Hypokalaemic Nephropathy Secondary to Enterocutaneous Fistula: A Rare Complication of Abdominal Hysterectomy

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Abstract

A case of severe hypokalaemia due to enterocutaneous fistula as a post surgical complication of total abdominal hysterectomy is described. The severity of the hypokalaemia resulted in hypokalaemic nephropathy. The polyuria, nocturia and polydipsia were all reversed with appropriate fluid and potassium replacement after the closure of the fistula.

Introduction

Potassium is one of the major electrolytes in the body with most of it being in the intracellular compartment. The serum level is controlled by renal excretion and extra renal losses through the gastrointestinal tract. A number of drugs also affect the potassium homeostasis by affecting the aldosterone release such as heparin, non-steroidal anti-inflammatory drugs (NSAIDS) or by directly affecting renal potassium handling. Hypokalaemia can occur in different clinical settings. Some of the causes include: increase renal loss such as in diuretics therapy, increased aldosterone secretion in end organ failure, exogenous mineralocorticoids, renal tubular acidosis, severe dietary deficiency, redistribution into cells e.g. in alkalosis, insulin treatment; and gastrointestinal loss such as chronic diarrhea and fistula.

Mild hypokalaemia is usually asymptomatic, but severe hypokalaemia may cause muscle weakness and cardiac arrhythmias. Moderate to severe hypokalaemia is associated with interstitial renal disease. Loss of urinary concentrating ability is the most common functional defect due to defective operation of the countercurrent multiplier system and elevated intrarenal prostaglandin[1]. Clinical presentations include nocturia, polyuria, and polydipsia. Urine specific gravity is usually low with associated mild proteinuria. The serum urea and creatinine are usually normal.

Enterocutaneous fistula is an abnormal connection between the intestine and the abdominal skin. It may occur as a complication of any abdominal surgery. Potassium is majorly secreted by the intestinal lining into the lumen and about one litre of fluid is secreted from the lower intestine into the lumen daily. The concentration of potassium in the jejunum is about 6mmol/l, in the ileum is about 13mmol/l and colon is about 30mmol/l. This is why loss of ileal fluid e.g.enterocutaneous fistula, or colonic e.g. chronic diarrhea can lead to severe hypokalaemia [2]. We present here the case of a middle-aged woman that developed Hypokalaemic nephropathy secondary to enterocutaneous fistula as a complication of total abdominal hysterectomy.

Case Report

A 52-years old woman seen at the gynecology clinic with one-half year's history of menorrhagia secondary to uterine fibroid. She had total abdominal hysterectomy (TAH) done on 26/5/03; however sixth day post operation she was noticed to be discharging faeculent material from the operation site. She was subsequently referred to the General surgery department of the hospital.

On admission to the surgical unit she was ill looking, not pale, anicteric, afebrile (37.2°C) and of good hydration status. The fluid input/output the previous sixteen hours was 1250ml/1000ml respectively. Pulse rate of 84beats/min regular and of good volume, blood pressure of 130/70mmHg. The abdomen was distended; the wound dressing was soaked with greenish discharge, with marked tenderness around the wound. There was copious discharge with greenish faeculent matter from the wound site. The laboratory results included haematocrit of 34%, haemoglobin of 11g/dl, white blood cell of 9,700/mm^3, and platelet count of 220,000/mm^3. The blood chemistry values were Na^+ 136mmol/L (135-145mmol/L), K^+ 3.0mmol/L (2.9-5.0mmol/L), urea of 5.2mmol/L (2.5-6.5mmol/L), and creatinine of 88mol/L (53-106mol/L). Her medications on admission included Cefuroxime, Gentamicin and Metronidazole.

She had exploratory laparatomy done the following day (3/6/03) where intraperitoneal abscess was drained, ileo-ileal anastomosis and anterior abdominal wall debridement was done. The operation was well tolerated. She was continued on antibiotics. She had

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total abdominal wound dehiscence that was subsequently managed conservatively without surgical repair thus necessitating her prolonged stay on admission. By the 26/6/03 patient developed polyuria of 7700ml/24hours, which progressively increased to19, 400ml/day by 4/7/03. The serum potassium level also decreased from 4.1mmol/L on 26/6/03 to 1.4mmol/L by 4/7/03. The Chemical pathology unit of the hospital was invited to co-manage the patient.

The investigation done include Na^+ 139mmol/L, K^+ 1.8mmol/L, urea 4.1mmol/L, creatinine 86mol/L, serum osmolality 296osmol/kg, serum total protein 40g/L (60-80G/L), albumin 29g/L (35-50g/L), random blood sugar of 10.4mmol/L (2.5-5.0mmol/L), urinary specific gravity 1.005 and pH 7.5. The ECG findings were consistent with hypokalaemia. An assessment of hypokalaemic nephropathy secondary to enterocutaneous fistula was made. She was commenced on intravenous K^+ supplement with daily monitoring of serum K^+ and urine specific gravity. 40mmol of KCL was added into each litre of normal saline given 6hourly over 24hours. She had a total of 160mmol/day of potassium. This was continued for 10 days with gradual increase in serum K^+ and urine specific gravity; but she was still polyuric although the volume was reducing.

On the 10th day post potassium supplement, serum K^+ came up to 4mmol/L, 24hr urine output reduced to 4800ml and the ECG findings were also found to be within normal limits. The potassium intake was then reduced to 80mmol/day with oral supplement of 1200mg/day. The urine volume continues to decrease with increase in its specific gravity. By the14th day post infusion the serum electrolyte, urine specific gravity and output become normalized. She was continued on oral potassium supplement only.

Discussion

One of the major problems arising from the passage of gastrointestinal content through a fistula is water, electrolyte and acid-base imbalance. Edmund *et al* in a review of management of intestinal fistula reported a mortality rate of 43% despite the introduction of fluid and electrolyte replacement and antibiotics [3]. Data are not readily available in this environment on mortality from enterocutaneous fistula.

Hypokalaemia is one of the major electrolyte disorders that occur in intestinal fistula due to increased loss of potassium from the ileal content. Potassium depletion from any cause may result in renal damage. How severe or prolonged potassium depletion must be to produce renal damage in humans is not known, however there is evidence that the morphologic lesions found mainly in the proximal convoluted tubules, may occur in a matter of days suggesting that the intensity of depletion is an important issue [4]. The renal damage leads to loss of urinary concentrating ability.

For our patient the obvious site of potassium loss was through the entero-cutaneous fistula. As at the time of referral to the general surgical unit, the serum potassium level was still normal, most likely with replacement of loss from the intracellular compartment. However, because of the total body loss of potassium without replacement over a long period (3weeks), the patient developed hypokalaemia. The hypokalaemia resulted in decrease Na^+-K^+ adenosine triphosphate activity in the thick limb of loop of Henle, thereby impairing the concentrating ability of the kidney. This is in line with the findings of Gutsche *et al* [5]. Thus the hypokalaemia resulted in hypokalaemic nephropathy[6].

There was not any other obvious source of potassium loss in this patient apart from the fistula, the serum urea and creatinine levels were normal, this negate the presence of renal failure as a possible cause of hypokalaemia. Also, there was no history of diarrhea and neither was she on any diuretics.

In conclusion we have reported a case of severe hypokalaemia due to enterocutaneous fistula as a post surgical complication of total abdominal hysterectomy. The severity of the hypokalaemia resulted in hypokalaemic nephropathy. The polyuria, nocturia and polydipsia were all reversed with appropriate fluid and potassium replacement after the closure of the fistula.

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