

Although it has been shown that smoking does not cause venous thrombosis,¹⁵ it is at first surprising to find that smokers with myocardial infarction are so much less likely to develop a leg vein thrombosis, and presumably pulmonary embolism, than smokers. As Doll¹⁶ has pointed out, however, patients with a removable cause for their disease do better when that cause is removed, and it is well established that smoking cigarettes is one of the causes of myocardial infarction. As we suggested earlier, patients who enter a coronary care unit with myocardial infarction may be drawn from two populations. One group may be intrinsically more susceptible to both arterial and venous thrombosis so will suffer myocardial infarction whether they smoke or not; the other group do not have this susceptibility to thrombosis but suffer a myocardial infarction because they smoke. This is undoubtedly an oversimplified account, but it is a reasonable explanation of why non-smokers are more likely to develop leg vein thrombosis after myocardial infarction.

We therefore conclude that low-dose heparin prophylaxis should be given routinely to all patients admitted to hospital with myocardial infarction who do not smoke cigarettes.

We thank Mr A Bovington, who regularly carried out the leg

scans, and the other physicians of Westminster Hospital for allowing us to include their patients in this study.

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Wound sepsis after cholecystectomy: effect of incidental appendicectomy

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Summary

The records of a consecutive series of 224 patients were analysed to discover the effect of incidental appendicectomy on the wound sepsis rate after cholecystectomy. One hundred and five patients had had a cholecystectomy alone and 119 cholecystectomy with incidental appendicectomy. The incidence of wound sepsis in patients not given adequate antibiotic prophylaxis was significantly lower (16.1%) when cholecystectomy alone was carried out than when the appendix was removed as well (41.1%).

Introduction

Many surgeons remove the normal appendix during a potentially contaminated laparotomy on the grounds that it is the only way to prevent later acute appendicitis. Hewitt *et al*¹ calculated the risk of subsequently developing appendicitis and found a progressive decline from 16% at the age of 2½ years to 0.02% at the age of 87½ years.

The arguments against incidental appendicectomy in totally clean abdominal surgery are overwhelming, and few people would care to risk the contamination that might arise from removing the appendix during, for example, an abdominal aortic replacement. On the other hand, opinion is divided about

the merits of incidental appendicectomy with operations such as cholecystectomy. The possibility of an increased liability to malignant disease after appendicectomy is still being debated.

Reports on the effects of incidental appendicectomy during abdominal operations—for example, by Howie²—have been mainly concerned with the incidence of wound sepsis. In retrospective analyses of hospital case notes estimation of the sepsis rate is unreliable, and we have shown³ that nearly 40% of all cases of wound sepsis can be either so trivial or so late in onset that they are not mentioned.

This review was undertaken to compare the incidence of septic complications after cholecystectomy alone with those after cholecystectomy plus appendicectomy in patients who had been included in a series of prospective, controlled clinical trials of cephaloridine and other antibacterial substances as wound sepsis prophylactic agents. The effects of incidental appendicectomy on sepsis rates after gastric surgery will be presented in detail elsewhere. We found in these trials that the wound sepsis rates after removal of an inflamed appendix were 7.8% and 12.4% respectively in patients protected and not protected by cephaloridine, and 1.9% and 7.6% respectively after removal of a normal appendix.

Patients and methods

All patients under the care of one surgeon who were to have potentially contaminated abdominal operations were randomly allocated to receive either cephaloridine or no prophylaxis,^{4 5} gentamicin,⁶ povidone-iodine,⁷ framycetin,⁸ ampicillin,³ or water irrigation (in progress). Details of each patient, including a double-blind assessment of wound sepsis for at least four weeks after operation, were entered on punch cards. We reviewed the cards, selecting patients who had had either a cholecystectomy alone or one with incidental appendicectomy. All other operations on the biliary tract, including choledochotomy, were excluded to ensure comparability within the

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series. The appendix was rarely removed with any other biliary operation.

