Chapter 12. Atherosclerosis and peptic ulcer

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Aortic and coronary atherosclerosis and the frequency of coronary stenosis and myocardial lesions were studied in subjects with peptic ulcer, in two subgroups with acute and chronic peptic ulcer, and in subjects who had undergone a stomach operation. In all these respects the groups were similar to each other. Men with peptic ulcer had the same amount of aortic atherosclerosis as the standardized average coronary atherosclerosis group but less coronary atherosclerosis, while women with peptic ulcer had less aortic and much less coronary atherosclerosis. The prevalence of coronary stenosis, fresh myocardial infarction, and myocardial scar was very low in those with peptic ulcer, especially in women.

Although the possible relationship between peptic ulcer and atherosclerosis merits investigation in view of the fact that both conditions are influenced by environmental and, at least in the case of peptic ulcer, psychogenic factors, no studies of this relationship seem to have been published and there have only occasionally been reports dealing with the problem from a clinical point of view.

MATERIAL AND METHODS

During a 5-year period autopsy material was collected from 5 different towns in Europe by means of the methods described in Chapter 1. Peptic ulcer was found in 594 males aged between 10 and 99 years and in 291 females aged between 20 and 99 years. However, the numbers of males and females outside the age range 40–89 were too small to be used in this analysis.

The age, sex, and geographical distribution of subjects with peptic ulcer are shown in Table 34, which also indicates the frequency in relation to the number of non-violent deaths. It includes subjects with ulcer, type unspecified. In some cases either acute or chronic peptic ulcer was recorded as the principal disease; details of such cases are given in Table 35. The total number of subjects in each of these two ulcer groups was the same.

The analysis was performed both on the material broken down into age decades and on the age group 40–79 as a whole. The prevalence of atherosclerosis in the ulcer subjects was compared with that in the low atherosclerosis group (excluding subjects with peptic ulcer) and the extent of atherosclerosis in the ulcer subjects was also compared with that in the standardized average and high atherosclerosis groups. Comparisons were also made involving subjects with peptic ulcer but without hypertension and diabetes (319 out of 511 men and 142 out of 204 women). Subjects with different types of ulcer were also compared with subjects who had undergone an operation on the stomach (429 men and 163 women).

RESULTS

Prevalence

The prevalence of atherosclerotic lesions in the abdominal aorta in subjects with peptic ulcer and in the low atherosclerosis group is shown in Table 36. Complicated and calcified lesions in both men and women were more prevalent in subjects with peptic ulcer than in the low atherosclerosis group, while raised lesions showed a similar prevalence. Milder forms of atherosclerosis (fatty streak or fatty streak with fibrous plaque only) were consequently more prevalent in the low atherosclerosis group. The findings for the coronary arteries were similar (Table 37): both men and women with ulcer had a higher prevalence of complicated and calcified lesions than the low atherosclerosis group, and milder forms of atherosclerosis were less common in ulcer subjects. Although the prevalence of raised coronary lesions showed only slight differences they also tended to be more prevalent in ulcer subjects than in the low atherosclerosis group, both for the different age decades and in terms of age-standardized values. Coronary stenosis was much more prevalent in subjects with peptic ulcer, especially in men, the

Table 34. Number of subjects aged 40–79 with peptic ulcer and its frequency (%) among non-violent deaths, by age, sex, and town

Age group	All towns[a]				Malmö				Prague				Ryazan				Yalta				Tallin			
	M		F		M		F		M		F		M		F		M		F		M		F	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
40–49	41	6.6	8	1.7	20	12.0	2	1.5	10	16.9	2	3.4	4	2.9	2	2.1	3	3.5	—	—	4	2.3	2	1.6
50–59	133	8.0	44	4.2	68	14.1	23	7.1	32	10.3	11	6.4	18	6.6	3	2.2	6	3.4	3	2.5	9	2.2	4	1.4
60–69	201	7.9	80	3.7	118	12.1	32	5.3	57	9.8	20	4.5	9	3.8	4	1.5	9	4.0	9	4.3	8	1.5	15	2.5
70–79	136	7.1	72	3.4	86	10.4	24	3.2	38	6.8	27	3.7	2	2.2	2	2.2	3	3.1	8	7.1	7	2.0	11	2.3
All ages (40–79)	511	7.6	204	3.5	292	11.9	81	4.5	137	9.1	60	4.3	33	4.5	11	1.8	21	3.6	20	4.0	28	1.9	32	2.1

[a] Because of the small numbers, the age group 80–89 (47 men and 48 women) is not analysed according to town.

differences being least evident in the higher age groups.

