

Hyperglycemia With Non-Insulin-Dependent Diabetes Following Intraarticular Steroid Injection

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A 53-year-old man had a history of non-insulin-dependent diabetes mellitus for years well controlled on a second-generation oral hypoglycemic agent. He had sustained trauma to the left knee 20 years previously and was having increasing difficulty walking. He had no signs of end-organ compromise from his diabetes, with normal renal, ophthalmological, and neurological function. The patient reported that home glucose levels were always 4.4 to 5.6 mmol/L (80 to 120 mg/dL), and these levels were supported by clinic checks. Routine x-ray films were consistent with degenerative changes, and a diagnosis of degenerative joint disease was made. He was placed on a nonsteroidal anti-inflammatory drug (ibuprofen), but because he did not respond to this therapy, his medication was changed to tolmetin, and he was given a patella knee brace. He experienced only mild improvement. Upon presentation to the family practice center, he complained of increased swelling with mild erythema and decreased functional movement as a result of the pain. There were no signs of instability, and he had a negative McMurray sign. The medial aspect of the left knee was aspirated of 3 mL of clear fluid. A Gram stain of the fluid and a culture were both negative for infection. One milliliter (4 mg) of 16- β -methylprednisolone and mepivacaine were injected into the joint. A blood glucose reading was not obtained at this visit.

The patient began experiencing symptoms of weakness and numbness in his extremities some three hours later. He denied any loss of consciousness. He reported feeling lightheaded and slightly disoriented, and reported falling while at home. He experienced a brief episode of chest pain. He was transported to the emergency department, where he was noted to be tremulous and diaphoretic. Laboratory data revealed a glucose of 55.8 mmol/L (1006 mg/dL), sodium 123 mmol/L (123 mEq/L), creatinine 270 mmol/L (3.1 mg/dL), potassium 7.7 mmol/L (7.7

mEq/L) and arterial pH of 7.42. Partial oxygen pressure was 29 mmHg and partial carbon dioxide pressure was 89 mmHg with an oxygen saturation of 97 percent. There were no acute electrocardiographic changes. The patient was placed on aggressive intravenous fluid hydration, and nonsteroidal anti-inflammatory drugs were temporarily stopped. He responded well to conservative management. He was discharged after two hospital days, with laboratory data returning to baseline. He was sent home on sulindac for his knee pain, and his oral hypoglycemic agent was restarted.

COMMENT

This case describes the possibility of increased morbidity in patients with impaired glucose tolerance who receive steroids intraarticularly. Risks and benefits must be weighed in any decision to inject intraarticular steroids.

The systemic effect of intraarticular steroids appears to be primarily related to an alteration in the hypothalamic-pituitary-adrenal axis.¹ Local complications have been documented in several sources.² These effects include decreased plasma cortisol, demargination of peripheral blood leukocytes, and alteration in growth hormone response. The gluconeogenic effect of corticosteroids is frequently identified following systemic administration but is likely to be overlooked in local steroid installation. Eighty milligrams of methylprednisolone, given by intraarticular injection, results in a peak serum concentration of 200 mmol/L (200 mg/mL) at about 8 hours after injection.^{3,4} A recent article suggests that delaying ambulation decreases adrenocorticoid suppression and may decrease systemic effects.⁵

A search of the literature failed to provide other examples of severe hyperglycemia or a complication of intraarticular steroid use, although glucose tolerance alterations are mentioned in the package insert.

An inventory of available texts on outpatient procedures was undertaken. Manuals discussing intraarticular steroid injection in the rheumatology, family medicine, and or-

Submitted, revised, January 24, 1989.

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thropedics literature failed to mention hyperglycemic effects, nor did they suggest monitoring patients with glucose tolerance problems.⁶⁻⁹

The following means of decreasing the systemic effects of injected steroids and monitoring the patient's metabolic status are suggested: (1) Check blood glucose levels before arthrocentesis, (2) consider delaying ambulation for 2 to 4 hours, and (3) check blood glucose levels at 4 hours and 8 hours after injection of the steroids. These glucose level checks may be performed at home by the patient with one of the available fingerstick techniques. The goal is to limit any excess morbidity.

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