One may reasonably classify patients with hyponatremia using a clinical assessment of volume status and the determination of whether or not renal salt retention is present. The most common clinical settings of hyponatremia are: (1) edema (hypervolemia) with a low urinary sodium (due to heart failure or cirrhosis); (2) euvolemia with an elevated urinary sodium (due to SIADH), and (3) dehydration (hypovolemia) with a low urinary sodium.

From a standpoint of urinary electrolytes, SIADH must be considered in this case, especially in view of the elevations in ADH levels that have been documented with exacerbations of chronic obstructive pulmonary disease. This diagnosis must be rejected, however, since ADH excess alone does not cause enough fluid retention to produce edema.

Edematous disorders are commonly associated with hyponatremia. The salt and water retention that occur in these disorders (perhaps in an attempt to restore effective circulating blood volume to normal) results in hyponatremia because net water intake (dietary water + water of metabolism – water excretion and insensible losses) typically exceeds sodium intake when compared with extracellular fluid concentrations. The hyponatremia present in the case described appears to fall in this category except for the absence of renal salt retention.

Theophylline use might have been a ready explanation if it had not been discontinued several days before urinary electrolytes were obtained. There is no evidence for intrinsic renal disease or adrenal insufficiency. Transient bicarbonaturia might explain an elevated urinary sodium in this setting, but does not account for the high urinary chloride. The best explanation for the urinary electrolytes in this setting is the use of heparin.

Heparin’s diuretic effect is well documented, if not widely known. In therapeutic doses, a clinically significant diuresis and natriuresis occurs beginning approximately 36 h after initiation of therapy, peaking on the 3rd to 5th day of treatment, and continuing for 2 days after heparin is discontinued. The drug’s diuretic effect appears to be due to inhibition of adrenal aldosterone synthesis. An autopsy study on 1 patient receiving prolonged heparin therapy showed severe atrophy of the zona glomerulosa, site of aldosterone synthesis.

In evaluating the hyponatremic patient the diagnosis of SIADH is favored when substantial quantities of NaCl are present in the urine, while the presence of only small amounts of salt makes the diagnosis unlikely. SIADH is not, however, a salt wasting disorder in the sense that renal salt retention is impossible since urinary sodium will fall to under 10 mEq/l with severe sodium restriction. Urinary sodium in SIADH generally approximates dietary intake but will differ temporarily from that ingested when body weight (and hence total body water) is changing. As total body water increases and serum sodium declines, negative sodium balance is found. This change in sodium balance is, however, only a minor factor in the development of hyponatremia with SIADH.

When, in this syndrome, total body water falls (as with water restriction) and serum sodium rises, sodium balance is positive. Despite this, diagnostic confusion with hyponatremic disorders associated with a low urinary sodium does not usually result. The low urine volumes combined with substantial sodium intake typically results in urinary sodium concentrations that exceed 40 mEq/l. In the setting of severe water restriction, increased insensible water loss and a restricted sodium intake, urinary sodium may be quite
low, as is the case here. When this patient’s fever resolved and his appetite improved, urinary sodium and chloride exceeded 40 mEq/l despite persistent hyponatremia. It was then recognized that chlorpropamide had been inadvertently continued. When this error was corrected the hyponatremia gradually resolved.

References