Two hundred and twenty-seven cases (out of 347 biliary operations) were available for analysis, but three patients who died (one from septic shock three days after operation, the second on the ninth day from intraperitoneal haemorrhage, and the third from cardiac infarction on the 11th day) were not included in the assessment of wound sepsis.

In the early trials bacteriological investigation was confined to wound discharges, but later swabs were taken of the contents of hollow viscera and of subcutaneous tissues at the end of an operation. Our present practice is to transport a fragment of an incised organ and (at the end of each operation) of the subcutaneous tissue in Robertson's meat medium from the operating theatre to the department of bacteriology. There aerobic cultures are made on Oxoid No 2 7% horse-blood agar and on Oxoid cystine-lactose electrolyte-deficient media, and anaerobic cultures are made on Oxoid No 2 blood agar with 100 mg/l of neomycin sulphate in evacuated containers with GasPak (BBL) hydrogen-carbon dioxide generators.

No firm guidelines were established for performing an incidental appendectomy and the decision was made by the surgeon at the time of the operation. Wound sepsis was defined as the discharge of pus from the wound, and the few cases of secondary sepsis (associated with an intraperitoneal drain or a biliary leak) were excluded. Major sepsis was accompanied by constitutional disturbance and delayed the patient's discharge from hospital. Minor sepsis was more of a nuisance than anything else but caused inconvenience and worry to patients and family doctors.

The significances of differences were calculated by the χ^2 test or Student's *t* test as appropriate.

Results

The comparability of the two groups is shown in table I. Older people were significantly less likely than the young to have an incidental appendectomy ($\chi^2=11.44$; $P<0.001$), and when the gall bladder was inflamed or infected the appendix was significantly less likely to be removed than when the gall bladder was not inflamed ($\chi^2=19.89$; $P<0.001$). The distribution of obesity (defined as a thickness of subcutaneous fat of 2.5 cm or more, measured at operation, at the site of incision) was not significantly different between the two groups.

Forty-eight patients developed minor or major wound sepsis (21.4%). The earliest day on which pus was discharged or evacuated was the second, and the latest the 18th. Fifteen of the 48 wounds (31.2%) discharged pus on the eighth day or later and might have been missed in a retrospective analysis of case notes.

In patients protected by parenteral or intracincisional cephaloridine there were three cases of minor and two of major sepsis among 49 patients who underwent cholecystectomy alone (10.2%) compared with two cases of minor and two of major sepsis among 46 patients with incidental appendectomy (8.7%). In patients not protected by cephaloridine, however, there were four cases of minor and five of major sepsis among 56 (16.1%) who had single operations compared with 30 (19 minor and 11 major) among 73 (41.1%) patients who had

their appendix removed as well. This difference was significant ($\chi^2=9.41$; $P<0.01$) (table II).

In the absence of effective antibiotic prophylaxis obese patients were more liable to develop wound sepsis than others (table III). The sepsis rate in those who underwent cholecystectomy alone was 17.2% in the obese and 11.1% in the non-obese. The corresponding figures for those who had a cholecystectomy with appendectomy were 53.8% and 26.5%. The latter difference was significant ($\chi^2=5.62$; $P<0.02$).

When patients' ages were analysed against type of operation and antibiotic prophylaxis no significant differences were found. Twenty-five out of 108 patients under the age of 60 (23.1%) developed wound sepsis compared with 23 out of 116 over this age (19.8%).

TABLE II—Wound sepsis rates

	Cholecystectomy alone		Cholecystectomy and appendectomy	
	No of patients	No (%) with wound sepsis	No of patients	No (%) with wound sepsis
Cephaloridine prophylaxis	49	5 (10.2)	46	4 (8.7)
Others:	56	9 (16.1)	73	30 (41.1)
No prophylaxis	17	3 (17.6)	24	8 (33.3)
Intracincisional gentamicin	9	1 (11.1)	14	5 (35.7)
Intracincisional povidone-iodine	8	2 (25.0)	10	7 (70.0)
Intracincisional framycetin	6	2 (33.3)	5	3 (60.0)
Intracincisional ampicillin	15	1 (6.7)	16	5 (31.3)
Water irrigation	1	0 (0)	4	2 (50.0)

