Orthostatic hypotension in elderly patients.
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CHAPTER 12

Summary
Orthostatic hypotension (OH) occurs frequently in the elderly population, and its prevalence increases with advancing age [1, 2]. International consensus defines OH as a decrease in systolic blood pressure (SBP) by at least 20 mmHg or a decrease in diastolic blood pressure (DBP) by at least 10 mmHg within 3 minutes after changing from supine to a standing position [1].

There is limited information with regard to differences between the various methods to accurately determine OH, about the consequences whenever OH is established, and about the therapy regarding OH in the elderly population. It is advised to perform a continuous blood pressure (BP) measurement, while automated sphygmomanometers with intermittent measurements are commonly used for this purpose in daily practice. It is generally assumed that OH is causally related to falling, cardiovascular complications and mortality, despite the sparse evidence. The lack of evidence regarding OH underlines the need for gaining more knowledge about the implications of OH.

OH is partially caused by antihypertensive treatment. However, information regarding the relation between BP and mortality risk is lacking in a nursing home population, which adds to the discussion that the need for strict antihypertensive treatment in this population is questionable.

Finally, the role of health related quality of life (HRQOL) in this specific population is important and perhaps even more important than numerous clinical parameters. However in what way HRQOL is related to cardiovascular morbidity and mortality is unknown.

The aims of this thesis were to study the OH measurements itself, to study the clinical implications of OH in elderly patients, and to study factors (including OH) that might be related to mortality and successful rehabilitation in nursing home residents.

A large part of this thesis is based on the results of a prospective study performed in a nursing home. Data of this study were used to investigate the relationship between OH and different endpoints like falling, successful rehabilitation, and mortality. Also, health related quality of life (HRQOL) was investigated in this population. The other chapters of this thesis were based on performed cross-sectional cohort study amongst community-dwelling elderly visiting the outpatient clinic of internal medicine, and a prospective cohort study amongst elderly hospitalized with a hip fracture. Various methods to measure OH were studied and the relationship between OH, muscle strength, and successful rehabilitation were described in hospitalized elderly.

The results of the studies as described in the different chapters of this thesis will be summarized below.
In chapters 2 and 3 various methods to measure OH are described. We compared the postural change to standing with the postural change to the sitting position and continuous versus interval blood pressure measurement. A difference was seen in blood pressure response between standing and sitting postural change. Although no significant difference in the prevalence of OH was observed, there was at most moderate agreement between the methods in diagnosing or refuting OH on an individual level. In addition, no difference in the prevalence of OH was observed between OH measurements using the continuous or the interval BP measurement device. However, agreement between methods was low.

In chapters 4 and 5 we described the relation between OH and falling. In chapter 4, no relationship between presence of OH and falling or recurrent falling was found within a nursing home population. The meta-analysis, as described in chapter 5, showed a significant relationship between orthostatic hypotension and time to first fall incident. By performing an individual patient data meta-analysis with prospective studies it can be concluded that OH is associated with the time to a first fall incident. However, the lower boundary and the width of the 95% confidence interval do not exclude the possibility there is no relevant association. Therefore, more prospective studies are needed for a precise estimate of the relationship between OH and falling.

In chapters 6 and 7 we focused on the relationship between OH and rehabilitation in elderly patients. In nursing home residents, patients with OH were found to have a higher chance of successful rehabilitation compared to patients without OH [3]. However, in hospitalized patients with a hip fracture, OH measured during the first days of hospitalization did not predict successful rehabilitation.

The relationship between blood pressure, OH, and mortality in a nursing home population was described in chapter 8. OH was related to increased all-cause mortality, but only in patients at the psychogeriatric department. Besides, a significant relationship was only observed between DBP and all-cause mortality. Although the study showed that DBP and OH were both an independent risk factor for mortality, its practical implications seem to be small. Adding DBP to other important risk factors for mortality, DBP hardly improved risk prediction.

In chapter 9 the discussion about the standard consensus definition of OH is described. We explored different definitions of OH in relation to the endpoints orthostatic complaints and falling. It was shown that the consensus definitions of OH are not related to orthostatic complaints or previous fall incidents in community-dwelling participants aged 65 years and older. Out of all studied definitions, only a marked \(\geq 25\%\) decrease in SBP was related to complaints, whereas only a \(\geq 25\%\) decrease in DBP was related to previous fall incidents.
In chapter 10, the relationship between HRQOL, rehabilitation and mortality in a nursing home population was described. HRQOL, as assessed with the RAND-36 questionnaire, was significantly associated with mortality in three dimensions. However the additional values of these dimensions in mortality prediction were found to be very limited.

Based on the results of this thesis one may conclude that the approach of OH in elderly patients needs to be changed. OH measurements according to the current International consensus definition are not related to important clinical endpoints and therefore not useful in daily practice. Furthermore, the mortality prediction capabilities of BP and HRQOL are very limited in a nursing home population.
Chapter 12

REFERENCES

