

CASE PRESENTATION

DONE BY:

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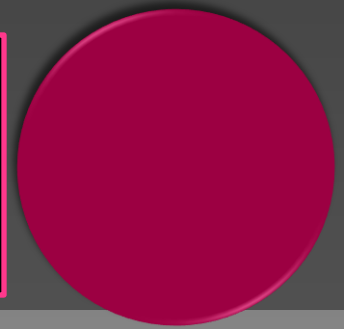
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SUPERVISED BY:

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Pediatrics Endocrinologist

Beginning of the Story



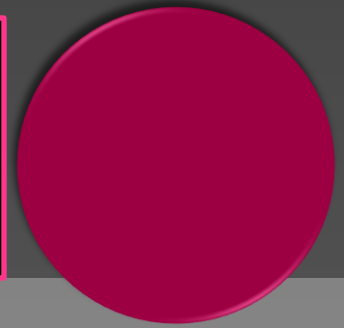
13 year old, Saudi, girl *known case* of :
uncontrolled **IDDM** for 7 years **on 1** I.U/kg premix
insulin

Admitted electively from the clinic with *history of*

- ⊙ ↑ increased weight
(more than 5 kg)
- ⊙ lower limbs swelling

} More Than **7days**
Prior To Admission

Symptoms Analysis



④ Edema :

- ▶ started gradually
- ▶ in the lower limbs → progressed to the lower part of the abdomen
- ▶ Noticed by mother...

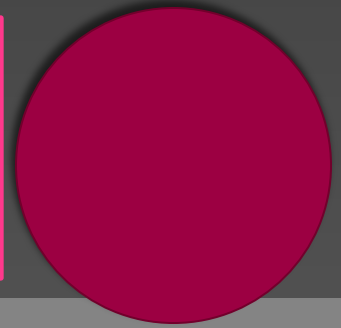
Symptoms Analysis



NO HISTORY OF :

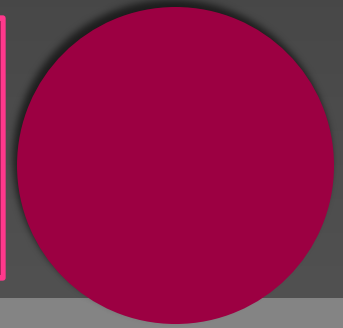
- ④ fever
- ④ Chest pain , orthopnea.
- ④ S.O.B , cough
- ④ change in bowel habits or abdominal pain
- ④ change in color of urine or others urinary symptoms.
- ④ skin rash , joint pain
- ④ pallor

History



Regarding to her diabetes : diagnosed 7 years back ,started on insulin, regular home Monitoring 3 times /day.
Insulin injction;by mother till 2 y back

History



- ④ Development : good school performance
- ④ vaccine: up to age
- ④ Nutritional: diabetic diet but not compliance
- ④ Menstrual: normal cycles.

Physical Examination

@ GENERAL :

@ She is oriented ,concusses, not distress , no face puffiness

@ Wt : **46** kg **ABOVE 75**th percentile

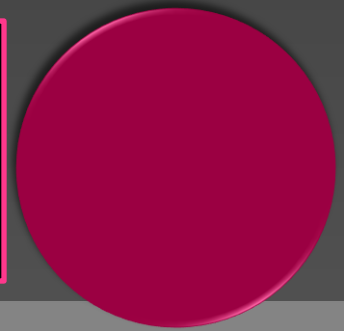
@ Vital signs :

- ▶ T (36.5 C)
- ▶ B/P (116/67 mm Hg)
- ▶ pulse (110 b/min)
- ▶ RR (30 B/min)
- ▶ O2 sat (100 %) room air

Physical Examination

- ④ Tanner stag ;is 3
- ④ Lymph nodes : no lymph node enlargement
- ④ ENT : clear ,no palpable thyroid mass
- ④ Chest : equal air entry bilaterally ,vesicular breathing
no add sound
- ④ CVS:good pulse ,perfusion , normal S1+ S2 +o
- ④ GIT: soft ,lax mild distended ,no organomegaly
shifting dullness was negative
- ④ CNS: grossly intact
- ④ MSK: **Lower limbs**: bilateral pitting edema up to thigh
Injection sites: upper, lower limbs and abdomen no
fat atrophy or hypertrophy

