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QUESTION FROM THE MEDICAL PRACTICE

The Senile Heart

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Question:

What functional changes take place in the "senile heart"?

Answer:

The term "senile heart" was defined somewhat more accurately for the first time as early as 1942 as a condition in which the limits between natural aging processes of the still healthy heart and pathological changes become blurred (1).

We term the decrease in the muscular force of the heart at advanced age as virtually still physiological in old age (according to M. Burger) (2). The term "senile heart" is frequently used although we know that different authors have highly deviating ideas of this. Some view it as a still "latent" cardiac insufficiency, others observe the decreasing muscular force as if it were as an age-specific and not yet in a real sense pathological process [opinions from 1982; cf. (2)].

However, there is no reference to the term "senile heart" in the *Handlexikon der Medizin* by G. Thiele, published in 1980 (3), in contrast to a multitude of "senile diseases" such as senile atrophy, senile dementia, senile depression, adult-onset diabetes, senile polyglobulia, senile emphysema, senile gangrene, senile skin, senile high pressure, senile pruritus, senile deafness, presbyopia etc.

Special reference is made to the senile heart in the chapter "Spezielle klinische Pharmakologie in der Geriatrie" (7). Pathological-anatomical and functional alterations which naturally make the term "senile heart" understandable are

described. Since the clinical signs of such senile heart alterations remain by all means discrete and cannot always be diagnosed with the normal facilities of the clinic, it is always necessary to think of the senile heart in old people and to make use of corresponding therapeutic measures.

In the *Monatskurse für die Ärztliche Fortbildung* published in 1982 (4) by chief physician Dr. med. Karl-Siegfried Lachnit, medical departmental head of the IVth medical department in the nursing home of the town of Wien-Lainz, Versorgungsheimplatz 1, A-1130 Vienna; in a survey paper on "reduced functional powers in age" in a special survey, reference is made in detail to "functional alterations to the senile heart" which are quoted below in semitabular form.

Functional alterations to the senile heart:

1. Cardiac output reduced and ejection time shortened
2. Delayed recovery of the pulse rate after effort
3. Reduced maximum oxygen consumption
4. Enddiastolic pressure and pulmonary vascular resistance increased; pulmonary heart disease; please also refer to (6)
5. Reduced reaction of the heart rate to stress loads, probably because of embedded connective tissue in the sinus and atrioventricular nodes and in the atrioventricular bundle; the catecholamine receptors of the myofibrils are presumably also reduced
6. The isometric or better isovolumetric phase of the ventricular systoles and the relaxation are prolonged; this is

connected with the reduced production of calcium ions from the sarco-plasmatic reticulum; the consequence is delayed myocardial contractility

7. Elevated peripheral vascular resistance
8. The arterial pulse wave velocity is extended by the reduced elasticity of the vessels and by arteriosclerotic processes
9. Increase in systolic and diastolic blood pressure and increasing vascular fridity, possibly as reaction to the reduced cardiac output
10. Increased venous pressure and extended circulation time.

The consequences of reduced cardiac output (item 1 above) and of the extended circulation time (item 10 above) are reduced blood supply and thus intensified oxygen deficiency in organs and tissues

This is particularly critical in the brain, in the coronary arteries and in the kidneys (4).

Shock (quoted in [4]) showed that in the kidneys the glomerular filtration rate drops with increasing age and renal plasma flow also falls rapidly, the latter probably because of constriction of the sympathetic efferent arterioles.

It should be said in addition here that the glomerular filtration rate (GFR)—physiologically—decreases continuously from approximately the 40th year and is at the age of 80 years at around 50% of the initial value, as I reported in 1981 in *Biol. Med.*, this being with special reference to the practical consequences with regard to digitalis therapy in old age (6).

As a further consequence of the reduced cardiac output (item 1 above) and of the extended circulation time (item 10 above), as well as of the above mentioned constriction of the sympathetic efferent arterioles, the colour and temperature

of the extremities change leading to livid and cold hands and feet (4).

Reference should be made to the fact that indolence towards physical complaints very frequently exists in old people (4,5). This is also very frequently connected—and also applies for the senile heart—with the fact that “the old organs suffer without complaining”, as was recently expressed very aptly (4,5).

References

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