

Insulin Dependence is Associated with Increased Risk of Complications after Upper Extremity Surgery in Diabetic Patients

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Introduction

- While diabetes is often associated with worse surgical outcomes, previous studies have not shown increased complication rates after hand surgery.
- Few studies, however, differentiate between insulin-dependent (IDDM) and non-insulin dependent diabetes (NIDDM).
- The purpose of this study is to evaluate the impact of insulin dependence on the risk of complications in diabetic patients after hand surgery.

Materials and Methods

- Patients undergoing surgery from 2005-2015 from the distal humerus to the hand were identified in the NSQIP database using *Current Procedural Terminology (CPT)* codes.
- NSQIP categorizes patients as insulin dependent diabetes mellitus (IDDM), non-insulin dependent diabetes mellitus (NIDDM), or diet controlled / non-diabetics.
- Thirty-day postoperative complications were divided into medical complications, surgical site complications, readmissions, and overnight hospital stays. Medical complications included death, cardiac, respiratory, and renal complications, deep vein thrombosis or pulmonary embolus, stroke, sepsis, or urinary tract infection.
- Adverse outcomes were compared between patients with NIDDM or IDDM to those without DM using multivariable logistic regression.

Results

- Overall complication rate 5.7% in IDDM vs 2.3% (NIDDM) and 1.5% (non-diabetics)
- Patients with IDDM had significantly higher rates of surgical site complications and readmission in our multivariable logistic regression models. There was no significant difference in rates between NIDDM and non-diabetic patients.

Results cont...

- In multivariable regression analysis including all patients: patients that were >70 years old, had COPD, smoking history, were functionally dependent or had more proximal procedures were at increased risk for complications.

Table 4. Multivariable Logistic Regression of Adverse Outcomes in Upper Extremity Procedures by Diabetic Status

	Non-DM vs NIDDM			Non-DM vs IDDM		
	Odds Ratio	95% CI	P-Value	Odds Ratio	95% CI	P-Value
Any complication	0.86	0.62 - 1.13	0.23	1.82	1.44 - 2.30	< 0.001 †
Medical complications	0.94	0.67 - 1.33	0.74	1.48	1.07 - 2.04	0.02
Death	0.64	0.22 - 1.85	0.41	1.13	0.52 - 2.47	0.76
Cardiac complications	0.86	0.29 - 2.52	0.78	1.63	0.67 - 3.98	0.28
Respiratory complications	0.74	0.36 - 1.51	0.41	1.35	0.75 - 2.43	0.32
Renal Complications	--	--	--	3.40	0.96 - 12.11	0.06
Deep vein thrombosis/Pulmonary embolism	1.54	0.69 - 3.42	0.29	0.99	0.34 - 2.92	0.99
Stroke	1.20	0.25 - 5.65	0.82	2.20	0.44 - 11.05	0.34
Sepsis	1.94	1.02 - 3.70	0.04	1.47	0.71 - 3.06	0.30
Urinary tract infection	0.63	0.31 - 1.26	0.19	1.20	0.65 - 2.21	0.57
Surgical site complications	0.75	0.48 - 1.16	0.19	2.35	1.70 - 3.23	< 0.001 †
Deep surgical site infection	0.42	0.13 - 1.35	0.15	2.20	1.14 - 4.27	0.02
Superficial surgical site infection	0.83	0.50 - 1.39	0.48	2.55	1.74 - 3.73	< 0.001 †
Wound dehiscence	0.87	0.30 - 2.49	0.80	1.36	0.52 - 3.60	0.53
Readmission (30 day)	1.17	0.90 - 1.51	0.24	1.68	1.29 - 2.19	< 0.001 †

† Significant p-values are defined as < 0.003 to correct for multiple group comparisons, and are presented in **bold**

Conclusions

- This national database study showed a greater risk of complications in patients with insulin dependent diabetes mellitus. There was also increased risk for older patients, those with smoking history and undergoing more proximal upper extremity surgeries.
- Non-insulin dependent diabetes was not associated with an increased risk of complications.
- These findings are important in patient risk stratification as well as guiding further investigation to decrease complication rates in IDDM patients after upper extremity surgery.