MAJOR AETIOLOGICAL TYPES OF HEART FAILURE IN THE BANTU IN DURBAN*

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Material for this study includes routine necropsy and histological records of 877 consecutive deaths from heart failure in African and Indian subjects at King Edward VIII Hospital during the period January 1958 - December 1962. The criteria determining their inclusion in this series are as follows:

Sudden cardiac death: those in whom no evidence of congestive failure was found but death had been sudden and resulted from some form of heart disease.

Congestive heart failure: congestive heart failure from any cause other than acute bacterial endocarditis, acute pericarditis associated with pneumonias and uraemia, and possible toxic myocarditis occurring with diphtheria, typhoid, pneumonia, etc.

ANALYSIS OF MATERIAL

Sudden Cardiac Deaths

In 9,069 consecutive necropsies, performed on Bantu patients, there were 6 sudden cardiac deaths. The age, sex and aetiological types of heart disease in these 6 patients are summarized in Table I.

TABLE I. AGE, SEX, AND AETIOLOGICAL FACTORS IN 6 CASES OF SUDDEN CARDIAC DEATH IN BANTU PATIENTS

Sex	*Age in years*	*Cause*
M	60	Syphilitic aortitis with narrowing of the coronary ostia
M	53	Syphilitic aortitis with narrowing of the coronary ostia
M	60	Syphilitic aortitis with narrowing of coronary ostia plus coronary artery embolism from vegetations on the aortic valves
F	53	
M	34	Coronary atheroma and myocardial infarction
F	30	Rheumatic valvular disease (mitral stenosis)

Syphilitic aortitis is thus the commonest cause of acute heart failure in the Bantu in this series, males in the sixth decade of life being most frequently affected. For comparison, in 829 consecutive postmortem examinations of Indian subjects there were 5 cases of acute heart failure, the age, sex, and aetiology being shown in Table II. By contrast with the Bantu, coronary atheroma accounts for all 5 acute cardiac deaths among Indian subjects.

TABLE II. AGE, SEX, AND AETIOLOGICAL FACTORS IN 5 CASES OF SUDDEN CARDIAC DEATH IN INDIAN PATIENTS

Sex	*Age in years*	*Cause*
M	52	Coronary atheroma and myocardial infarct
M	57	Coronary atheroma and myocardial infarct
M	50	Coronary atheroma and myocardial infarct
M	44	Coronary atheroma and myocardial infarct
F	45	Coronary atheroma, myocardial infarction with rupture of wall of left ventricle

Although these results do not reflect the true incidence of acute heart failure on account of the legal formality attached to sudden deaths, they nevertheless do reveal interesting differences in the aetiological processes responsible for such deaths in the Bantu as compared with the Indian in Durban.

Coronary artery and hypertensive diseases, in predominantly white American communities, are reported as being the most frequent of all causes of unexpected, sudden, natural deaths.[1-3] Males are particularly affected, and the majority of all cases sampled by Martland were between the ages of 40 and 65 years. Helpern and Rabson,[2] while recording coronary artery disease as the major aetiological factor among all diseases of the heart and aorta responsible for sudden deaths, place syphilitic aortitis second and valvular diseases third in order of frequency. Rabson[4] recorded disease of the heart and aorta as occupying first place among all causes of sudden natural deaths at and after the ages of 35 - 39 years.

The results here show that coronary artery disease, which features so prominently in White pathology in South Africa and in many other parts of the world, is also the most frequent cause of acute heart failure in the Indian population, but much less so among the Bantu in Durban.

Obstruction of the coronary ostia by syphilitic involvement of the aorta is the main cause of an acute cardiac death among Bantu in agreement with the findings of Williams[5] and Davies[6] in Uganda, and Elliot[7] in South Africa. Although extensive atheroma may occur in association with syphilitic aortitis,[5] this was not considered an important factor contributing towards the suddenness of death in these patients. Because obstruction takes place at the coronary ostia, death occurs rapidly and usually follows on sudden exertion, excitement, or alcohol. The myocardium in such instances may show no evidence of infarction, this being so in the present series.

With regard to age, the patients included here are older than the majority of Williams's cases,[5] but it must be appreciated that the above author referred to age at onset of symptoms, while this work reflects the age at death. Males preponderated in this series, in keeping with the general opinion that syphilitic aortitis is more frequent among males.