TABLE III—Influence of obesity on wound sepsis rates in patients not protected by cephaloridine

	Obese		Not obese		Significance of difference (P)
	No of patients	No (%) with wound sepsis	No of patients	No (%) with wound sepsis	
Cholecystectomy alone	29	5 (17.2)	27	3 (11.1)	NS
Cholecystectomy and appendectomy	39	21 (53.8)	34	9 (26.5)	<0.02
Total	68	26 (38.2)	61	12 (19.7)	<0.05

BACTERIOLOGICAL STUDIES

Swabs or fragments of 124 gall bladders, 46 appendices, and 51 subcutaneous tissues were examined bacteriologically. Eighty-six of the gall bladder cultures were sterile (69.4%) compared with 13 (28.3%) from the appendix and 37 (72.5%) from subcutaneous tissue. The bacteria isolated are shown in table IV. Many cultures showed more than one organism, so the total number of organisms exceeded the total number of infected organs.

The sepsis rates correlated well with operative bacteriological findings (table V), being considerably higher when gall bladder or appendix, or both, were infected ($\chi^2=4.71$) and higher still when subcutaneous tissue was also infected ($\chi^2=4.81$). The differences were significant at the 5% level. Subcutaneous tissue was never infected when the organ culture was sterile.

TABLE IV—Results of operative bacteriology

	Gall bladder	Appendix	Subcutaneous tissue
Swab or fragment sterile	86	13	37
Swab or fragment infected:	38	33	14
<i>Escherichia coli</i>	24	31	8
<i>Streptococcus faecalis</i>	8	4	2
Other streptococci	2	1	0
<i>Clostridia</i> spp	1	7	1
<i>Bacteroides</i> spp	2	5	0
<i>Proteus</i> spp	1	3	1
<i>Klebsiella</i> spp	1	3	1
<i>Pseudomonas</i> spp	0	3	0
<i>Enterobacter</i> spp	1	0	0
<i>Staphylococcus aureus</i>	2	1	1
<i>Staphylococcus epidermidis</i>	4	1	2

TABLE I—Comparability of the two groups

	No (%) who underwent cholecystectomy	No (%) who underwent cholecystectomy plus appendectomy	Total (=100%)
Age:			
<30	6 (37.5)	10 (62.5)	16
30-39	13 (46.4)	15 (53.6)	28
40-49	7 (26.9)	19 (73.1)	26
50-59	12 (31.6)	26 (68.4)	38
60-69	41 (51.3)	39 (48.8)	80
≥70	26 (72.2)	10 (27.8)	36
<60	38 (35.2)	70 (64.8)	108
≥60*	67 (57.8)	49 (42.2)	116
State of gall bladder:			
Inflamed or infected*	39 (73.6)	14 (26.4)	53
Not inflamed	66 (38.6)	105 (61.4)	171
Sex:			
Men	22 (44.9)	27 (55.1)	49
Women	83 (47.4)	92 (52.6)	175
Obese	50 (43.9)	64 (56.1)	114
Not obese	55 (50.0)	55 (50.0)	110

*There were significantly more patients over the age of 60 and with inflamed or infected gall bladders in the cholecystectomy-alone group. The other differences were not significant.

TABLE V—Wound sepsis correlated with operative bacteriological findings

	Organ sterile, subcutaneous tissue sterile or not taken	Organ infected, subcutaneous tissue sterile or not taken	Organ and subcutaneous tissue infected
Number of cases	61	71	13
No (%) of cases of wound sepsis	6 (9.8)	17 (23.9)	7 (53.8)

OTHER SEPSIS

The incidence of sepsis in sites other than the wound was examined with particular reference to septicaemia, intraperitoneal abscesses, and serious chest complications. The single death from septic shock occurred after cholecystectomy alone, and there was one other case of septicaemia in this group and one after cholecystectomy and appendicectomy. Intraperitoneal abscesses developed in three patients after cholecystectomy alone and in four after cholecystectomy with appendicectomy. Serious chest infections occurred in 10 patients who had the single operation and in 11 who had an appendicectomy also. There was no significant difference in the incidence of any of these complications between the cholecystectomy group and those who had an appendicectomy as well.

