

Effects of A Second Dose of Dexamethasone on Postoperative Glycemic Control in Diabetic Patients Following Primary Total Knee Arthroplasty

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INTRODUCTION:

Perioperative glucocorticoid administration has been shown to decrease postoperative pain and nausea. However, there is concern regarding the effects of glucocorticoids on perioperative glucose control in diabetic patients. This study aimed to evaluate the effect of two, intravenous perioperative (IV) doses of dexamethasone on glucose levels, pain scores, and inpatient opioid consumption after total knee arthroplasty (TKA).

METHODS:

A retrospective review of 953 diabetic patients who underwent primary elective TKA between 2020 and 2021. A total of 609 patients who received two perioperative doses (2D) of IV dexamethasone 10mg were compared to a control group of 344 patients who received one perioperative dose (1D). Postoperative glucose levels were assessed in 12-hour intervals. Nursing documented opiate administration events were converted into morphine milligram equivalents (MMEs) for consecutive 24-hour postoperative intervals. Postoperative pain was assessed using the Verbal Rating Scale (VRS) for pain.

RESULTS:

The 2D group demonstrated significantly higher glucose levels at 24-36 hours (172.81±47.88 vs. 153.45±36.92; p<0.001), 36-48 hours (172.81±47.88 vs. 143.38±35.42; p<0.001), 48-60 hours (164.57±42.75 vs. 152.46±40.10; p=0.012) postoperatively. Similarly, maximum blood glucose levels were higher in the 2D group at 24-36 hours (189.12±57.15 vs. 168.50±46.37; p<0.001), 36-48 hours (171.03±49.89 vs. 152.13±43.91; p<0.001, and 48-60 hours (179.41±51.54 vs. 168.01±48.99; p=0.0039) postoperatively. Additionally, the 2D group had significantly lower overall opiate consumption (52.20±105.69 vs. 84.86±133.36 MME; 38.49% decrease, p=0.026) postoperatively. Lastly, there was no significant difference in VRS pain scores, infection rates, delayed wound healing, or any other complications within the 90-day postoperative period.

DISCUSSION AND CONCLUSION:

Administration of a second perioperative of dexamethasone to diabetic patients was associated with an increase in postoperative blood glucose levels. While the risks of this observed effect in diabetic patients may not outweigh the clinical benefits of a second perioperative dose of glucocorticoids, these patients should be carefully monitored for uncontrolled glucose levels postoperatively.

Table 1. Baseline and demographic characteristics

	One Dose (N=344)	Two Dose (N=609)	P-value
Age	68.0(±12.0)	67.8(±12.0)	0.98
Female (%)	75.0	75.0	0.98
Male (%)	25.0	25.0	0.98
ASA Class I (%)	10.0	10.0	0.98
II (%)	80.0	80.0	0.98
III (%)	10.0	10.0	0.98
IV (%)	0.0	0.0	0.98
Weight (kg)	75.0(±15.0)	75.0(±15.0)	0.98
Height (cm)	170.0(±10.0)	170.0(±10.0)	0.98
BMI (kg/m ²)	26.0(±4.0)	26.0(±4.0)	0.98
Diabetes	100.0	100.0	0.98
Insulin	10.0	10.0	0.98
Oral	90.0	90.0	0.98
Time	10.0	10.0	0.98
ASA	10.0	10.0	0.98
ASA II (%)	80.0	80.0	0.98
ASA III (%)	10.0	10.0	0.98
ASA IV (%)	0.0	0.0	0.98
ASA V (%)	0.0	0.0	0.98
ASA VI (%)	0.0	0.0	0.98
ASA VII (%)	0.0	0.0	0.98
ASA VIII (%)	0.0	0.0	0.98
ASA IX (%)	0.0	0.0	0.98
ASA X (%)	0.0	0.0	0.98
ASA XI (%)	0.0	0.0	0.98
ASA XII (%)	0.0	0.0	0.98
ASA XIII (%)	0.0	0.0	0.98
ASA XIV (%)	0.0	0.0	0.98
ASA XV (%)	0.0	0.0	0.98
ASA XVI (%)	0.0	0.0	0.98
ASA XVII (%)	0.0	0.0	0.98
ASA XVIII (%)	0.0	0.0	0.98
ASA XIX (%)	0.0	0.0	0.98
ASA XX (%)	0.0	0.0	0.98
ASA XXI (%)	0.0	0.0	0.98
ASA XXII (%)	0.0	0.0	0.98
ASA XXIII (%)	0.0	0.0	0.98
ASA XXIV (%)	0.0	0.0	0.98
ASA XXV (%)	0.0	0.0	0.98
ASA XXVI (%)	0.0	0.0	0.98
ASA XXVII (%)	0.0	0.0	0.98
ASA XXVIII (%)	0.0	0.0	0.98
ASA XXIX (%)	0.0	0.0	0.98
ASA XXX (%)	0.0	0.0	0.98

