THE RARITY OF PULMONARY THROMBOEMBOLISM IN ASIANS

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It is generally accepted that pulmonary thromboembolism, a common condition in Western communities, is exceedingly rare among Asians and Africans. This conclusion has been reached on the basis of clinical studies (Franz *et al.*, 1961, Tinckler, 1964, Srivatava, 1964). As rare diseases are not readily diagnosed clinically, it appears particularly relevant to make a study of the frequency of this disease among necropsies.

This paper on the frequency of pulmonary thromboembolism in Asians is based on 36,176 consecutive necropsies in Singapore.

MATERIALS AND METHODS

The cause of death returns from 36,176 necropsies, representing virtually all the necropsies performed in Singapore during a 15 year period (1952-1966), were examined and the necropsy reports of all deaths due to pulmonary thromboembolism or to conditions with which pulmonary embolism might be associated (*e.g.* pulmonary thrombosis, pulmonary infarctions, venous thrombosis, etc.) were scrutinized. To check the reliability of this method, all the 12,767 necropsy reports over a 5 year period (1962-1966) were scrutinized individually; this examination showed that no case of pulmonary thromboembolism was missed by the first method.

The present study includes two categories of necropsies:

(i) Coroner's necropsies (46·5%) on persons dying from 'unnatural' causes, persons dying without medical attendance, etc.,

(ii) elective necropsies (53·5%) performed with the consent of relatives on persons dying in hospitals.

The distributions of all necropsies during 1952-1966 according to age, sex and race are shown in Table I. There is a high proportion of children and a low necropsy rate among Malays and adult females in this series.

In most necropsies, full examinations were performed. The leg and pelvic veins were dissected only when indicated.

RESULTS

29 cases of pulmonary thromboembolism were found in this series, giving an overall incidence of 0·80 per 1,000 necropsies and an incidence of 1·63 per 1,000 necropsies in adults over the age of 20 years.

The incidence of pulmonary thromboembolism in necropsies by race, sex and age are shown in the Table II. Adult females were 3·5 times more frequently involved with pulmonary emboli than adult males. Indians were more frequently involved than Chinese. The incidences per 1,000 adult necropsies were 0·93 for Chinese

TABLE I

NUMBER OF NECROPSIES DURING THE YEAR 1952—1966
BY RACE, SEX AND AGE GROUPS

		Chinese		Indians		Malays		Others		Total	
		Males	Females	Males	Females	Males	Females	Males	Females	Males	Females
Age 20 and below	Elective	7,966	6,246	215	209	6	8	38	27	8,225	6,490
	Coroner's	2,621	1,591	187	122	201	103	38	23	3,047	1,839
	Total	10,587	7,837	402	331	207	111	76	50	11,272	8,329
Age above 20	Elective	2,821	1,190	426	84	8	15	69	26	3,324	1,315
	Coroner's	6,841	2,207	1,739	182	468	135	318	46	9,366	2,570
	Total	9,662	3,397	2,165	266	476	150	387	72	12,690	3,885
Total	Elective	10,787	7,436	641	293	14	23	107	53	11,549	7,805
	Coroner's	9,462	3,798	1,926	304	639	238	356	69	12,413	4,409
	Total	20,249	11,234	2,567	597	683	261	463	122	23,962	12,214

TABLE II

LIST OF PULMONARY THROMBOEMBOLISM

No.	Sex	Age	Race	Relevant Clinical History	Sites of Emboli	Sites of Venous Thrombosis
1.	M	19	Chinese	Carcinoma of pancreas with secondaries in L 1, L 2.	Pulmonary trunk and Right pulmonary artery	Periprostatic Plexus
2.	M	31	Chinese	died 3 days after appendicectomy	Left pulmonary artery	—
3.	M	33	Chinese	died 14 days after hemicolectomy.	Both pulmonary arteries	—
4.	M	38	Chinese	died 7 days after subtotal gastrectomy	Both pulmonary arteries	Left common and internal iliac
5.	M	52	Chinese	died 10 days after fractured L I.	Both pulmonary arteries	—
6.	M	55	Chinese	died 5 days after open reduction left lip	Pulmonary trunk	left calf veins
7.	M	56	Chinese	died 11 days after fractured L 1	Pulmonary bifurcation	—
8.	M	61	Chinese	Found dead in public lavatory	Both pulmonary arteries	Right popliteal up to femoral
9.	M	64	Chinese	Senile dementia. Sudden death	Right pulmonary artery	Both profunda femoris
10.	M	82	Chinese	died 24 days after fractured right femur	Right pulmonary artery	Right popliteal up to common iliac
11.	M	30	Indian	died 9 days after fractured cervical spine	Left pulmonary artery	—
12.	M	46	Indian	Left pleurisy pain with fever, oedema of left leg died 11 days after admission	Right pulmonary artery	Left popliteal up to femoral
13.	M	57	Indian	Old encephalitis; coma for 13 days	Left pulmonary artery	Periprostatic plexus
14.	M	66	English	Sudden death	Both pulmonary arteries	Left popliteal
15.	F	8	Chinese	Nephrotic syndrome on prednisolne	Pulmonary trunk and arteries	Right profunda femoris
16.	F	42	Chinese	Mental patient, right vein thrombophlebitis	Pulmonary trunk	—
17.	F	43	Chinese	Sella turcica meningioma	Right pulmonary artery	—
18.	F	57	Chinese	died 3 days after appendicectomy	Left pulmonary artery	—
19.	F	59	Chinese	died 10 hours after right nephrectomy for tumour	Both pulmonary arteries	—
20.	F	62	Chinese	Cerebral thrombosis, died 6 days after admission	Pulmonary trunk	Right popliteal up to right external iliac
21.	F	67	Chinese	died 9 days after iridectomy	Left pulmonary artery	—
22.	F	70	Chinese	Senile dementia, sudden death	Pulmonary trunk	Right common iliac up to inferior vena cava.
23.	F	72	Chinese	died 10 days after fresh cerebral thrombosis	Both pulmonary arteries	Right femoral up to external iliac
24.	F	78	Chinese	died 20 days after fractured spine	Both pulmonary arteries	Right ovarian
25.	F	88	Chinese	died 14 days after below knee amputation	Right pulmonary artery	Right and left profunda up to femoral
26.	F	26	Indian	Fractured 6 and 7: 18.6.58 delivered a stillbirth 25.6.58 died 19.7.58	Both pulmonary arteries	Left internal iliac up to common iliac
27.	F	33	Indian	In puerperium. No history	Pulmonary trunk	Periuterine
28.	F	45	Malay	died 3 days after right above knee amputation for diabetic gangrene	Both pulmonary arteries	Right iliac
29.	F	38	Indian	Mental patient. Sudden death	Left pulmonary artery	Both femoral