Since the presence of diabetes and hypertension, which are known to be associated with a high degree of atherosclerosis, might be responsible for the more severe atherosclerosis in the ulcer group, subjects with these two diseases were excluded from both the ulcer and low atherosclerosis groups and the two groups were again compared. Table 38 shows that in the abdominal aorta the differences remained, although they were smaller. This finding was most evident in the case of calcified lesions in men, those in the low atherosclerosis group aged below 60 now having a higher prevalence than the ulcer group. The differences in the left anterior descending coronary artery (Table 39) persisted, however, and the prevalence of coronary stenosis was still much higher in ulcer subjects than in the low atherosclerosis group.

Extent

Study of the extent of the different types of atherosclerotic lesion in the average aorta and average coronary artery by decade and sex and in relation to the low atherosclerosis group showed that ulcer subjects had significantly more extensive aortic atherosclerosis, the difference being most evident in men. For calcified lesions the differences in men were rather slight but in women, especially in the higher age groups, they were very marked. The differences, though smaller, persisted when subjects with hypertension and diabetes were excluded from the groups, especially in women. They persisted especially for complicated lesions in men.

The extent of raised and calcified lesions in the average aorta in the combined 40–79-year age group in subjects with different types of ulcer and in relation to the reference atherosclerosis groups was studied. Men with peptic ulcer had significantly more raised aortic lesions than the low atherosclerosis group; in women, however, this difference was not significant. Men had the same amount of aortic raised lesions as the standardized average atherosclerosis group but less than the high atherosclerosis group, while women with peptic ulcer had significantly less than both these groups. No differences were noted for aortic calcified lesions. When subjects with hypertension and diabetes were excluded, the findings were the same for women, but aortic raised lesions were slightly less extensive in men with peptic ulcer than in men in the standardized average atherosclerosis group.

Table 35. Number of subjects aged 40–79 recorded as having acute or chronic peptic ulcer as the principal disease, by age, sex, and town

Age group	All towns		Malmö		Prague		Ryazan		Yalta		Tallin	
	M	F	M	F	M	F	M	F	M	F	M	F
40–49	6	1	3	0	1	0	1	1	1	0	0	0
50–59	21	4	3	1	6	0	5	2	4	0	3	1
60–69	31	15	15	6	9	3	1	1	4	2	2	3
70–79	36	20	27	4	5	6	1	0	0	5	3	5
40–79	94	40	48	11	21	9	8	4	9	7	8	9
Frequency (%) [a]	1.4	0.7	2.0	0.6	1.4	0.6	1.1	0.7	1.5	1.4	0.6	0.6

[a] Frequency = % of non-violent deaths.

Table 36. Prevalence (%) of atherosclerotic lesions in the abdominal aorta in subjects aged 40–89 with peptic ulcer and in the low atherosclerosis (LAth) group (exclusive of subjects with peptic ulcer)

Age group	Fatty streak only		Fatty streak and fibrous plaque only		Complicated lesions		Calcified lesions		Raised lesions	
	Ulcer	LAth	Ulcer	LAth	Ulcer	LAth	Ulcer	LAth	Ulcer	LAth
Males										
40–49	7	11	57	78	32	14	29	17	93	89
50–59	2	1	26	41	66	45	51	47	98	99
60–69	1	1	8	23	81	65	77	60	99	99
70–79	0	1	3	7	87	84	90	77	100	99
80–89	0	0	0	9	89	78	96	83	100	100
Standardized average	3	4	31	47	59	41	52	41	97	96
Females										
40–49	0	20	70	86	20	9	30	9	100	80
50–59	5	10	44	65	33	19	49	30	95	90
60–69	0	1	12	34	62	39	78	57	100	100
70–79	0	0	6	11	73	65	89	85	100	100
80–89	0	1	2	6	88	67	98	92	100	98
Standardized average	2	10	42	62	38	22	52	31	98	90

Men with peptic ulcer had significantly more extensive coronary atherosclerosis lesions of all kinds than the low atherosclerosis group, with the exception of fatty streak, which was slightly (but significantly) more extensive in the latter group. In women, however, the differences between the two groups were much less evident and only rarely significant in the 10-year age groups. When diabetics and hypertensives were excluded from the two groups the differences were much less evident but

Table 37. Prevalence (%) of atherosclerotic lesions in the left anterior descending coronary artery in subjects aged 40–89 with peptic ulcer and in the low atherosclerosis (LAth) group (exclusive of subjects with peptic ulcer)

Age group	Fatty streak only		Fatty streak and fibrous plaque only		Complicated lesions		Calcified lesions		Raised lesions		Stenosis	
	Ulcer	LAth	Ulcer	LAth	Ulcer	LAth	Ulcer	LAth	Ulcer	LAth	Ulcer	LAth
Males												
40–49	0	7	75	89	11	2	18	8	100	92	19	3
50–59	1	5	48	59	15	8	46	35	99	95	22	8
60–69	2	2	36	49	26	14	60	45	98	98	30	13
70–79	0	1	16	34	33	21	79	65	100	99	48	30
80–89	0	7	15	28	46	7	78	72	100	94	44	39
Standardized average	1	5	53	65	17	8	41	30	99	95	23	8
Females												
40–49	18	26	82	90	9	2	18	6	82	73	18	3
50–59	10	18	76	84	10	2	19	14	91	82	7	4
60–69	0	9	47	64	15	3	45	34	100	90	14	11
70–79	0	2	39	48	18	8	59	49	100	99	19	15
80–89	0	2	15	36	27	20	77	59	100	98	38	27
Standardized average	9	17	68	80	11	2	27	18	91	82	13	6

persisted and were often statistically significant in men. In women, however, the differences were not significant in any decade.

