

East African Medical Journal Vol 94 No. 12 December 2017

## MANNITOL IN DIURETIC RESISTANT NEPHROTIC SYNDROME: A CASE REPORT

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## MANNITOL IN DIURETIC RESISTANT NEPHROTIC SYNDROME: A CASE REPORT

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### SUMMARY

**A 6 year old presented with generalized oedema to Kagando hospital, Uganda, and was diagnosed with nephrotic syndrome. Despite treatment with a fluid restriction, prednisolone and furosemide, the oedema worsened and the weight increased. Mannitol was added to the treatment regime and the oedema improved. The patient was able to be discharged four days later without any diuretic therapy. The case highlights the use of mannitol in the treatment of diuretic resistant oedema with nephrotic syndrome. It provides an alternative therapy for the resource-poor setting to the expensive albumin-furosemide combination often used elsewhere.**

### CASE HISTORY

A 6-year-old female was presented to the hospital after 8 months of general body swelling with no resolution despite treatment with prednisolone, ceftriaxone and furosemide at a local clinic. On examination there was generalized oedema with marked periorbital oedema to the point where the left eye was closed. There was no jaundice, anaemia or rash noted. She was febrile at 38.8 but had otherwise normal vitals. The child weighed 16kg on admission. Initial investigations showed a raised white cell count of 20.6 with increased lymphocytes and granulocytes. Haemoglobin was 10.7 with MCV of 70.0. Blood screen for malaria was negative. Urinalysis showed protein +++ along with + leukocytes and trace of red blood cells. Abdominal ultrasound showed mildly

enlarged kidneys with reduced cortico-medullary differentiation and no ascites. Other organs were reported as normal.

Initial treatment was with intravenous furosemide, prednisolone and ceftriaxone along with a fluid restriction. However the oedema increased further to the point of closing both eyes. Her weight increased by 1.5kg from admission. On the fifth day of admission intravenous (IV) Mannitol was added at a dose of 40mls of 20% solution twice a day for 4 days. The next day her oedema had improved and the urine output was increased. On one occasion her blood pressure fell on to 70/50, however, the blood pressure quickly normalized and the patient showed steady decrease in oedema. By the ninth day of admission, the fourth day of IV mannitol, the oedema was almost completely resolved, and the patient had lost one kilogram from her peak weight

during the admission. Urinalysis showed no protein and her blood pressure was within normal limits. The patient was discharged.

## DISCUSSION

Nephrotic syndrome is characterized by heavy proteinuria, hypoalbuminaemia, oedema and hyperlipidaemia. It is a common paediatric condition worldwide with an incidence rate of 2-16.9 per 100,000 children. [1] In children the majority of cases are caused by minimal change disease which is frequently responsive to steroids. The Ugandan clinical guidelines suggest treatment for severe oedema with prednisolone, furosemide and fluid restriction [2] with no information on second line treatment if no response. In developed countries, the combination of albumin and furosemide is often used for diuretic resistant cases. [3] Albumin is an expensive drug which has limited availability in developing countries and is not available in our referral hospital in Uganda. This case describes an alternative second-line option for diuretic resistant nephrotic syndrome that was effective and is available for use in developing health settings.

Mannitol is an osmotic agent commonly used in cerebral oedema. It is listed among the World Health Organization (WHO) essential list of medications. WHO undertook a review of the use of mannitol in children in 2011 and deem mannitol to still have a role. [4] Its side-effects as listed in the British National Formulary (BNF) include hypotension, thrombophlebitis, and fluid and electrolyte imbalance. The BNF describes the indications for mannitol as cerebral oedema, raised intra-ocular pressure, peripheral oedema and ascites. An important contraindication relevant to nephrotic syndrome is anuria as well as severe heart failure, pulmonary oedema and dehydration. [5] There is little evidence

available on the use of mannitol in the treatment of nephrotic syndrome. In one reported case series of 3 children of similar ages, there was reported rapid diuresis with mannitol use. The report commented that the use of mannitol needed to be explored more in the developing world as it would be of great value due to low costs and the poor availability of intravenous albumin. [6] One study was found in Bangladesh which compared the use of mannitol and furosemide to albumin and furosemide in 40 children with nephrotic syndrome and resistant oedema. They found the combination of mannitol and furosemide to be as effective as furosemide and albumin. [7]

From this case, we can see the dramatic effect that mannitol had on relieving oedema. The drug was used with close monitoring of the blood pressure and only had to be used for short interval to be effective. There was one episode of hypotension in this case which quickly resolved with observation. Evidence is very limited on the use of mannitol in nephrotic syndrome. This case study will add to the literature on the use of mannitol as a potential second-line drug for resistant oedema in nephrotic syndrome. Its advantages include its availability and inexpensive cost. More research is needed and guidelines adapted to reflect the role of this drug in this common childhood condition.

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