males, 1·38 for Indian males, 2·94 for Chinese females and 11·28 for Indian females.

The pulmonary emboli were all massive, involving the main pulmonary artery or the major branches on one or both sides. The majority of patients (66%) died suddenly. A definite clinical diagnosis of pulmonary embolism was made in only three cases.

The 29 cases belonged to the following categories:

Surgical (postoperative, 10 hours to 14 days): 8 cases.

Orthopaedic (mostly fractured spine or hip) : 7 cases.

Medical (psychiatric, hemiplegic, congestive heart failure, etc.) : 13 cases.

Obstetrical (During puerperium) : 1 case.

Venous dissections at necropsies were performed in 19 of the 29 cases. Thromboses were present in the leg veins in 6 cases, in the high veins in 9 cases, and in the pelvic veins in 7 cases. The veins on the right side were involved in 8 cases, on the left side in 5 cases and on both sides in 3 cases.

During the same period there were 30 cases of pulmonary thrombosis occurring mainly in patients with pulmonary hypertension, and 10 cases of systemic venous thrombosis without embolism. Tumour, fat, air and septic emboli were excluded from the present study.

DISCUSSION

The average necropsy incidence of fatal pulmonary thromboembolism in Western general hospitals is about 10 per cent (Dexter *et al.*, 1960). Massive pulmonary embolism is exceedingly rare in Singapore. The characteristic clinical features of massive pulmonary embolism are virtually unknown in postoperative patients in Singapore (Tinckler, 1964). During a five year period (1962-1966) there were 52,861 major operations in Singapore General Hospital (Table IV), and postoperative pulmonary embolism was found in only 5 cases giving an incidence of 0·094 per 1,000 operations. The mean incidence of fatal postoperative pulmonary embolism in the West is 0·14 per cent (DeBakey, 1954).

TABLE III

NUMBER AND INCIDENCE OF PULMONARY EMBOLISM BY RACE, SEX AND AGE GROUPS

		Chinese		Indians		Malays		Others		Total	
		Males	Females	Males	Females	Males	Females	Males	Females	Males	Females
Age 20 and below	Number of cases	1	1	0	0	0	0	0	0	1	1
	Incidence (per 1,000 necropsies)	0.09	0.13	0	0	0	0	0	0	0.08	0.12
Age above 20	Number of cases	9	10	3	3	0	1	1	0	13	14
	Incidence (per 1,000 necropsies)	0.93	2.94	1.38	11.28	0	6.67	2.58	0	1.02	3.60

TABLE IV

ADMISSIONS AND MAJOR OPERATIONS IN GENERAL HOSPITAL (1962—1966)

	Medical	Surgical	Orthopaedic	ENT and Ophthalmic	Paediatric
Admissions	53,228	74,241	21,460	15,902	59,188
Major Operations	—	27,910	10,874	14,077	—

It is unlikely that race *per se* is the cause or the low frequency of pulmonary embolism in Asians and Africans. While Africans in Africa have a low frequency (Franz *et al.*, 1961), American Negroes experience a frequency essentially similar to the American Whites (Ochsner *et al.*, 1951).

Blood fibrinolytic activity, an important factor in the genesis of thromboembolism, has been shown to be much higher in Africans, Indians and natives of New Guinea than in Caucasians (Fearnley, 1961, Franz *et al.*, 1961, Goldrick, 1961). This activity may be reduced by a raised plasma lipid level which in turn is influenced by dietary intake of fats (Kwaan *et al.*, 1957, Tillman *et al* 1960); a low dietary intake of fat would therefore appear to be a possible explanation for the low frequency of pulmonary embolism in Asians. It may be of interest to note that the Chinese in Singapore are much less liable to coronary heart disease than Europeans, and the incidence of mural thrombosis and embolism following myocardial infarction is lower in Chinese than in occidental experience (Muir, 1960).

It is probable that the marked female preponderance to pulmonary embolism in the present series is due partly to a bias in selection. Whereas the frequency of necropsies in adult females is much lower than that of adult males due to greater difficulty in getting consent for necropsy, this difference is not likely to be marked for patients with pulmonary embolism, where, owing to the sudden or often unexpected nature of the death there is a much higher likelihood for a postmortem examination.

SUMMARY

Massive pulmonary thromboembolism is an exceedingly rare disease in Asians. A review of 36,176 necropsies over a 15 year period in Singapore showed that pulmonary thromboembolism occurred in 0·80 per 1,000 necropsies (all ages) or 1·63 per 1,000 adult necropsies.

Some possible causes for the low incidence are discussed.

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