Minimal change disease following exposure to mercury-containing skin lightening cream

A 34-year-old woman developed nephrotic syndrome after using a skin lightening cream that contained an extremely high level of mercury. Blood and urine mercury levels were elevated and a renal biopsy revealed minimal change disease. Membranous nephropathy was excluded using immunofluorescence and electron microscopy. Her proteinuria remitted 9 months after she stopped using the cosmetic cream. This is the first reported case in the English literature of proven minimal change disease secondary to mercury exposure. It is important that mercury poisoning due to cosmetic cream is considered in the differential diagnoses for any woman who presents with nephrotic syndrome.

Introduction

Mercury is a silvery liquid that is volatile at room temperature because of its high vapour pressure and able to enter the human body via ingestion, inhalation, and absorption through the skin. Chronic mercury poisoning commonly affects the kidneys and the central nervous system. Involvement of the kidneys usually causes nephrotic syndrome. As early as 1818, mercury was identified as a cause of proteinuria in humans.1 The renal pathology seen in most cases of mercury-induced nephrotic syndrome is membranous nephropathy.1-6 In the past, mercurial diuretics and mercury-containing ointments prescribed for psoriasis2,7,8 were the main sources of exposure.3,4,6 Skin lightening creams that contain mercury are a more recent source of mercury poisoning.3,4,6,9 We report the first proven case of minimal change disease caused by exposure to mercury-containing skin lightening cream.

Case report

In November 2002, a 34-year-old Chinese woman was admitted to Princess Margaret Hospital with a 1-month history of bilateral ankle swelling. She had no history of renal disease, hypertension, or diabetes mellitus. Physical examination revealed bilateral pitting ankle oedema up to the knee. Her facial skin was particularly light-coloured. Examination of the abdomen, cardiovascular, respiratory and central nervous systems revealed no abnormalities. Laboratory investigations showed: sodium, 137 mmol/L; potassium, 3.5 mmol/L; urea, 3.9 mmol/L; creatinine, 52 µmol/L; albumin, 15 g/L; globulin, 35 mmol/L; liver enzymes, normal range; random blood glucose, normal range; haemoglobin, white blood cells and platelets, normal range; an increased total cholesterol, 10.4 mmol/L, and triglycerides, 5.88 mmol/L. Her 24-hour urine protein excretion was 8.35 g and creatinine clearance 114 mL/min. Urine microscopy revealed no red blood cells or casts. Investigations for a cause of her nephrotic
Mercury-induced minimal change disease

A 38-year-old Chinese woman was referred for the management of new onset proteinuria. Her medical history was unremarkable except for daily use of a skin lightening facial cream purchased from Mainland China over the past 4 months. She was a beautician and had applied the cream once daily. Physical examination was normal. Blood pressure was 110/70 mm Hg, and urine analysis showed 4+ proteinuria (0.39 g/24 h, reference level <0.15 g/24 h). Renal biopsy was performed which revealed 41 glomeruli with no significant proliferation or spike formation (Fig 1a). Immunofluorescence microscopy revealed only scanty granular deposits of immunoglobulin M and C3 in the mesangium. No immune deposits were found in the capillary loops. On electron microscopy, the podocytes showed moderate fusion of the foot processes (Fig 1b) and microvilli formation. No electron dense deposits were detected in the capillary loops and mesangium. Minimal change disease was diagnosed.

The cosmetic cream was found to contain mercury levels of 30 000 parts per million (reference level, <1 part per million). The patient was advised to stop using the cream and chelation therapy with D-penicillamine was given for 10 days. Her proteinuria gradually returned to a normal level of less than 0.01 g per day over a period of 9 months (Fig 2). Blood and urine mercury levels also decreased with time and this reduction coincided with the decrease in proteinuria (Fig 2). Her blood and urine mercury levels returned to normal 1 month and 9 months respectively after cessation of facial cream usage. No steroid therapy was prescribed and the patient had no history of taking any drugs such as non-steroidal anti-inflammatory drugs before presentation.

Discussion

The pathological diagnosis of minimal change disease in our patient was confirmed by light microscopy, immunofluorescence, and electron microscopy findings. Membranous nephropathy was excluded by the absence of immune deposits in the capillary loops on immunofluorescence microscopy and the absence of subepithelial electron dense deposits on electron microscopy. No steroid therapy or other immunosuppressive agents were prescribed to treat her nephrotic syndrome. Resolution of proteinuria coincided with normalisation of blood and urine mercury levels. Of Chinese patients with minimal change disease, in the 18 to 50 age-group, only around 5% will achieve spontaneous remission.10 This led us to conclude that mercury poisoning was the cause of minimal change disease in our patient.

There have been a few reports of minimal change lesions in renal histology following exposure to mercury.7,9,11 In one report, 50% of young African women in Kenya who used mercury-containing skin lightening creams developed ‘minimal change’ glomerular lesions.9 In other patients, minimal glomerular structural lesions have developed after use of mercurial diuretics and occupational contact with mercury.7,11 Neither immunofluorescence nor electron microscopy were performed in any of these series so the diagnosis of membranous nephropathy could have been missed. Our patient is the first reported case in the English literature of proven minimal change disease secondary to mercury poisoning.

It has been suggested that when nephrotic syndrome...
develops following mercury exposure, it is due to idiosyn-
cratic reactions or an abnormal immune response to the
heavy metal. The mechanism by which mercury caused
minimal change disease was not evident in our patient.
Further case studies of the pathogenesis of minimal change
disease following exposure to this heavy metal are needed.
More importantly, mercury poisoning due to cosmetic
creams should be considered one of the differential
diagnoses in any woman, irrespective of age, who presents
with proteinuria or nephrotic syndrome, as it has been shown
by Sin and Tsang that the age range of people using
cosmetic creams is very wide: 15 to 76 years.

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