Relationship of nocturnal polyuria and combination anti-hypertensive drug therapy

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Introduction

Nocturia due to nocturnal polyuria is a prevalent problem in middle-aged and elderly patients.[1] Nocturnal polyuria is excessive urine production during the hours of sleep. The mechanism of nocturnal polyuria is believed to be multifactorial, including impaired release of natriuretic peptides and anti-diuretic hormone, and blunting of the normal nocturnal dip in blood pressure (which can drive pressure-natriuresis and thus nocturnal polyuria).[2] This study aims to identify if an association is present between intensity of anti-hypertensive (AHT) drug therapy and nocturnal polyuria.

Methods

We performed a retrospective analysis of voiding diaries taken from men at a Veterans-Affairs based urology clinic. Inclusion criteria were patients with a baseline actual nocturnal voids (ANV) ≥1 and age ≥ 50. Patients were excluded who had a diagnosis of obstructive sleep apnea, diabetes insipidus, congestive heart failure, or chronic renal failure. Patients were split into 3 groups based on number of AHT's taken (0, 1, or 2 or more), which were limited to thiazide diuretics, calcium-channel blockers, and ACE-I's/ARB's. For continuous variables, the Wilcoxon median and 95% confidence intervals are compared. Significance was determined using a one-way ANOVA on ranks.

Results

A total of 184 voiding diaries completed by 184 men were used in the present analysis. Patients taking 0, 1, or 2 or more AHT's had: (1) a nocturnal polyuria index (NPi) of 38% (n=96), 40% (n=59), and 47% (n=29), respectively (p= 0.03, Table 2); (2) an ANV of 2.5, 2.5, and 3.0 (p=0.02); and (3) a nocturnal bladder capacity index (NBCi) of 1.10, 1.23, and 1.53 respectively (p=0.04). Other parameters were not found to be significant, and are displayed in Table 1.

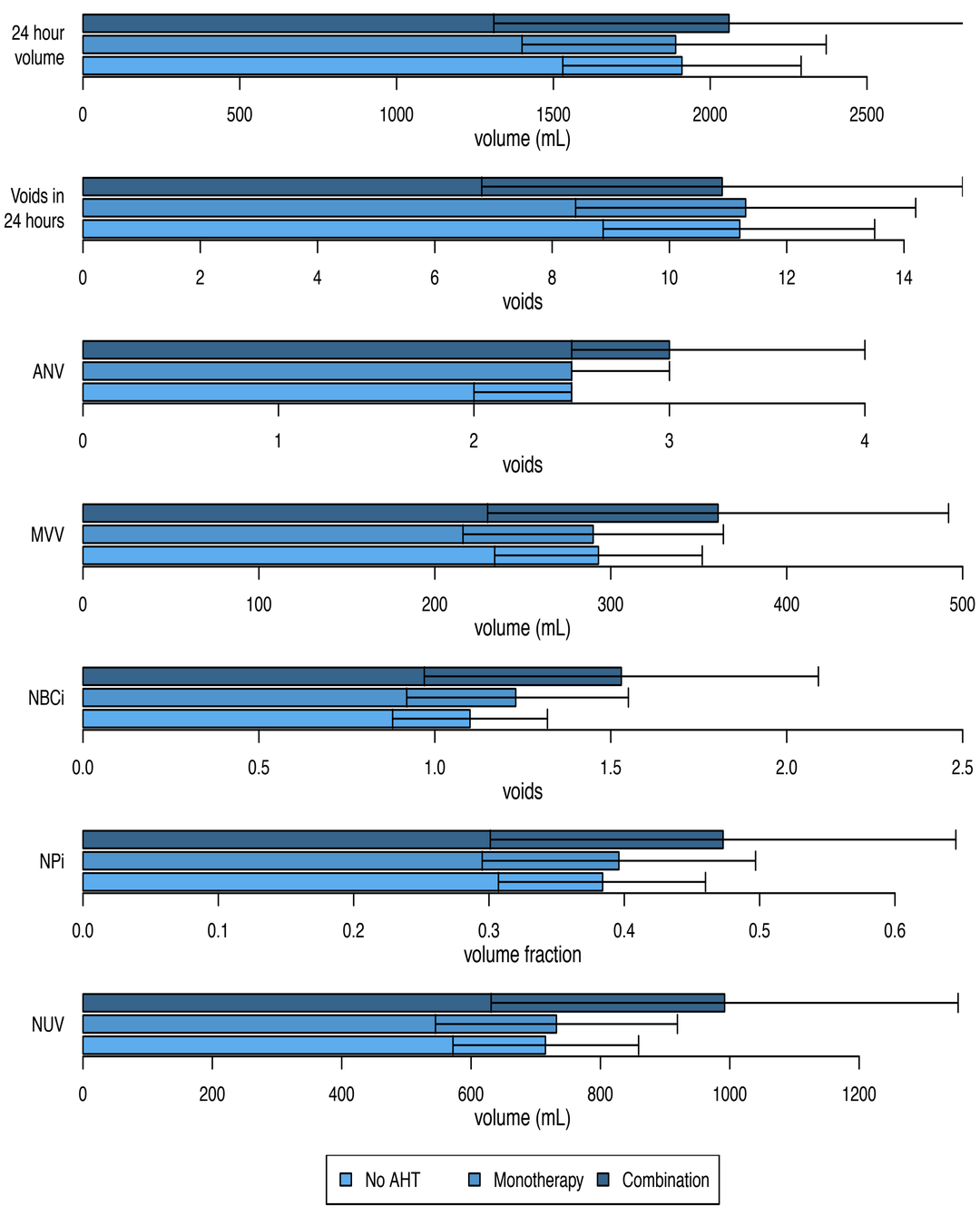

Figure 1. Barplot showing median (95% confidence intervals) of voiding diary parameters in patients taking no anti-hypertensives, monotherapy, and combination therapy. ANV = actual nocturnal voids; MVV = maximum voided volume; NBCi = nocturnal bladder capacity index; NPi = nocturnal polyuria index, and NUV = nocturnal urine volume.

	No AHT (n=96)	**Monotherapy** (n=59)	**Combination therapy** (n=29)
24 hour volume	1910 (1530-2290)	1890 (1400-2370)	2060 (1310-2810)
Voids in 24 hours	11.2 (8.9-13.5)	11.3 (8.4-14.2)	10.9 (6.8-15.0)
ANV	2.5 (2.0-2.5)	2.5 (2.5-3.0)	3.0 (2.5-4.0)
MVV	293 (234-352)	290 (216-364)	361 (230-492)
NBCi	1.1 (0.9-1.3)	1.2 (0.9-1.6)	1.5 (1.0-2.1)
NPi	0.38 (0.31-0.46)	0.40 (0.30-0.50)	0.47 (0.30-0.65)
NUV	715 (572-859)	732 (545-919)	992 (631-1353)

Table 1. Table showing median (95% confidence intervals) of voiding diary parameters in patients taking no anti-hypertensives, monotherapy, and combination therapy.

Conclusions

Combination drug therapy for hypertension, compared with untreated hypertension or monotherapy, was shown to be associated with worse nocturia and nocturnal polyuria. Nocturnal bladder capacity also progressively diminished as compared with MVV, manifesting as the increasing NBCi in patients taking combination therapy. Patients requiring multiple antihypertensive drugs are likely to have more severe and long-standing hypertension, with impairment of both nocturnal dipping of blood pressure and renal tubular sodium and water transport.[3,4]

References

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