Workup



④ CBC

WBC (4.4) , Hb (15.4), Platelet (243)

④ HA1c (13.2)

④ Chemistry

Na(132) ,K(4.1) ,urea(4),ceritinine(64)

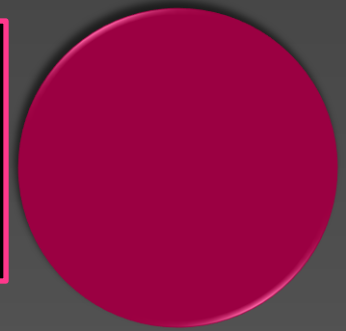
urine protein(0.69)g/d(**0_0.120**)

Microalbuminuria(468.2)mg/l (**0-20**)

④ LFT

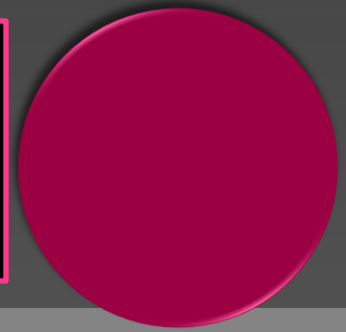
TP(80), ALB(37),AST(52), ALT(108),ALP(254)

Workup



- ② **Lipid profile**: cholesterol(7.8) ,triyglyce(1.3)
- ② **TFT**: TSH(1.16) ,T4(14) ,T3(6.03)
- ② **Celiac test** : tissue trens glutaminase IGA=5 (0-20)
- ② **LL venous Doppler U/S** :bilateral subcutaneous edema of both thigh and gluteal region.
- ② **Abdomenoplvic U/S**: mild hepatomegaly
- ② **Cardiac echo**: 60% ejection fraction of no signs of heart failure

Hospital course



- ④ BS was high (18,15,30) she started on diabetic diet and 2 U/kg insulin(RI and NPH)
- ④ Seen by cardiologist Started on
 - ▶ lasix(furosemid) 40 mg po OD
 - ▶ enalpril 5mg po OD
- ④ Edema improved after diuretic
- ④ Pt discharge after 5 days on same medication
- ④ Readmitted after a month and insulin pump was inserted

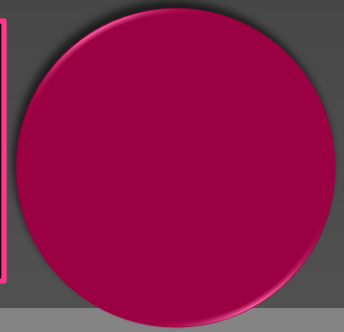
Patient received insulin in her upper limbs due to the lower limb edema.

SUMMARY

**13 y old, saudi girl known case of
IDDM (uncontrolled) admitted
with history of sudden increased
weight and edema for 7 days
No associated symptoms**