In the pooled 40–79-year age group raised coronary lesions were significantly less extensive in the ulcer group than in the standardized average atherosclerosis group in both men and women, especially in women. Calcified lesions did not differ significantly in extent from those in the standardized group but were significantly less extensive than those in the high atherosclerosis group. When hypertensives and diabetics were excluded, the differences for raised lesions increased and calcified lesions were less extensive (but not significantly) than those in the standardized group. Coronary stenosis was significantly less prevalent in this broad age group than in the standardized average group in both men and women; in men it was somewhat more prevalent in the ulcer than in the low atherosclerosis group but in women there were no differences between the two groups. When hypertensives and diabetics were excluded this pattern remained.

Subjects with acute or chronic gastric ulcer as the principal disease and those who had undergone an operation on the stomach generally followed the same pattern as ulcer subjects as a whole. It appears, therefore, that the groups of operated and non-operated ulcer subjects could have been pooled in this analysis.

Marked differences were observed in the prevalence of myocardial lesions. Fresh and old myocardial infarction were significantly less prevalent in both men and women with ulcer than in the standardized average atherosclerosis group and these differences persisted even when hypertensives and diabetics were excluded. They were highly significant in those who had had a stomach operation, and were also found in subjects with acute and chronic ulcer, although the differences in these comparisons were not significant.

Inter-town differences

The pattern observed for the total material was also found in each of the towns. However, the number of cases in the towns of the USSR was rather small. The low frequency of coronary stenosis

Table 38. Prevalence (%) of atherosclerotic lesions in the abdominal aorta in subjects aged 40–89 with peptic ulcer (exclusive of hypertensives and diabetics) and in the low atherosclerosis (LAth) group (exclusive of subjects with peptic ulcer)

Age group	Fatty streak only		Fatty streak and fibrous plaque only		Complicated lesions		Calcified lesions		Raised lesions	
	Ulcer	LAth	Ulcer	LAth	Ulcer	LAth	Ulcer	LAth	Ulcer	LAth
Males										
40–49	13	11	73	78	20	14	13	17	87	89
50–59	3	1	32	41	60	45	43	47	97	99
60–69	1	1	7	23	83	65	78	60	99	99
70–79	0	1	3	7	85	84	92	77	100	99
80–89	0	0	0	9	87	78	97	83	100	100
Standardized average	6	4	38	47	54	41	44	41	94	96
Females										
40–49	0	20	70	86	20	9	30	9	100	80
50–59	7	10	48	65	30	19	48	30	93	90
60–69	0	1	13	34	65	39	78	57	100	100
70–79	0	0	7	11	69	65	84	85	100	100
80–89	0	1	5	6	86	67	96	92	100	98
Standardized average	2	10	44	62	38	22	52	31	98	90

and fresh and old myocardial infarction was specially marked for men in Ryazan and Yalta; in these two towns there was not a single case of fresh myocardial infarction in the male peptic ulcer subjects.

DISCUSSION

The frequency of peptic ulcer in both men and women seemed to vary considerably between the towns. Among men it was higher in Malmö and Prague than in the towns of the USSR. In Malmö the frequency was about six times that reported for Tallin (12% and 2%, respectively). In women the inter-town differences were smaller, with Malmö, Prague, and Yalta at a similar level that was twice that for Ryazan and Tallin (4% and 2%, respectively). The male/female ratio varied considerably, being much higher for Malmö, Ryazan, and Prague (2.6%, 2.5%, and 2.1% respectively) than for Yalta and Tallin (0.9%). It is doubtful, however, whether these differences are real. In ages above 69 the material was hardly population-related for the towns of the USSR, and these towns did not use the detailed autopsy record form used in Malmö and Prague (see Chapter 1). These two towns should, on the other hand, be comparable and it therefore appears that peptic ulcer was more common in Malmö than in Prague in men but not in women.

When only those subjects were considered in whom the ulcer was specified as acute or chronic and as being the principal disease, the inter-town differences for women disappeared except that values for Yalta were still as high and well above those for the other towns. For men they became much smaller but persisted, especially the relatively high frequency in Malmö. The male/female ratio was still highest in Malmö (3.3) and lowest in Yalta and Tallin (1.0). These data, which were probably more reliable than the data about peptic ulcer in general, thus corroborate the previous findings and indicate that peptic ulcer is less common in the USSR than in Czechoslovakia and Sweden and that the male preponderance observed in Czechoslovakia and Sweden is much less obvious or even non-existent in the USSR.

