Wound Infection Prophylaxis with Topical Ampicillin (PentrexylR) in Gastric Surgery

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Sequential analysis of a double-blind, fixed dose, controlled clinical trial comprising 64 patients treated by truncal vagotomy and pyloroplasty demonstrating a statistically significant reduction of postoperative wound infections by topical application of ampicillin in the wound.

Key-words: Ampicillin; controlled trial; gastric surgery; wound infection

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Asepsis—in the strict sense of the word—cannot be maintained in most surgical operations on the gastrointestinal tract. Consequently, wound infection is a common complication to abdominal surgery. An incidence of 24 per cent after gastric operations was recently described in a major study (6), and the incidence seems especially high in colonic surgery—41 per cent was reported by Nash & Hugh (11).

Since a pilot inquiry in our department showed that the incidence of wound infection was 23 per cent after different abdominal operations—primarily gastric operations—it was decided to investigate the effect of a topically applied antibiotic agent upon the occurrence of wound infection after abdominal vagotomy and pyloroplasty.

PATIENTS AND METHODS

The postoperative course in 64 patients was studied. They underwent a truncal vagotomy with pyloroplasty. The operations were performed for duodenal ulcer (45 patients), pyloric ulcer (3 patients), gastric ulcer (13 patients), and hiatus hernia (1 patient). In two patients no abnormalities were found at the operation. Both had a long dyspeptic history and a high acid production. The mean age and sex distribution is given in Table I.

The abdominal skin was washed twice with Cetavlon® and then swabbed twice with iodine 2.5 per cent. Next, the abdominal skin was covered with Steridrape® and wound towels.

The laparotomy incision ran from the xiphoid process through the midline of the epigastrium, turning to the right below the curvature where the right rectus muscle was transsected transversely.

The wound was closed a continuous chromic catgut suture of the peritoneum and interrupted non-absorbable sutures of the fascia and skin. Two suction tubes were placed under the liver and led out through separate incisions. They were removed 4 to 6 days later. Finally, the skin was sprayed with Nobecutan® and covered with sterile dressing.

In the postoperative course systemic antibiotics were given to 15 patients. Five of these patients had received topical treatment with ampicillin and ten had not. The indications for the systemic antibiotic treatment were pneumonia (9 patients), pulmonary embolism (1 patient), subfascial abscess (1 patient), wound sepsis (1 patient), and fever of unknown etiology (3 patients).
Table I. Age and sex distribution in the topically treated and the untreated group

<table>
<thead>
<tr>
<th></th>
<th>Treated group</th>
<th>Untreated group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>F</td>
</tr>
<tr>
<td>No. of patients</td>
<td>15</td>
<td>17</td>
</tr>
<tr>
<td>Mean age in years</td>
<td>47.5</td>
<td>51.6</td>
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</table>

M = Male  F = Female

Statistics

Prior to the trial the patients were paired sequentially, and each pair was allocated a random number (4). In the case of an even random number it was decided that the first patient in the pair received topical treatment with ampicillin in the wound and the second did not. In the case of an odd random number the order of treatment was reversed. Each pair then consisted of a treated and a control patient. One patient with a history of allergy to penicillin and two patients in bad general condition were excluded from the trial prior to the operation.

If the code, described above, required topical treatment of the abdominal wound, one gram of ampicillin (Pentrexyl<sup>®</sup> Lundbeck) powder was applied to the wound, after the closure of the peritoneum and before the skin was sutured.

The results were analysed by a restricted, skew sequential design (2).

RESULTS

In 32 patients who received local wound treatment with ampicillin, no case of wound infection occurred. Among the other 32 patients, who did not have this treatment, eight cases of wound inflammation were recorded. Wound infection was defined as a purulent discharge appearing spontaneously or after surgical division. Three cases (20 per cent) of wound infection were registered in 15 patients receiving systemic antibiotics, and 5 cases (10 per cent) occurred in 49 patients who did not receive this treatment.

Bacterial cultures showed streptococcus in four cases, staphylococcus aureus in three and pneumococcus in one case.

Topical ampicillin treatment did not cause any side effects. No case of wound disruption occurred and the wounds healed well.

The significant difference of the frequency of wound infection between treated and untreated cases is demonstrated by the sequential design (Fig. 1).

DISCUSSION

At the present time there seem to be three ways of reducing the frequency of wound infection in abdominal surgery. Experiences from battle surgery showed that a thoroughly excised open wound is the least favourable environment for the bacteria. This experience is now supported by experiments which show that the open wound builds up an intrinsic resistance during the preparatory phase of healing (8). Even a heavily contaminated wound can be closed after some days. Employing this principle, Grosfeld & Solit (5) reduced the incidence of wound infection after perforated appendicitis from 14.6 to 2.3 per cent.

Postoperative systemic treatment with antibiotics cannot reduce the frequency of wound infection (7,9). On the contrary, the incidence of wound sepsis seems to increase (10,14). On the other hand, it was reported by Polk & Lopez-Mayor (12), that saturation with a systemic broad-spectrum antibiotic in the immedi-
Ampicillin

20

\[ \theta = 0.80 \]

\[ 2d = 0.05 \]

\[ \delta = 0.05 \]

\[ n = 32 \]

Fig. 1. Skew, restricted sequential design. Each trip to the right and upward indicates an A-preference (infection in the control patient, but not in the paired treated patient). There was no O-preference (infection in the treated, but not in paired untreated patient). The significance level (5%) is reached after 8 A-preferences.

ate preoperative and postoperative period reduced the frequency of wound infection significantly. Wound infection prophylaxis therefore seems to require the presence of an antibiotic agent at the time when contamination occurs. This statement is supported by experimental data (3).

A more simple way is to apply a broad-spectrum antibiotic topically. Recently it was shown, in double-blind trials, that topical treatment of the abdominal wounds with ampicillin reduced the frequency of wound infection significantly in colon surgery (1,11) and after appendectomy (13). The present study strongly indicates that a similarly significant effect upon the frequency of wound sepsis can be obtained with topical ampicillin in gastric surgery.

ACKNOWLEDGEMENT

The work was supported by a grant from Stæns lægevidenskabelige forskningsråd.

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Received 25 June 1970
Accepted 20 October 1970