

My shoes are too small for me to fit in!

Guan Hao Tan

A 15-year-old Malay boy presented with concerns of his feet becoming swollen over a 5-day period and were too big to fit his shoes, without associated eyelid or facial swelling. There were no preceding insect bites or trauma. There was no recent history of prolonged inactivity, orthopnoea or decreased effort tolerance.

Further history revealed a recent admission 10 days ago for newly diagnosed type 1 diabetes mellitus complicated by hyperglycaemia (not in crisis). Prior to that admission, he suffered from weight loss (10 kg) with polyuria over a period of 6 months. Islet cell antibodies were detected and he was started on evening long-acting insulin glargine with short-acting insulin aspart before meals. He was compliant with his daily subcutaneous insulin injections, with no pedal oedema on discharge.

Examination revealed a thriving boy who looked alert and comfortable, and had gained 5 kg since discharge. There was no facial or periorbital oedema, or stigmata of chronic liver disease. He had no goitre and no shifting dullness on examination. However,

he had non-tender pitting oedema of his lower limbs ([figure 1](#)) extending all the way to the lower thighs proximally. There was no leg erythema or increased warmth. With this concern, he was admitted for further investigations.

QUESTIONS

1. What differentials would you entertain at this moment?
 - A. Atypical nephrotic syndrome
 - B. Protein losing enteropathy
 - C. Pretibial myxoedema
 - D. Cardiac failure
 - E. Insulin-related oedema
2. Given your clinical findings, what preliminary investigations would you perform?
3. What changes would you make to this child's treatment?
 - A. Decrease insulin glargine
 - B. Decrease insulin aspart
 - C. Commence diuretics
 - D. Do nothing

Answers can be found on page 251.



Figure 1 Picture showing pedal oedema of patient's lower limb.

ANSWERS TO THE QUESTIONS ON PAGE 250

ANSWER 1

Presentation with bilateral oedema evokes several considerations. Atypical nephrotic syndrome should be considered in view of his age, and one should also look for secondary causes such as autoimmune causes. Protein losing enteropathy should be considered and relevant history such as stool consistency, change in bowel habits needs to be explored. Pretibial myxoedema is a possibility, so evaluation of thyroid diseases should be performed. Cardiac failure should be excluded as well. The main clinical suspicion, however, was insulin-related oedema.

ANSWER 2

- A. Urinalysis/early morning urine protein:creatinine ratio
- B. Thyroid function test
- C. Liver function test

Investigations performed included a normal renal panel, a normal chest X-ray. The serum albumin was 37 g/L (normal range: 38–50 g/L) and there was no raised transaminase or hyperbilirubinaemia. His midstream urinalysis revealed mild proteinuria 1+ with no haematuria or ketonuria but glycosuria 4+. His spot total urinary protein was <0.07 g/L (normal range: 0.01–0.14 g/L), the urinary protein/creatinine ratio was 19.4 mg/mmol (normal range: <20 mg/mmol). The thyroid function test was normal.

ANSWER 3

- D. Do nothing

Parents were counselled regarding the self-resolving nature of the condition, and he was discharged a day later. During an endocrine clinic review a week later, the pedal oedema had resolved spontaneously.

DISCUSSION

Peripheral or generalised oedema is a rare complication of insulin therapy, which mostly occurs after the initiation of intensive insulin therapy^{1,2} in patients with newly diagnosed or poorly controlled diabetes. With current trends towards intensive insulin therapy, clinicians should be aware of insulin oedema syndrome, and its occurrence should be documented and differentiated from other causes of oedema.

In a recent literature review,³ the reported patients had a mean age of 13.5 (9–19) years. Twelve of 15 patients had peripheral oedema and one of them had

peripheral and generalised oedema. In this review, 10 of 15 patients needed no specific medical treatment and insulin oedema resolved completely. Only five patients had required medical treatment with diuretics as these cases had either significant weight gain from the oedema or had presented with anasarca.

It is postulated that insulin has sodium retention action on renal tubules, and this leads to an expansion of interstitial and plasma volumes.⁴ The other postulation is that of increased vascular permeability of subdermal blood vessels in response to subcutaneous insulin injection.⁵

Guan Hao Tan

Department of Paediatrics; General Paediatrics, KK Women's and Children's Hospital, Singapore

Correspondence to Dr Guan Hao Tan, Department of Paediatrics; General Paediatrics, KK Women's and Children's Hospital, Singapore; tan.guan.hao@khh.com.sg

Competing interests None declared.

Patient consent Parental consent obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

© Author(s) (or their employer(s)) 2019. No commercial re-use. See rights and permissions. Published by BMJ.



To cite Tan GH. *Arch Dis Child Educ Pract Ed* 2019;**104**:250–251.

Received 14 May 2018
Accepted 22 June 2018
Published Online First 26 July 2018

Arch Dis Child Educ Pract Ed 2019;**104**:250–251. doi:10.1136/archdischild-2018-315434

REFERENCES

- 1 Hopkins DF, Cotton SJ, Williams G. Effective treatment of insulin-induced edema using ephedrine. *Diabetes Care* 1993;**16**:1026–8.
- 2 Bağ VN, Çetinkaya S, Ağladioğlu SY, *et al*. Insulin oedema in newly diagnosed type 1 diabetes mellitus. *J Clin Res Pediatr Endocrinol* 2010;**2**:46–8.
- 3 Derya Bulus A, Andiran N, Osman Köksal A. Insulin edema in type 1 diabetes mellitus: report of a case and brief review of the literature. *Iran J Pediatr* 2016;**26**:e5077.
- 4 Saudek CD, Boulter PR, Knopp RH, *et al*. Sodium retention accompanying insulin treatment of diabetes mellitus. *Diabetes* 1974;**23**:240–6.
- 5 Garcia-Leme J, Böhm GM, Migliorini RH, *et al*. Possible participation of insulin in the control of vascular permeability. *Eur J Pharmacol* 1974;**29**:298–306.