Table 39. Prevalence (%) of atherosclerotic lesions in the left anterior descending coronary artery in subjects aged 40–89 with peptic ulcer (exclusive of hypertensives and diabetics) and in the low atherosclerosis (LAth) group (exclusive of subjects with peptic ulcer)

Age group	Fatty streak only		Fatty streak and fibrous plaque only		Complicated lesions		Calcified lesions		Raised lesions		Stenosis	
	Ulcer	LAth	Ulcer	LAth	Ulcer	LAth	Ulcer	LAth	Ulcer	LAth	Ulcer	LAth
Males												
40–49	0	7	87	89	7	2	7	8	100	92	14	3
50–59	1	5	54	59	9	8	42	35	99	95	15	8
60–69	1	2	32	49	22	14	63	45	99	98	25	13
70–79	0	1	19	34	33	21	77	65	100	99	51	30
80–89	0	7	14	28	45	7	79	72	100	94	46	39
Standardized average	1	5	57	65	13	8	37	30	99	95	19	8
Females												
40–49	20	26	80	90	10	2	20	6	80	73	10	3
50–59	15	18	85	84	0	2	15	14	85	82	8	4
60–69	0	9	53	64	18	3	38	34	100	90	14	11
70–79	0	2	44	48	11	8	56	49	100	99	18	15
80–89	0	2	24	36	19	20	67	59	100	98	29	27
Standardized average	12	17	73	80	9	2	24	18	88	82	11	6

Whether this is true for both gastric and duodenal ulcer could not be ascertained.

The analysis showed that subjects with peptic ulcer had a higher prevalence of complicated and calcified lesions in the aorta and the coronary arteries than the low atherosclerosis group. Also, atherosclerosis was significantly more extensive in ulcer subjects than in the low atherosclerosis group, especially in men, in whom this was true also for the different types of lesion, except fatty streaks. In women, however, such differences for aortic atherosclerosis were only sometimes significant and most often for calcified lesions, and in the case of coronary atherosclerotic lesions almost no significant difference from the low atherosclerosis group was observed. Generally, men with peptic ulcer had the same amount of aortic atherosclerosis as the standardized average atherosclerosis group and slightly less coronary atherosclerosis, while women had less aortic and much less coronary atherosclerosis and were in this respect similar to the low atherosclerosis group. The frequency of coronary stenosis was significantly lower in the ulcer than in the standardized average atherosclerosis group; in women it was even as low as in the low atherosclerosis group. Correspondingly, the prevalence of myocardial infarction was very low, fresh infarction especially being very rare in women with ulcer. Subjects who had undergone a stomach operation were in all these respects similar to those with ulcer as a whole.

Subjects with peptic ulcer, especially women, thus had little rather than much atherosclerosis and the negative relation between the prevalence of myocardial lesions and peptic ulcer was stronger than that between atherosclerosis and ulcer. This finding is contrary to that of Crawford & Morris (*1*), according to whom the prevalence of coronary stenosis was high in subjects with peptic ulcer. It is, however, in agreement with preliminary observations on a Swedish series of operated ulcerous subjects (Borgström, S., unpublished observations, 1973) in which myocardial infarction was rarely the cause of death.

One reason for the discrepancy may be different proportions of gastric and duodenal ulcer of the stomach and duodenum, since it is presumed that gastric ulcer patients tend to have a different type of personality from duodenal ulcer patients (S. Borgström & E. Nyman, personal communication, 1976). No further analysis was possible in the present study because of lack of information on the ulcers.

RÉSUMÉ

CHAPITRE 12. ATHÉROSCLÉROSE ET ULCÈRE GASTRO-DUODÉNAL

L'athérosclérose aortique et coronarienne, et la fréquence de la sténose coronarienne et des lésions du myocarde ont été étudiées chez des malades porteurs d'ulcère digestif, répartis en deux sous-groupes selon le caractère aigu ou chronique de l'ulcère, et chez des sujets qui avaient subi une opération sur l'estomac. Sous tous ces rapports, les groupes sont similaires les uns aux autres. Les hommes atteints d'ulcère digestif ont le même degré d'athérosclérose aortique que le groupe normalisé des athéroscléreux coronaires moyens, mais moins d'athérosclérose coronaire, tandis que les femmes ulcéreuses ont moins d'athérosclérose aortique et beaucoup moins d'athérosclérose coronaire. La fréquence de la sténose coronaire, de l'infarctus myocardique récent et des cicatrices myocardiques est très faible chez les ulcéreux, notamment chez les femmes.

REFERENCE

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