It is of interest to note that in 2 of the 4 cases of acute deaths from syphilitic aortic-cardiac disease, although ostial narrowing was present, the final episode was the result of an embolus impacting in a narrowed coronary ostium. The source of the embolism was, in both cases, bacterial vegetations on the aortic valves. While this contrasts with the findings of Libman,[8] Fulton and Levine,[9] Williams,[5] and Koletsky,[10] it is in agreement with those of Braunstein and Townsend,[11] Rosenberg,[12] Wright and Zeek,[13] and Siew,[14] and supports the view that the association between syphilitic aortic valve disease and subacute bacterial endocarditis is not as rare as is believed. Such association, when present, may enhance the risk of sudden death from coronary embolism.

Congestive Heart Failure

In Bantu, as in Indian subjects, this was the commonest type of heart failure encountered at necropsy. During the 5-year necropsy survey period, 684 Bantu and 173

*Abstract from a thesis approved by the University of Natal for the M.D. degree.

Indians died as a result of congestive heart failure. The relative incidence of the aetiological types encountered in the 2 race groups is shown in Table III.

TABLE III. AETIOLOGICAL TYPES OF CONGESTIVE HEART FAILURE: 684 BANTU AND 173 INDIAN CONSECUTIVE CASES OF CCF IN ROUTINE NECROPSIES

Aetiological type of heart disease	*Bantu*		*Indians*	
	No.	*%*	*No.*	*%*
Rheumatic	147	21·5	40	23·1
Hypertensive	129	18·9	40	23·1
Cardiomyopathy	108	15·8	1	0·6
Cor pulmonale	82	12·0	19	11·0
Syphilitic	33	4·8	1	0·6
Pericarditis				
Tuberculous	33	4·8	1	0·6
Non-tuberculous	19	2·8	0	—
Coronary	15	2·2	45	26·0
Congenital	48	7·0	7	4·0
Senile (multiple causes)	20	2·9	5	2·8
Miscellaneous	31	4·5	7	4·1
Undiagnosed	19	2·8	7	4·1
Total	684	100·0	173	100·0

While marked differences appear in the relative incidence of cardiomyopathy, pericarditis, syphilitic heart disease and coronary heart disease in the 2 racial groups, no significant differences are apparent when the less common causes of heart failure are considered.

In an appreciable number of older subjects (65 years and over), of both races, multiple causes for the development of congestive heart failure were present in the same patient, and no single cause could be incriminated as being the most important. Such cases have therefore been listed separately under the heading 'Senile (multiple causes)', the incidence proving much the same in both the Bantu and the Indian.

The miscellaneous group included anaemia (6 Bantu and 4 Indians); viral myocarditis, occurring mainly in children (19 Bantu and 2 Indians); suppurative myocarditis (1 Indian); mycotic aneurysm of mitral valve (1 Bantu); eclampsia (2 Bantu); and myocardial infarction due to embolism of coronary artery in an otherwise normal heart or aorta (3 Bantu).

In a fair number of cases of both races no cause was apparent either at necropsy or on histological examination. Included in this category were 2·8% of Bantu and 4·1% of Indian deaths from congestive heart failure.

Table IV shows comparative clinical and necropsy figures from 4 series of cases elsewhere in Africa[6,15-17] and 5 series from South Africa,[18-22] together with those quoted for the United Kingdom by Wood.[23] The latter are used in substitution for figures in relation to White races, since no comparative figures for South African Whites are available.

As evident from Table IV, the present series of Bantu necropsies show rheumatic heart disease to be the commonest cause of congestive heart failure, with hypertensive heart disease occupying second place, and cardiomyopathy third position. Cor pulmonale, pericarditis, and syphilitic heart disease follow in order of frequency. Although general agreement exists among the majority of clinical and necropsy studies regarding the chief causes of congestive heart failure in the Bantu population of South Africa, variations appear in respect of the relative incidence of the different aetiological types.

