Conference Paper

New Aspects on Arterial Hypertension

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Received 15 January 2013; Accepted 1 April 2013

Academic Editors: A. Bellou, E. Giannitsis, C. Hamm, M. Möckel, and J. Searle

This Conference Paper is based on a presentation given by Stefan Blankenberg at “Clinical Decisions in Acute Patients: ACS–POCT–Hypertension and Biomarkers” held from 19 October 2012 to 20 October 2012 in Berlin, Germany.

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Beside established diagnostic and therapeutic guidelines, several new approaches for the treatment of hypertension are emerging. Newer studies reveal the importance of individualized reference values for the treatment of high blood pressure. Several biomarkers have shown a predictive value for the development of hypertension, which in future might help to develop an individual risk score and therapeutic goals. In patients with therapy-resistant hypertension, renal denervation therapy offers a safe and effective therapeutic option. Follow-up studies reported a reduction of systolic blood pressure up to 32 mmHg after 24 months. A more invasive approach is the implantation of a baroreceptor stimulator, which as well was effective in treating high blood pressure. These new aspects on arterial hypertension are presented in this paper.

1. Epidemiology, Prevalence, and Diagnostic Tools

With a worldwide prevalence of 26%, arterial hypertension is a population disease of mayor medical and social-economic interest [1]. The prevalence shows important regional differences, varying from 3% in India to 60% in Germany. By lowering the blood pressure, it is possible to reduce the overall mortality and cardiovascular events [2, 3]. Classical diagnostic instruments, for example, office blood pressure and 24-hour blood pressure measurement are effective and are established in diagnosing arterial hypertension. Furthermore indirect echocardiographic parameters, for example, left-ventricular hypertrophy, diastolic dysfunction, and dilatation of the ascending aorta are related to hypertension. Especially, diastolic dysfunction is strongly associated with arterial hypertension and is a predictor for mortality in older patients [4]. It is classified by echocardiographic measures of mitral-valve velocity and tissue Doppler into three grades.

2. Treatment Guidelines

Already today guidelines recommend individualized reference values for treating hypertension, especially for patients with cardiovascular disease, renal failure, and diabetes mellitus. In the general population, the aim of a reduction below 140/90 mmHg is well established. In patients with manifested coronary heart disease, a reduction of blood pressure below 120/70 mmHg showed an increase in mortality [5]. The HYVET Trial observed that the best outcome in older patients (>80 years) was obtained aiming for a blood pressure below 150 mmHg [6]. Reference values for patients with diabetes mellitus are not yet well evidence based, but the ACCORD study did not show a significant reduction of mortality when lowering the blood pressure below 133 mmHg [7]. Besides lifestyle changes, including physical exercise and weight loss, antihypertensive drugs are the basic therapeutic option. The first commonly used and well-tolerated medial therapy was introduced in 1957 [8]. Nowadays, there are many established antihypertensive drugs, while ACE inhibitors (ACEI), angiotensin-renin blockers (ARBs), diuretics, and

FIGURE 1: Milestones in the treatment of arterial hypertension.

calcium channel blockers (CCBs) are the first choice. The recommendations on the choice of antihypertensive drugs are depending on the national guidelines and show some variation. The European Cardiac Society recommends a monotherapy in patients with moderate arterial hypertension and a low cardiovascular risk [9]. Otherwise, a combination of two drugs is recommended. In patients with special medical conditions, some drugs should be preferred (e.g., ACEI/ARB in subclinical organ damage or diuretics/CCB in elderly and blacks) [9]. A timetable of the milestones in the treatment of hypertension is shown in Figure 1.

3. Role of Biomarkers in Arterial Hypertension

The role of several biomarkers in arterial hypertension is still evaluated. In a large trial, which included 16.000 women, concentrations of C-reactive protein (CRP) and cholesterol were independently associated with the future development of hypertension [10, 11]. In a multibiomarker approach CRP, plasminogen activator inhibitor-1 (PAI-1) and the urinary albumin/creatinine ratio (UACR) were significantly related to incident hypertension [12]. This prospective study included 1500 nonhypertensive individuals, which received a baseline measurement of CRP, fibrinogen, PAI-1, aldosterone, renin, homocysteine, natriuretic peptides, and the UACR. This panel of 9 biomarkers was associated with the development of hypertension, while CRP, PAI-1, and the UACR showed significant results alone. Various new biomarkers are emerging, and with the framework program “Biomarker for Cardiovascular Risk Assessment in Europe” (BiomarCaRE), we can expect new insights into their predictive value for the development of hypertension.

4. New Directions

In patients with therapy-resistant arterial hypertension, renal denervation is a new therapeutic option. In 2009, the first-in-men study showed that denervation of renal sympathetic nerves was safe and effective in lowering the blood pressure [13]. Follow-up studies reported a reduction of systolic blood pressure up to 32 mmHg after 24 months [14, 15]. The effects on renal denervation therapy are not yet completely understood, but various effects on the cardiovascular system have been recently reported. For example, the glucose metabolism

was improved, and arterial stiffness was reduced after renal denervation [16, 17]. In patients with atrial fibrillation, the recurrence rate was reduced after combined renal and cardiac ablation [18]. Several new devices are currently assessed in clinical trials and will widen the therapeutic options, such as “EnligHTN” by St. Jude Medical, “Vessix V2” by Vessix Vascular, “One Shot” by Covidien, and the ultrasound-based “PARADISE” device by ReCor Medical. Stimulating the baroreceptors at the carotid sinus by implantation of the Rheos device is an additional therapeutic option that was effective in reducing blood pressure in therapy-resistant hypertension [19]. A completely new approach offers the antibody CYT006-AngQb, which stimulates production of antibodies against angiotensin II [20]. In the first clinical trial it was effective in reducing blood pressure by 9 mmHg systolic in 83 individuals, but it is still in a very early stage of clinical research.

5. Conclusion

In summary, several new approaches for treatment of hypertension are emerging. It is more and more important to individualize reference values for blood pressure. Several biomarkers could be associated with hypertension. In the future, biomarkers might help to establish an individual risk score and to develop individual therapeutic goals. Renal denervation therapy offers a safe and effective therapeutic option in patients with therapy-resistant hypertension.

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