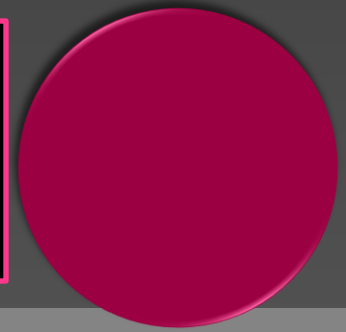
DIFFERENTIAL DIAGNOSIS

Differential diagnosis

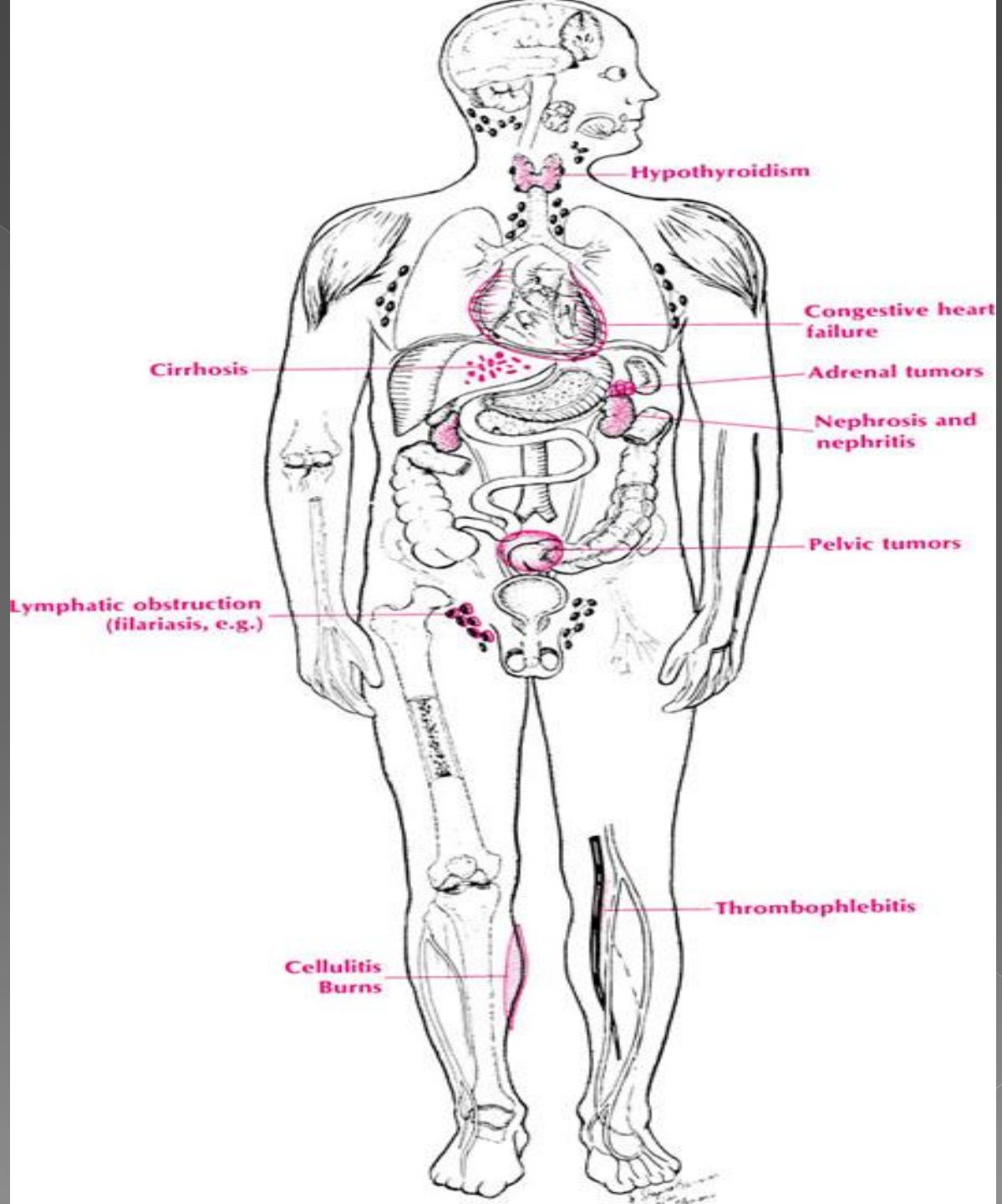


- **Generalized edema**
- ⊗ **Increased capillary hydrostatic pressure**
 - ⊗ Increased plasma volume from sodium and water retention
 - ⊗ Congestive heart failure
 - ⊗ Primary renal disease
 - ⊗ Drug induced
 - ⊗ Venous obstruction
 - ⊗ Hepatic cirrhosis
- ⊗ **Decreased capillary oncotic pressure (Hypoalbuminemia)**
 - ⊗ Nephrotic syndrome
 - ⊗ Liver failure
 - ⊗ Protein losing enteropathy
 - ⊗ Protein malnutrition (kwashiorkor)
- ⊗ **Increased capillary permeability**
 - ⊗ Burn
 - ⊗ Sepsis

Differential diagnosis

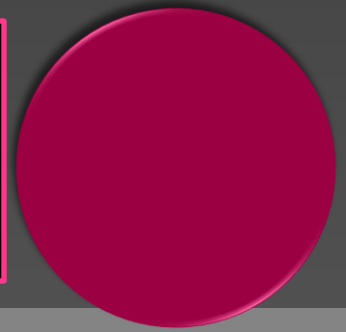


- **Localized edema**
- **Increased capillary hydrostatic pressure**
- **Venous obstruction**
 - > Extrinsic compression (tumor or lymphadenopathy)
 - > Venous thrombosis
- **Increased interstitial hydrostatic pressure**
- **Lymphatic obstruction**
- Primary
 - > Turner syndrome
 - > Noonan syndrome
 - > Milroy's disease
 - > Lymphedema praecox
- Secondary
 - > Lymphadenitis
 - > Granulomatous lymphangitis
 - > Autoimmune disease (juvenile rheumatoid arthritis & Crohn's disease)
- **Increased capillary permeability**
- **Angioedema**
 - > Allergic reaction
 - > Hereditary angioedema