Rheumatic heart disease, though not shown as the most frequent cause of congestive heart failure in some other series, nevertheless appears as one of the 3 most common causes of heart failure in the Bantu. Whereas the necropsy incidence of this disease is by comparison extremely low in Uganda,[6] a comparatively higher incidence is seen in Bulawayo.[17]

Hypertensive heart disease, as a cause of congestive heart failure, is common throughout Africa. Although most series do not show this to be the most frequent cause as reported by Becker,[18] it is nevertheless obvious from both clinical and necropsy studies that the disease is less common among the Bantu inhabitants of South Africa than among those of Uganda.

There is almost general disagreement among the various investigators in South Africa as regards the relative incidence of cardiomyopathy among the Bantu. Higginson *et al.*,[20] from a necropsy study, and Cosnett,[21] from clinical evidence, regarded cardiomyopathy to be less frequent than cor pulmonale, placing it fourth in line of causes of congestive cardiac failure. Yet, the clinical reports of Schwartz *et al.*[19] and Powell and Wright[22] show cardiomyopathy as the most important cause of heart failure among the local Bantu population. A disparity in the incidence of the disease is also observed in reports from Southern Rhodesia.[15,17] Becker,[18] however, makes no mention of cardiomyopathy, his work having been published before the concept of this disease was defined.

TABLE IV. AETIOLOGICAL DISTRIBUTION OF CONGESTIVE HEART FAILURE IN THE BANTU

Types of heart disease	*Clinical series*							*Necropsy series*				
	Wood (London) 1956 (Whites)	*Gelfand (Southern Rhodesia) 1957*	*Schwartz et al. (Tvl, SA) 1958*	*Shaper & Williams (Uganda) 1960*	*Cosnett (Natal, SA) 1962*	*Baldachin (Southern Rhodesia) 1963*	*Powell & Wright (Natal, SA) 1965*	*Present series (Bantu)*	*Becker (Tvl, SA) 1946*	*Davies (Uganda) 1948*	*Higginson et al. (Tvl, SA) 1960*	*Present series (Indian)*
Total cases		189	275	712	1,000	564	270	694	332	229	537	173
Rheumatic	20·0	27·0	23·6	14·7	20·5	38·3	17·0	21·5	23·5	3·4	32·4	23·1
Hypertensive	30·0	14·8	19·6	37·4	20·2	22·2	14·0	18·9	28·6	31·0	18·6	23·1
Cardiomyopathy	0·3	15·4	37·5	—	13·8	7·3	34·0	15·8		—	14·9	0·6
Endomyocardial fibrosis	—	—	—	13·6	—	—	—	—	—	9·6	—	—
Cor pulmonale	5·0	3·7	10·9	0·28	16·2	5·1	10·0	12·0	10·0	3·9	15·6	11·0
Pericarditis	1·0	6·9	4·0	3·5	2·5	2·8	6·0	7·6	—	3·5	4·8	0·6
Syphilitic	1·0	10·5	1·1	13·6	8·8	11·3	10·0	4·8	16·9	20·9	6·1	0·6
Coronary	30·0	—	0·4	1·3	0·6	—	—	2·2	1·5	4·3	2·2	26·0
Congenital	1·5	8·9	1·1	1·3	0·6	7·1	—	7·0	1·8		2·2	4·0
Senile (multiple causes)	—	—	—	—	—	—	4·0	2·9	—		—	2·8
Miscellaneous	—	11·7		2·8	3·5	5·9	5·0	4·5	6·3		3·0	4·1
Undiagnosed	—	1·1	—	11·8	13·3		—	2·8	4·0	5·1	—	4·1

Cor pulmonale is apparently common in the Bantu in South Africa, where its incidence is shown in the various series to be of the order of 10 - 16% of all cases of congestive heart failure. These percentages are higher than those quoted elsewhere in Africa and higher also than that reported by Wood[23] for central London.

Except for the low percentage quoted by Schwartz *et al.*,[19] syphilitic heart disease is an important cause of congestive cardiac failure throughout Africa. In contrast to most other series, pericarditis is shown in the present study to be a more common cause of heart failure in the Bantu than is syphilitic heart disease. During the course of this study it was noted that clinically pericarditis was more often misdiagnosed as cardiomyopathy than vice versa. This factor may account for a higher incidence of syphilitic heart disease in comparison with pericarditis in certain clinical series.