Table 2. Perioperative blood glucose levels and HbA1c level at onset

	One Dose (N=344)	Two Dose (N=609)	P-value
Preoperative	100.0(±10.0)	100.0(±10.0)	0.98
12h	100.0(±10.0)	100.0(±10.0)	0.98
24h	100.0(±10.0)	100.0(±10.0)	0.98
36h	100.0(±10.0)	100.0(±10.0)	0.98
48h	100.0(±10.0)	100.0(±10.0)	0.98
60h	100.0(±10.0)	100.0(±10.0)	0.98
72h	100.0(±10.0)	100.0(±10.0)	0.98
84h	100.0(±10.0)	100.0(±10.0)	0.98
96h	100.0(±10.0)	100.0(±10.0)	0.98
108h	100.0(±10.0)	100.0(±10.0)	0.98
120h	100.0(±10.0)	100.0(±10.0)	0.98
132h	100.0(±10.0)	100.0(±10.0)	0.98
144h	100.0(±10.0)	100.0(±10.0)	0.98
156h	100.0(±10.0)	100.0(±10.0)	0.98
168h	100.0(±10.0)	100.0(±10.0)	0.98
180h	100.0(±10.0)	100.0(±10.0)	0.98
192h	100.0(±10.0)	100.0(±10.0)	0.98
204h	100.0(±10.0)	100.0(±10.0)	0.98
216h	100.0(±10.0)	100.0(±10.0)	0.98
228h	100.0(±10.0)	100.0(±10.0)	0.98
240h	100.0(±10.0)	100.0(±10.0)	0.98
252h	100.0(±10.0)	100.0(±10.0)	0.98
264h	100.0(±10.0)	100.0(±10.0)	0.98
276h	100.0(±10.0)	100.0(±10.0)	0.98
288h	100.0(±10.0)	100.0(±10.0)	0.98
300h	100.0(±10.0)	100.0(±10.0)	0.98
312h	100.0(±10.0)	100.0(±10.0)	0.98
324h	100.0(±10.0)	100.0(±10.0)	0.98
336h	100.0(±10.0)	100.0(±10.0)	0.98
348h	100.0(±10.0)	100.0(±10.0)	0.98
360h	100.0(±10.0)	100.0(±10.0)	0.98
372h	100.0(±10.0)	100.0(±10.0)	0.98
384h	100.0(±10.0)	100.0(±10.0)	0.98
396h	100.0(±10.0)	100.0(±10.0)	0.98
408h	100.0(±10.0)	100.0(±10.0)	0.98
420h	100.0(±10.0)	100.0(±10.0)	0.98
432h	100.0(±10.0)	100.0(±10.0)	0.98
444h	100.0(±10.0)	100.0(±10.0)	0.98
456h	100.0(±10.0)	100.0(±10.0)	0.98
468h	100.0(±10.0)	100.0(±10.0)	0.98
480h	100.0(±10.0)	100.0(±10.0)	0.98
492h	100.0(±10.0)	100.0(±10.0)	0.98
504h	100.0(±10.0)	100.0(±10.0)	0.98
516h	100.0(±10.0)	100.0(±10.0)	0.98
528h	100.0(±10.0)	100.0(±10.0)	0.98
540h	100.0(±10.0)	100.0(±10.0)	0.98
552h	100.0(±10.0)	100.0(±10.0)	0.98
564h	100.0(±10.0)	100.0(±10.0)	0.98
576h	100.0(±10.0)	100.0(±10.0)	0.98
588h	100.0(±10.0)	100.0(±10.0)	0.98
600h	100.0(±10.0)	100.0(±10.0)	0.98
612h	100.0(±10.0)	100.0(±10.0)	0.98
624h	100.0(±10.0)	100.0(±10.0)	0.98
636h	100.0(±10.0)	100.0(±10.0)	0.98
648h	100.0(±10.0)	100.0(±10.0)	0.98
660h	100.0(±10.0)	100.0(±10.0)	0.98
672h	100.0(±10.0)	100.0(±10.0)	0.98
684h	100.0(±10.0)	100.0(±10.0)	0.98
696h	100.0(±10.0)	100.0(±10.0)	0.98
708h	100.0(±10.0)	100.0(±10.0)	0.98
720h	100.0(±10.0)	100.0(±10.0)	0.98
732h	100.0(±10.0)	100.0(±10.0)	0.98
744h	100.0(±10.0)	100.0(±10.0)	0.98
756h	100.0(±10.0)	100.0(±10.0)	0.98
768h	100.0(±10.0)	100.0(±10.0)	0.98
780h	100.0(±10.0)	100.0(±10.0)	0.98
792h	100.0(±10.0)	100.0(±10.0)	0.98
804h	100.0(±10.0)	100.0(±10.0)	0.98
816h	100.0(±10.0)	100.0(±10.0)	0.98
828h	100.0(±10.0)	100.0(±10.0)	0.98
840h	100.0(±10.0)	100.0(±10.0)	0.98
852h	100.0(±10.0)	100.0(±10.0)	0.98
864h	100.0(±10.0)	100.0(±10.0)	0.98
876h	100.0(±10.0)	100.0(±10.0)	0.98
888h	100.0(±10.0)	100.0(±10.0)	0.98
900h	100.0(±10.0)	100.0(±10.0)	0.98