PATHOPHYSIOLOGY

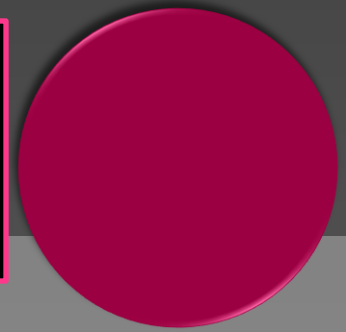
Pathophysiology



- ④ An alteration in capillary hemodynamics that favors the movement of fluid from the vascular space into the interstitium.
- ④ The retention of dietary or intravenously administered sodium and water by the kidneys

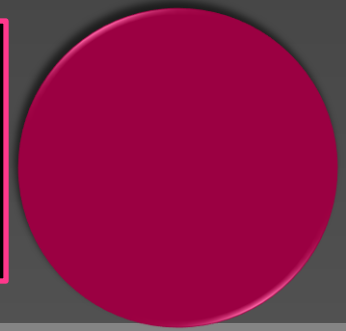
INSULIN OEDEMA IN CHILDREN

INSULIN OEDEMA



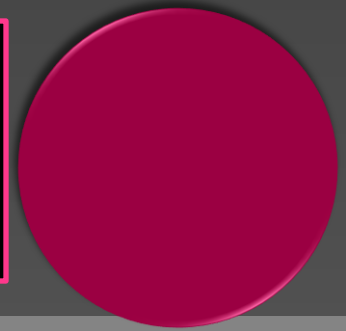
- Ⓢ first described by very few cases have been reported in the literature' wrote **Leifer** in **1928**
- Ⓢ More than 50 years later only a few further reports of marked insulin oedema appeared (Griep, 1955; Kirtley, 1955; Deckert, 1958; Marthedal et al, 1982)
- Ⓢ The first pediatric report dates back to **1979**, only 12 reported cases worldwide

INSULIN OEDEMA



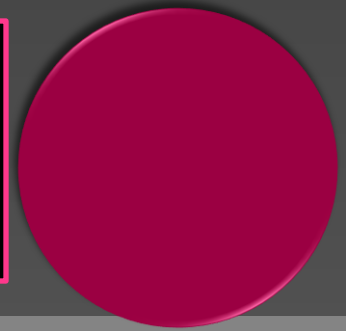
- ⊙ Peripheral or generalized oedema is an extremely rare complication of insulin therapy (*in the absence of heart, liver or renal involvement*)
- ⊙ It has been reported
 - ▶ in newly diagnosed type 1 diabetes
 - ▶ in poorly controlled diabetes following the initiation of insulin therapy
 - ▶ in underweight patients on large doses of insulin.

INSULIN OEDEMA



- © The reason is poorly understood and has been attributed to :
 - ▶ Changes in renal Na tubular transport
 - ▶ Increased vascular permeability
 - ▶ Decrease in albumin
 - ▶ Mitochondrial mutation in four cases
- © higher incidence within the African population
- © in pediatrics it is more common in females

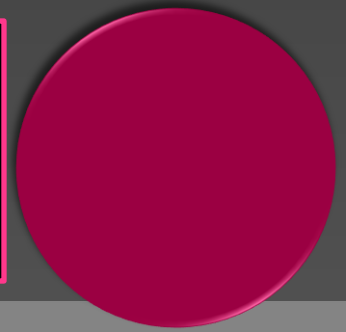
INSULIN OEDEMA



© Natural history

- ▶ Diagnosis of exclusion
 - ▶ Renal, hepatic, cardiac etiology
 - ▶ Insulin allergy
- ▶ Onset after starting or increasing insulin dosing
- ▶ Self-limited (7-30 days)
- ▶ Reversible