Morbidity was also assessed by the number of days after operation that the patients spent in hospital. The mean number after cholecystectomy alone was 13.13 (SD 6.18) and after cholecystectomy plus appendicectomy 12.08 (SD 5.44). These means did not differ significantly ($t=1.33$). In many patients, particularly the elderly, discharge from hospital was delayed by social factors.

Discussion

Patients were not allocated to the groups randomly. The decision to take out the appendix was made by the operating surgeon and depended on factors such as his personal preference, the age of the patient, and the ease with which the gall bladder was removed. Occasionally a patient made a special request that the appendix should be removed, and this was normally granted. In no case was the incision extended to allow appendicectomy, and if the organ could not be delivered by gentle finger dissection the appendicectomy was abandoned.

We would have expected more wound sepsis after cholecystectomy alone, as more of the gall bladders in this group were inflamed. Over a third of the gall bladders removed without the appendix were inflamed or infected, compared with fewer than 12% of those accompanied by an incidental appendicectomy. The results, however, proved otherwise. When the wound was not protected by cephaloridine the sepsis rate when the appendix was removed incidentally was 41.1% compared with 16.1% when it was not removed.

The higher proportion of old people in the cholecystectomy-alone group might be thought to be an additional hazard,⁹ although we have recently shown³ that old age alone has no importance as a cause of wound sepsis, and in this series the sepsis rate was slightly (but not significantly) lower in old people.

Norton *et al.*¹⁰ compared the incidence of wound sepsis in patients undergoing a laparotomy for abdominal trauma with or without incidental appendicectomy and found a 7% incidence with and a 17% incidence without appendicectomy. They pointed out, however, that appendicectomy was much more likely to be performed when the laparotomy showed no serious intra-abdominal injury, and the series was therefore considerably biased. Komorn and Kaufman¹¹ found that the addition of appendicectomy to cholecystectomy increased the wound sepsis rate, whereas Lowery and Lenhardt¹² and Bogart and Sebesta¹³ did not confirm this.

All these studies suffer from the disadvantage of being retrospective, and the occurrence of wound sepsis (especially if it is late or minor) is often omitted from routine hospital notes. Our findings, based on prospective trials of methods of preventing surgical sepsis, showed that the addition of appendicectomy increases the risk of abdominal wall contamination and, in the absence of an effective antibiotic prophylactic regimen, the risk of sepsis.

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SHORT REPORTS

Relevance of race in management of testicular tumours

Biopsy is usually regarded as contraindicated in cases of suspected malignancy of the testis because of the high risk of local recurrence and metastatic spread.¹ Most such patients, therefore, are subjected to orchidectomy.² Nevertheless, I suggest that limited biopsy should be used when the patient is from an ethnic group in which the prevalence of testicular cancer is low.

Present series

In a six-year period some 7500 surgical specimens from Nigerian Igbos were examined at a central laboratory. Of these, 21 were testicular samples

—five biopsy specimens and 16 orchidectomy specimens—sent in by 16 doctors from 12 hospitals.

Of the five biopsy specimens, two appeared to be normal, and three showed evidence of Leydig-cell tumours, tuberculosis, and infarction respectively. Three of the 16 orchidectomy specimens were normal. Of the remainder, nine showed evidence of granulomatous orchitis—five idiopathic, two tuberculous, and two schistosomal; two embryonal carcinoma; one metastatic lymphoma; and one fibrous pseudotumour of the testicular tunic.

Comment

Only three of the 21 testicular samples in this series showed evidence of primary cancer, two being orchidectomy specimens. This reflects the low prevalence of testicular cancer in Negroes.^{1 3 4} Thus although orchidectomy is mandatory for patients whose ethnic origins indicate a high likelihood of testicular cancer, it should not be performed routinely on Negroes. Biopsy should be the rule.