Table 3. Daily change from preoperative to postoperative average blood glucose levels

	One Dose (N=344)	Two Dose (N=609)	Mean	P-value
Change 0-12h	10.0(±10.0)	10.0(±10.0)	10.0	0.98
Change 12-24h	10.0(±10.0)	10.0(±10.0)	10.0	0.98
Change 24-36h	10.0(±10.0)	10.0(±10.0)	10.0	0.98
Change 36-48h	10.0(±10.0)	10.0(±10.0)	10.0	0.98
Change 48-60h	10.0(±10.0)	10.0(±10.0)	10.0	0.98
Change 60-72h	10.0(±10.0)	10.0(±10.0)	10.0	0.98
Change 72-84h	10.0(±10.0)	10.0(±10.0)	10.0	0.98
Change 84-96h	10.0(±10.0)	10.0(±10.0)	10.0	0.98
Change 96-108h	10.0(±10.0)	10.0(±10.0)	10.0	0.98
Change 108-120h	10.0(±10.0)	10.0(±10.0)	10.0	0.98
Change 120-132h	10.0(±10.0)	10.0(±10.0)	10.0	0.98
Change 132-144h	10.0(±10.0)	10.0(±10.0)	10.0	0.98
Change 144-156h	10.0(±10.0)	10.0(±10.0)	10.0	0.98
Change 156-168h	10.0(±10.0)	10.0(±10.0)	10.0	0.98
Change 168-180h	10.0(±10.0)	10.0(±10.0)	10.0	0.98
Change 180-192h	10.0(±10.0)	10.0(±10.0)	10.0	0.98
Change 192-204h	10.0(±10.0)	10.0(±10.0)	10.0	0.98
Change 204-216h	10.0(±10.0)	10.0(±10.0)	10.0	0.98
Change 216-228h	10.0(±10.0)	10.0(±10.0)	10.0	0.98
Change 228-240h	10.0(±10.0)	10.0(±10.0)	10.0	0.98
Change 240-252h	10.0(±10.0)	10.0(±10.0)	10.0	0.98
Change 252-264h	10.0(±10.0)	10.0(±10.0)	10.0	0.98
Change 264-276h	10.0(±10.0)	10.0(±10.0)	10.0	0.98
Change 276-288h	10.0(±10.0)	10.0(±10.0)	10.0	0.98
Change 288-300h	10.0(±10.0)	10.0(±10.0)	10.0	0.98
Change 300-312h	10.0(±10.0)	10.0(±10.0)	10.0	0.98
Change 312-324h	10.0(±10.0)	10.0(±10.0)	10.0	0.98
Change 324-336h	10.0(±10.0)	10.0(±10.0)	10.0	0.98
Change 336-348h	10.0(±10.0)	10.0(±10.0)	10.0	0.98
Change 348-360h	10.0(±10.0)	10.0(±10.0)	10.0	0.98
Change 360-372h	10.0(±10.0)	10.0(±10.0)	10.0	0.98
Change 372-384h	10.0(±10.0)	10.0(±10.0)	10.0	0.98
Change 384-396h	10.0(±10.0)	10.0(±10.0)	10.0	0.98
Change 396-408h	10.0(±10.0)	10.0(±10.0)	10.0	0.98
Change 408-420h	10.0(±10.0)	10.0(±10.0)	10.0	0.98
Change 420-432h	10.0(±10.0)	10.0(±10.0)	10.0	0.98
Change 432-444h	10.0(±10.0)	10.0(±10.0)	10.0	0.98
Change 444-456h	10.0(±10.0)	10.0(±10.0)	10.0	0.98
Change 456-468h	10.0(±10.0)	10.0(±10.0)	10.0	0.98
Change 468-480h	10.0(±10.0)	10.0(±10.0)	10.0	0.98
Change 480-492h	10.0(±10.0)	10.0(±10.0)	10.0	0.98
Change 492-504h	10.0(±10.0)	10.0(±10.0)	10.0	0.98
Change 504-516h	10.0(±10.0)	10.0(±10.0)	10.0	0.98
Change 516-528h	10.0(±10.0)	10.0(±10.0)	10.0	0.98
Change 528-540h	10.0(±10.0)	10.0(±10.0)	10.0	0.98
Change 540-552h	10.0(±10.0)	10.0(±10.0)	10.0	0.98
Change 552-564h	10.0(±10.0)	10.0(±10.0)	10.0	0.98
Change 564-576h	10.0(±10.0)	10.0(±10.0)	10.0	0.98
Change 576-588h	10.0(±10.0)	10.0(±10.0)	10.0	0.98
Change 588-600h	10.0(±10.0)	10.0(±10.0)	10.0	0.98
Change 600-612h	10.0(±10.0)	10.0(±10.0)	10.0	0.98
Change 612-624h	10.0(±10.0)	10.0(±10.0)	10.0	0.98
Change 624-636h	10.0(±10.0)	10.0(±10.0)	10.0	0.98
Change 636-648h	10.0(±10.0)	10.0(±10.0)	10.0	0.98</