute of Medical Sciences & Hospital, Durgapur, West Bengal, India.

³Assistant Professor, Department of General Surgery, Katuri Medical College and Hospital, Guntur, Andhra Pradesh, India.

⁴Assistant Professor, Department of General Surgery, Surabhi Institute of Medical Sciences, Mittapally, Siddipet, Telangana, India.

Corresponding Author

Pradeep Kumar. N

Assistant Professor, Department of General Surgery, Surabhi Institute of Medical Sciences, Mittapally, Siddipet, Telangana, India.

Received: 02 October, 2022

Accepted: 13 November, 2022

ABSTRACT

Background: Diabetes can affect many different organ systems in the body and, over time, can lead to serious complications. Surgical patients with DM are estimated to utilize 45% excess bed days compared to people without DM admitted to medical wards. In diabetic patients undergoing non-cardiac general surgery, the peri-operative mortality rate is significantly higher than the mortality seen in patients without DM. Hence, this study was conducted to assess the postoperative adverse events in diabetic patients undergoing orthopedic and general surgeries. Materials and Methods: A total of 200 subjects with presence of type 2 diabetes mellitus were enrolled. Complete demographic and clinical details of all the subjects was obtained. A Performa was made and diabetes related history of all the patients was recorded. Inclusion criteria for the present study included type 2 diabetic patients scheduled to undergo orthopaedic or general surgical procedures. All the patients were recalled in morning on the day of surgery and complete biochemical and haematological profile was evaluated. Postoperative follow-up was done and occurrence of postoperative adverse effects were males while the remaining were females. Overall, incidence of postoperative adverse events was 74 percent. While analysing the correlation of HbA1c with incidence of postoperative adverse events was significantly higher among patients with higher HbA1c values.

Keywords: Diabetes, Adverse events, Surgery.

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INTRODUCTION

Diabetes mellitus is a group of metabolic diseases characterized by hyperglycaemia resulting from defects in insulin secretion, insulin action, or both. Several pathogenic processes are involved in the development of diabetes. These range from autoimmune destruction of the β -cells of the pancreas with consequent insulin deficiency to abnormalities that result in resistance to insulin action. The basis of the abnormalities in carbohydrate, fat, and protein metabolism in diabetes is deficient action of insulin on target tissues. Deficient insulin action results from inadequate insulin secretion and/or diminished tissue responses to insulin at one or more points in the complex pathways of hormone action. Impairment of insulin secretion and defects in insulin action frequently coexist in the same patient, and it is often unclear which abnormality, if either alone, is the primary cause of the hyperglycaemia.¹⁻³ Diabetes can affect many different organ systems in the body and, over time, can lead to serious complications. Complications from diabetes can be classified as microvascular or macrovascular. Microvascular complications include nervous system damage (neuropathy), renal system damage (nephropathy) and (retinopathy).⁴ eve damage Macrovascular complications include cardiovascular disease, stroke, and peripheral vascular disease. Peripheral vascular disease may lead to bruises or injuries that do not heal, gangrene, and, ultimately, amputation.^{5, 6} Significant alterations in glucose metabolism occur during periods of heightened stress such as major surgery, trauma and sepsis. It has been reported that diabetic patients undergoing surgery are at risk for increased morbidity and longer hospital stays. Surgical patients with DM are estimated to utilize 45% excess bed days compared to people without DM admitted to medical wards. In diabetic patients undergoing non-cardiac general surgery, the perioperative mortality rate is significantly higher than the mortality seen in patients without DM.6, 7Hence, this study was conducted to assess the postoperative adverse events in diabetic patients undergoing orthopedic and general surgeries.

MATERIALS AND METHODS

A total of 200 subjects with presence of type 2 diabetes mellitus enrolled. Complete were

demographic and clinical details of all the subjects was obtained. A Performa was made and diabetes related history of all the patients was recorded. Inclusion criteria for the present study included type 2 diabetic patients scheduled to undergo orthopaedic or general surgical procedures. All the patients were recalled in morning on the day of surgery and complete biochemical and haematological profile was evaluated. Postoperative follow-up was done, and occurrence of postoperative adverse effects were recorded separately. All the results were recorded in Microsoft excel sheet and was subjected to statistical analysis.

RESULTS

Mean age of the patients was 48.3 years. Out of 200 patients, 134 patients were males while the remaining were females. Overall, incidence of postoperative adverse events was 74 percent. While analysing the correlation of HbA1c with incidence of postoperative adverse events was significantly higher among patients with higher HbA1c values.

