

OBSERVATIONS

Insulin Edema in a Patient With Cystic Fibrosis-Related Diabetes

Insulin edema is a rare complication of insulin therapy primarily seen with newly diagnosed or uncontrolled diabetes (1–3). Patients at risk are those who are beginning insulin treatment, underweight, or increasing their insulin dose either in the normal course of the disease or after diabetic ketoacidosis (1,4). The prevalence of insulin edema is unknown; a review of the literature revealed few case reports of insulin edema and no reports of insulin edema in a patient with cystic fibrosis-related diabetes (CFRD). This case report illustrates the effects of insulin edema in a 23-year-old female patient who was diagnosed with CFRD at the age of 16 years.

The patient presented to the pediatric endocrine clinic at the age of 16 years with an HbA_{1c} of 9.8%. She started therapy on an insulin pump, and within 1 month, her HbA_{1c} level fell within target range, and a lung transplant occurred in December 2007. One year later, her HbA_{1c} increased to 11.9%, and physical exam (PE) revealed lower extremity (LE) edema to the midcalf. Three months later, her HbA_{1c} increased to 12.5%. The patient's pump download data revealed that insulin had only been administered for 2 non-consecutive days before her appointment. Almost 1 year after a pump re-education session (August 2009), the patient's HbA_{1c} decreased to 11.8%. Pump download data revealed increased bolus intake as the patient's appointment neared. PE revealed nonpitting LE edema. All of the

potential causes of edema were considered, including cardiac abnormalities, liver impairment, and transplant medications. Furosemide was prescribed but did not resolve the edema. Six months later, the patient's HbA_{1c} increased to 16.5%. Consistent with prior visits, her pump download data revealed insulin delivery only on the 2 days before clinic appointment. The patient again complained of swelling in her legs and face, stating that it was worse when taking insulin. PE revealed extensive 2 + LE edema up to her thigh. At that time, her treatment regimen was changed to multiple daily injections with aspart and glargine insulin pens. One month later, her HbA_{1c} decreased to 13.4%, and her edema began to resolve with 2 + LE edema to the midcalf. In October 2010, HbA_{1c} decreased to 9%, and the patient reported improved compliance with her insulin pump. However, 3 months later, HbA_{1c} increased to 12.4%. The pump download data revealed that no insulin had been delivered in the past 14 days, and no edema was noted on the PE. The patient's edema would begin to resolve when insulin use was nonexistent or minimal and would return before follow-up appointments, coinciding with her sudden increased use of insulin.

The exact cause of insulin edema is unknown, and diagnosis is made by eliminating all other causes of edema (1). It often resolves without intervention; however, a reduction in insulin dose may resolve the edema (1). Short-term diuretic therapy, salt restriction, or ephedrine has been studied and shown to be effective in correcting acute edema (1,3). Insulin edema can be difficult to diagnose with concomitant disease states and medications, but the possibility of insulin edema occurring in a patient should be considered with insulin nonadherence and whenever starting or increasing an insulin dose.

KATHERINE S. O'NEAL, PHARMD, MBA, CDE¹
 BETHANY A. FRANCIS, BA²
 MICHELLE E. CONDREN, PHARMD, AE-C, CDE³
 LAURA J. CHALMERS, MD⁴

From the ¹University of Oklahoma College of Pharmacy, Tulsa, Oklahoma; the ²University of Oklahoma College of Pharmacy, Tulsa, Oklahoma; the ³University of Oklahoma College of Pharmacy, Tulsa, Oklahoma; and the ⁴University of Oklahoma School of Community Medicine, Tulsa, Oklahoma.

Corresponding author: Katherine S. O'Neal, katherineoneal@ouhsc.edu.

DOI: 10.2337/dc11-1952

© 2012 by the American Diabetes Association. Readers may use this article as long as the work is properly cited, the use is educational and not for profit, and the work is not altered. See <http://creativecommons.org/licenses/by-nc-nd/3.0/> for details.

Acknowledgments—No potential conflicts of interest relevant to this article were reported.

K.S.O. and B.A.F. researched the data, wrote the manuscript, and reviewed and edited the manuscript. M.E.C. and L.J.C. reviewed and edited the manuscript.

This case report was presented as a student poster at the Midyear Clinical Meeting of the American Society of Health-System Pharmacists, Anaheim, California, 5–9 December 2010 and in poster form and during a presentation at the University of Oklahoma-Tulsa Research Day, Tulsa, Oklahoma, 31 March 2011.

References

1. Kalamokis GN, Tsatsoulis AA, Tsianos EV. The edematogenic properties of insulin. *Am J Kidney Dis* 2004;44:575–590
2. Mamoulakis D, Bitsori M, Galanakis E, Raissaki M, Kalmanti M. Insulin-induced oedema in children and adolescents. *J Paediatr Child Health* 2006;42:655–657
3. Hopkins DF, Cotton SJ, Williams G. Effective treatment of insulin-induced edema using ephedrine. *Diabetes Care* 1993;16:1026–1028
4. Evans DJ, Pritchard-Jones K, Trotman-Dickenson B. Insulin oedema. *Postgrad Med J* 1986;62:665–668