A Discrepant Urine Specific Gravity
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CASE DESCRIPTION

A 21-year-old man presented after being struck by a car and underwent a computed tomography scan of the chest and spine. Three hours later, his clear yellow urine sample was sent to the laboratory. A routine urinalysis with the Roche Urisys® 2400 indicated the specific gravity (SG) as a flag, i.e., an error for SG. A manual repeat of the SG measurement was also not readable by refractometer (no boundary line on the scale) but was 1.015 according to Roche Chemstrips®. The urine osmolality was 500 mOsm/kg (adult reference interval, 50–1200 mOsm/kg).

QUESTIONS

1. Why was urine SG unreportable by Urisys 2400 and refractometer?
2. Which method is suitable for SG measurement of this sample?
3. What other approaches could be taken to report an SG for this sample?

The answers are below.

ANSWERS

SG is defined as the density of a liquid compared with that of distilled water at the same temperature (1). Refractometry (the principle of the Urisys 2400 SG and the manual refractometer) measures the refractive index, which is related to the total mass of solutes present in the urine. High molecular weight substances such as glucose, protein, or radiographic contrast agents will have a greater effect on the SG (1, 2). In contrast, reagent strips measure ionic strength and are not affected by protein, glucose, or contrast agents. Osmolarity is affected by glucose but not by contrast agents (1, 2).

The use of a radiographic contrast agent during the computed tomography examination was the cause of the discrepant SG results. The sample was diluted with 2 volumes of water, giving a reading of 1.029 by refractometer. Therefore, the correct SG was reported as 1.087 (i.e., 1 + 0.029 × 3).

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References