INSULIN OEDEMA



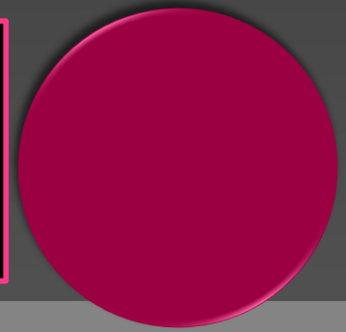
Ⓢ Treatment

- ▶ Control diabetes
- ▶ Further symptomatic or protracted course
 - ▶ Loop diuretics (furosemide)
 - ▶ Ephedrine



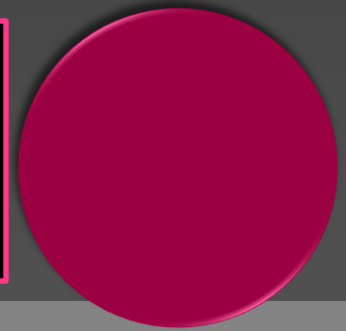
*Literatures
review*

Case 1



A 14-year-old girl was admitted with a 1-month history of polyuria and polydipsia. A recent weight loss of 5 kg was also mentioned. No family history of diabetes was reported. Physical examination at the time of admission revealed a temperature of 36.70C, a pulse of 66 beats per minute, a respiratory rate of 24 per minute, and a blood pressure of 110/70 mm/Hg. The patient's height was 161 cm (-0.01 SDS) and her weight was 40 kg (-2.85 SDS). Calculated body mass index was 15.6 kg/m² (-2.7 SDS). Careful history excluded anorexia nervosa as a contributing condition to her weight loss. She was at pubertal Tanner stage 5. Laboratory investigations revealed a blood glucose level of 363 mg/dL, ketonuria with acidosis, an arterial blood pH of 7.2 and an elevated glycosylated haemoglobin A1c concentration of 12.1%. The patient was initially treated with an intravenous infusion of insulin and 2/3 isotonic saline in 5% dextrose. Mild bilateral pitting ankle oedema and discoloration of the skin developed over the ankles. The oedema deteriorated on the fourth day, after the initiation of regular insulin administered subcutaneously, at a dose of 1.2 units/kg/day. No evidence of heart, liver or kidney dysfunction was noted. Serum albumin levels decreased from 3.5 to 3.2 g/dL, without proteinuria. Chest X-ray and abdominal ultrasound findings were normal. Doppler ultrasound findings of the lower leg arteries and veins were normal. Ten days later the oedema had completely resolved without any specific treatment.

Case 2



An 11-year-old girl was admitted with an 8-month history of polyuria, polydipsia and a recent weight loss of 7 kg. No family history of diabetes was reported. Physical examination at the time of admission revealed a temperature of 37°C, a pulse rate of 96 beats per minute, a respiratory rate of 28 per minute, and a blood pressure of 100/65 mm/Hg. Her height was 147 cm (-0.31 SDS) and her weight 30 kg (-1.75 SDS). Calculated body mass index was 13.8 (-1.9 SDS) kg/m². Pubertal stage was evaluated as Tanner stage 3. Physical examination was normal except for clinical signs of mild dehydration. Laboratory investigations revealed a blood glucose level of 453 mg/dL, ketonuria with acidosis, an arterial blood pH of 7.1 and an elevated glycosylated haemoglobin A1c concentration of 13.9%. The patient was treated with 2/3 isotonic saline in 5% dextrose and intravenous insulin infusion. On the fifth day of regular insulin administration, a non-tender, pitting oedema without skin discoloration developed over the ankles. No evidence of heart, liver or renal dysfunction was noted. Serum albumin levels remained stable. Chest X-ray and abdominal ultrasound findings were normal. Doppler ultrasound findings of the lower leg arteries and veins were normal. Seven days later the oedema disappeared completely without any treatment.

Case 3

- 12-year-old girl with newly diagnosed type 1 diabetes, who presented with oedema of the lower extremities and periorbitally, one day after the initiation of insulin treatment. Other causes of oedema were excluded. Following administration of frusemide, oedema resolved within ten days.

Journal of Paediatrics and Child Health October 2006

Case 4

- A 10-year-old boy had poorly-controlled diabetes for one year. He experienced weight gain and pitting edema in both lower legs and the scrotum 5 days after initiation of insulin therapy for diabetic ketoacidosis. The diagnostic work-up for this patient revealed no evidence of cardiovascular, renal, or hepatic disease. Thiazide was prescribed, but the patient did not take it. Because of family problems, he discontinued insulin therapy and the edema subsided within 2 to 4 days.

THANK YOU