Postonerative adverse events	Number of subjects	Percentage
Delayed extubation	101	50.5
Respiratory abnormalities	30	15
Circulatory defects	23	12.5
Non healing incision	29	14.5
Infections of other sites	25	12.5
Death	8	4
Overall incidence of postoperative adverse events	148	74

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Lable 2:	Correlation of	postoperative	auverse evenus	and moate levels

HbA1c (%)	Postoperative adverse events present	Postoperative adverse events absent	
Mean	11.3	9.1	
SD	2.8	2.1	
p-value	0.001 (Significant)		

DISCUSSION

Diabetes mellitus is a group of metabolic diseases characterized by chronic hyperglycemia resulting from defects in insulin secretion, insulin action, or both. Metabolic abnormalities in carbohydrates, lipids, and proteins result from the importance of insulin as an anabolic hormone. Low levels of insulin to achieve adequate response and/or insulin resistance of target tissues, mainly skeletal muscles, adipose tissue, and to a lesser extent, liver, at the level of insulin receptors, signal transduction system, and/or effector enzymes or genes are responsible for these metabolic abnormalities. Almost 80% of the total adult diabetics are in developing countries. The regions with the highest rates are the Eastern Mediterranean and Middle East, where 9.2 % of the adult population is affected, and North America (8.4%). The highest numbers, however, are found in the Western Pacific, where some 67 million people have Diabetes,

followed by Europe with 53 million. India leads the global top ten in terms of the highest number of people with diabetes with a current figure of 40.9 million, followed by China with 39.8 million. Behind them come USA; Russia; Germany; Japan; Pakistan; Brazil; Mexico and Egypt.⁷⁻¹⁰ Hence, this study was conducted to assess the Postoperative adverse events in patients with diabetes undergoing orthopaedic and general surgery. Mean age of the patients was 48.3 years. Out of 200 patients, 134 patients were males while the remaining were females. Overall, incidence of postoperative adverse events was 74 percent. While analysing the correlation of HbA1c with incidence of postoperative adverse events was significantly higher among patients with higher HbA1c values. Tao LS et al attempted to identify predictors of postoperative cardiac and noncardiac complications in diabetic patients undergoing elective general surgery. A cohort of 107 diabetic patients undergoing elective surgery

was assembled. Basic demographic and clinical data were recorded perioperatively, and all patients were followed up prospectively daily for 7 days postoperatively. Patients were interviewed at 5 years postoperatively. Total cardiac complications and myocardial infarction were predicted by the Goldman index. Wound complications were not predicted by any of the variables studied. At 5 years postoperatively, cardiac and vascular deaths and events were predicted by age, history of myocardial infarction or stroke, presence of vascular disease, Goldman index, duration of diabetes or hypertension, Charlson comorbidity score, and postoperative myocardial infarction or cardiac arrest. Blood sugar control during surgery was not predictive of any short- or long-term cardiovascular complications. Total cardiac complications had a significant preoperative predictor: the Goldman index. Both preoperative and postoperative variables and indices cardiac predicted long-term and vascular complications.¹¹ Filimonov A et al analyzed postoperative complications of total laryngectomies (TL) in patients with diabetes mellitus and apply these data toward preoperative management of diabetic patients undergoing TL. Following propensity matching there were 495 TL patients included in this study. Among these, 110 (22.2%) were diabetic and 385 (77.8%)were nondiabetic. The only comorbidities associated with the diabetic cohort after matching were obesity, previous percutaneous coronary intervention, and hypertension. The rates of superficial surgical site infections were higher in the diabetic patient cohort (10.9% vs. 4.7%, P = .022). There were no significant differences in unplanned readmission (12.7% vs. 9.1%, P = .260), reoperation (14.3% vs. 15.1%, P = .864), and mortality (1.8% vs. 2.6%, P = 1.000) between the diabetic and the nondiabetic groups. Multivariate regression utilizing preoperative variables not accounted for by propensity matching showed that superficial surgical site infections were still higher in the diabetes cohort (odds ratio: 3.371, P = .021). Diabetic patients undergoing TL showed an increased incidence of superficial surgical site infections postoperatively.¹² Patterson DC et al identified complications for which diabetic patients are at increased risk following operative treatment of proximal humerus fractures. There were 1391 patients identified; 1147 (82%) were not diabetic, 91 (7%) had IDDM, and 153 (11%) had NIDDM. Of these, 39.68% (550) were obese (body mass index >30.0). Hypertension, dyspnea, and chronic obstructive pulmonary disease were the most frequent concurrent patient factors in diabetic patients. Postoperatively, patients with diabetes had a statistically significant higher risk of pneumonia (OR, 217.80; P = .002) and length of stay >4 days (OR, 2.05; P = .010). Among diabetics, non-insulindependent diabetics had a greater risk of sepsis (OR, 25.84; P = .022) and pneumonia (OR, 12.19; P = .013) than insulin-dependent diabetics. Both NIDDM and

IDDM were associated with a number of adverse postoperative events.¹³

CONCLUSION

Diabetic patients are associated with significant proportion of postoperative adverse events.

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