The figures obtained for Indians in Durban bear a close similarity to those reported by Wood.[23] The high incidence of coronary heart disease and the low incidence or absence of cardiomyopathy, pericarditis, syphilitic heart disease and endomyocardial fibrosis among Indians and Whites in these studies contrast with the findings among Bantu populations in this and other series.

SUMMARY AND CONCLUSIONS

In contrast to the findings for Indians and those reported for White races, syphilitic heart disease is the main cause of a sudden cardiac death among Bantu patients. Subacute bacterial endocarditis may complicate syphilitic aortic valve disease, and embolization from such vegetations may be responsible for the suddenness of death in some such cases.

Congestive heart failure is the commonest form of cardiac decompensation encountered in the Bantu at necropsy. Whereas coronary heart disease, rheumatic heart disease, hypertensive heart disease, and cor pulmonale are the four main causes for congestive cardiac failure among the Indian and White races in South Africa, the Bantu shows 6 major causes which in order of frequency are rheumatic heart disease, hypertensive heart disease, cardiomyopathy, cor pulmonale, pericarditis, and syphilitic heart disease.

The chief difference regarding aetiology is observed in the low incidence of coronary heart disease, and the increased frequency with which infective conditions are encountered among Bantu in contrast to the other 2 race groups. However, cardiomyopathy, pericarditis, and syphilitic heart disease together account for almost as many deaths from congestive cardiac failure in the Bantu as does coronary heart disease in the other racial groups.

Apart from minor variations the pattern of heart disease in the Bantu in South Africa is similar to that reported in African communities in other parts of the continent, except for the presence of endomyocardial fibrosis in certain countries where cardiomyopathy is not encountered.

I wish to thank Dr H. R. J. Wannenburg, Medical Superintendent, King Edward VIII Hospital, Durban, for facilities, and the University of Natal for permission to publish. This study was partly financed by the US Public Health Service (NIH Grant HE 05445).

REFERENCES

1. Martland (1940): Quoted by White, P. D. (1951): *Heart Disease*, 4th ed., p. 955. New York: MacMillan.
2. Helpern, M. and Rabson, S. M. (1945): *Op. cit.*[4]
3. Rabson, S. M. and Helpern, M. (1948): Amer. Heart J., **35**, 635.
4. Rabson, S. M. (1950): Ann. Intern. Med., **86**, 361.
5. Williams, A. W. (1938): E. Afr. Med. J., **15**, 279.
6. Davies, J. N. P. (1948): *Ibid.*, **25**, 10, 117, 228, 322 and 454.
7. Elliot, G. A. (1953): Leech (Johannesburg), **23**, 25.
8. Libman (1917): *Op. cit.*[10]
9. Fulton, M. N. and Levine, S. A. (1932): Amer. J. Med. Sci., **183**, 60.
10. Koletsky, S. (1942): Amer. Heart J., **23**, 208.
11. Braunstein, A. L. and Townsend, S. R. (1940): Arch. Intern. Med., **65**, 957.
12. Rosenberg, D. H. (1940): *Ibid.*, **66**, 441.
13. Wright, J. and Zeek, P. M. (1940): Amer. Heart J., **19**, 587.
14. Siew, S. (1958): Leech (Johannesburg), **28**, 61.
15. Gelfand, M. (1957): *The Sick African*, 3rd ed. Cape Town: Juta.
16. Shaper, A. G. and Williams, A. W. (1960): Trans. Roy. Soc. Trop. Med. Hyg., **54**, 12.
17. Baldachin, B. J. (1963): Cent. Afr. J. Med., **9**, 463.
18. Becker, B. J. P. (1946): S. Afr. J. Med. Sci., **11**, 1, 15, 18, 97 and 107.
19. Schwartz, M. B., Schamroth, L. and Seftel, H. C. (1958): Med. Proc., **4**, 275.
20. Higginson, J., Isaacson, C. and Simson, I. (1960): Arch. Path., **70**, 497.
21. Cosnett, J. E. (1962): Brit. Heart J., **24**, 76.
22. Powell, S. J. and Wright, R. (1965): S. Afr. Med. J., **39**, 1062.
23. Wood, P. (1956): *Diseases of the Heart and Circulation*, 2nd ed. London: Eyre & Spottiswoode.