

Short term metronidazole therapy contrasted with povidone-iodine spray in the prevention of wound infection after appendicectomy

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SUMMARY

In a prospective, randomized trial metronidazole was found to be significantly better than povidone-iodine in reducing the incidence of wound infection after appendicectomy ($P < 0.005$). The metronidazole was given as a 3-day course and was found to be as effective as the established 7-day course. Over 65 per cent of the wound infections presented after the patients had been discharged from hospital.

WOUND infection is a common complication of appendicectomy (*Lancet*, 1970, 1971) increasing both the morbidity and the length of stay in hospital. Previous work in this hospital (Gilmore and Martin, 1974) has shown that povidone-iodine sprayed into the incision during closure reduces wound infection from 16 to 8 per cent. More recently the use of metronidazole (Willis et al., 1976) has shown a reduction in the wound infection rate from 22 to 10 per cent.

We report here the results of a prospective trial comparing short term (3 days) metronidazole administration with povidone-iodine spray for the prevention of wound infection.

Patients and methods

All the patients admitted to the Royal Berkshire and Battle Hospitals for emergency appendicectomy were randomly allocated to one of the treatment groups. Group 1 received a metronidazole 1-g suppository 2 h before operation and every 8 h after operation for a total of 3 days. If the oral form could be tolerated postoperatively 200 mg every 8 h was administered instead of the suppository. Children under 10 received 0.5-g suppositories. Group 2 received povidone-iodine dry powder into the wound after closure of the peritoneum, sprayed from a distance of 20 cm for approximately 8 s, so that a good coating of powder was visible in and around the wound. A further dose was applied after closure of the skin.

A standard appendicectomy technique was performed by all the surgeons involved. Wounds were inspected by an independent observer postoperatively, and the patients were reviewed at a special follow-up clinic between 3 and 5 weeks after leaving hospital. Patients were also asked to attend the ward should any discharge from the wound occur during this period.

A wound infection was defined as any purulent or infected sero-sanguineous discharge from the wound.

Results

One hundred and twenty-nine patients were entered in the trial in a 3-month period. Four patients were withdrawn from the trial. Two had received systemic antibiotic prophylaxis for suspected rheumatic heart disease, a third had an incomplete course of metronidazole and the fourth had systemic antibiotics for pneumonia. None of these patients developed a wound infection. A further 15 patients failed to attend the follow-up clinic but did reply to a postal inquiry and have been included in the trial.

There were 65 patients in the metronidazole group and 60 in the povidone-iodine group. Both groups

matched for age and sex. Wound infection occurred in 4 patients in the metronidazole group (6.2 per cent), which was significantly less than in the povidone-iodine group in which there were 16 patients with infection (26.6 per cent) ($P < 0.005$ —using χ^2 with Yates' correction). Eight of these infections (2 metronidazole, 6 povidone) were superficial and had healed within 2 or 3 days. The infection rate in relation to the severity of the appendicitis is shown in *Table I*.

The average length of stay in hospital was 4.9 days in the non-infected patients but 8.6 days in those infected. Thirteen of the wound infections presented after discharge from hospital and 3 of these patients (all in the povidone group) required readmission. Culture swabs of the wound infections were only available in 9 cases—7 of which showed growth with bacteroides organisms (all in the povidone group).

Table I: INFECTION RATE RELATED TO SEVERITY OF APPENDICITIS

Severity	Metronidazole		Povidone-iodine	
	No.	Infected	No.	Infected
Normal	14	0	12	1
Acutely inflamed	41	1	34	8
Gangrenous	5	1	7	2
Perforated	5	2	7	5
Total	65	4	60	16

Discussion

Because of good back-up facilities provided by the local family practitioners, we are able to send many of our patients home earlier after operation than is usually advocated (*Lancet*, 1970). For this reason nearly two-thirds of the wound discharges occurred after the patients had left hospital.

The patients were asked to attend the ward should they develop any complication with their wound, so that culture swabs could be taken. However, several did not attend and the diagnosis of wound infection was made retrospectively at the special follow-up clinic and included any wound discharge, however minor. These minor discharges, possibly due to iodine irritation, may explain the high rate of wound infection in the povidone-iodine group and it is a pity that for ethical reasons based on previous reports (Gilmore and Martin, 1974; Willis et al., 1976) a control group was not included in the design of our trial. Even if these minor wound discharges are excluded, metronidazole is still significantly better than povidone-iodine ($P = 0.02$).

Unfortunately as many patients did not attend for bacterial culture swabs to be taken, conclusions regarding the bacteriology cannot be made, but it is

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interesting to note that in the povidone group at least 7 of the 16 wound infections grew bacteroides and in 4 this was in pure culture.

Although the numbers in our trial were smaller, we were unable to reproduce the previous results obtained from our hospital by Gilmore and Martin (1974) using povidone-iodine. This was surprising since there had been little change in the proportion of severe cases, in the age and sex distribution, and no alteration in the composition of the povidone-iodine spray. If the minor wound discharges are excluded there was still a wound infection rate of 16 per cent which was similar to the control group in the previous study. However, at the time of the previous study, anaerobic culture techniques for bacteroides organisms were not as stringent as at present and perhaps some wound discharges were considered sterile and therefore not considered a wound infection. McClusky (1976) found that povidone-iodine solution did not prevent wound infection after general surgical operations and Galland et al. (1977) drew similar conclusions using povidone-iodine spray.

The incidence of wound infection after appendicectomy for a gangrenous or perforated appendicitis is extremely high. Three of the 4 cases of wound infection in the metronidazole group occurred in such cases. It would seem, therefore, that although metronidazole is fairly effective in reducing the incidence of wound infection, further measures such as delayed primary suture or additional prophylactic antibiotics should be considered in cases of gangrenous or perforated appendicitis.

We have found a 3-day course of metronidazole to be equally effective as the previously described 7-day course (Willis et al., 1976). Animal experiments

(Burke, 1961) suggest that systemic antibiotics given before or within 3 h of bacterial inoculation of a wound will suppress bacterial infection of that wound. Since most infections after appendicectomy are due to endogenous bacterial contamination it will be interesting to see if a two-dose course of metronidazole will also be effective in reducing wound infection.

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