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Diminished Expression of Aquaporin Water Channels in Rats with Unilateral Ureteral Obstruction

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Purposes: The present study was aimed at examining whether an altered regulation of aquaporin (AQP) water channels is involved in the urinary concentration defect following unilateral ureteral obstruction.

Materials and methods: Male Sprague-Dawley rats were unilaterally obstructed of their left proximal ureters for 48 hours, while the contralateral kidney was left untouched. Rats with sham obstructed served as control. The protein expression of AQP1-3 channels was determined in the kidney by Western blot analysis. To further determine the primary point of derangements of AQP channels that are regulated by arginine vasopressin (AVP)/cAMP pathway, the catalytic activity of different parts of adenylyl cyclase complexes was measured.

Results: Urinary osmolality and free water reabsorption was greatly decreased in the previously obstructed kidney, and not changed in the nonobstructed contralateral kidney. The obstructed kidney showed a decreased expression of AQP2 proteins in the cortex, outer medulla, and inner medulla. The expression of AQP1 and AQP3 proteins was also decreased in the outer medulla and inner medulla, though not altered in the cortex, of the obstructed kidney. The expression of Gs and adenylyl cyclase VI proteins was decreased in the medulla of the obstructed kidney. The cAMP generation in response to AVP, sodium fluoride, or forskolin was greatly decreased in the obstructed kidney, and only moderately decreased in the nonobstructed contralateral kidney.

Conclusions: The urinary concentration defect in the postobstructive kidney may at least in part be causally related with a reduced abundance of AQP water channels.

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Periodic hypokalemic paralysis와 동반된 일차성 알도스테론증 2예

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Periodic hypokalemic paralysis는 혈중 칼륨치가 갑자기 감소하면서 근육의 마비가 발생하는 비교적 드문 질환으로 서양보다는 동양인에게 많이 생기고 호흡근육을 침범하는 경우 호흡부전에 의하여 사망할 수 도 있는 질환이다. 원인으로는 대부분의 경우 특별한 원인을 찾을 수 없는 경우가 많으나 갑상선 기능항진, 바륨 중독, 신세뇨관 산증, 감초복용, 신장 또는 위장관으로 통한 칼륨의 소실 등에 의한 저칼륨혈증에 의하여 근마비가 온다고 알려져 있다. 저자들은 고혈압과 periodic hypokalemic paralysis의 임상증상으로 내원 하여 일차성 알도스테론증으로 진단된 2예를 경험하였기에 이에 보고하는 바이다.

두 증례 모두 저칼륨혈증에 의한 근마비로 내원 하였으며 내원 당시 모두 고혈압 소견을 보이고 있었다. 갑상선 기능검사는 두 증례 모두 정상소견을 보였고 그 외 약물복용을 포함한 병력상의 이상소견은 없었다. 입원 후 검사소견은 table 1과 같았다. 두 증례의 환자 모두 복강경을 통한 선종의 절제를 성공적으로 시행한 뒤 현재는 항고혈압제 투여없이 정상 혈압을 유지하면서 건강하게 생활 중이다.

Table 1. The clinical, laboratory, and pathologic findings of 2 cases

	Sex / Age	s-K^+ level at presentation	tCO_2 level at presentation	renin/aldosterone ratio at diagnosis	pathology
Case 1	M / 56	1.8 mEq/L	36 mmol/L	0.24/709.7 pg/mL	cortical adenoma, right
Case 2	F / 23	2.4 mEq/L	29.1 mmol/L	0.10/329.1 pg/mL	cortical adenoma, left