Efficacy of 48-hour Post-operative Antibiotics Prophylaxis for Patients Undergoing Percutaneous Endoscopic Gastrostomy Tube in Preventing Site Infection

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Abstract

**Background**: Percutaneous Endoscopic Gastrostomy (PEG) is an endoscopic procedure for placing a feeding tube into the stomach through the skin, primarily to avoid malnutrition. Malnutrition can increase the risk of wound infection, whose incidence can be decreased by using antibiotic prophylaxis. **Aim**: The purpose of our study was to evaluate the efficacy of a new antibiotic regimen in preventing acute post-PEG procedure complications. **Patients and Methods**: Ninety-seven consecutive patients were put on combined antibiotic therapy of clindamycin 600 mg and cefotaxime 1,000 mg every eight hours, starting with the insertion of the PEG tube and maintained for 48 hours. Pain/tenderness, leakage/drainage, bleeding fever, maximum white blood cells (WBC) count, pus/discharge, and PEG tube function were evaluated within 48 hours and 1 week from PEG insertion. **Results**: Infection at the site of PEG insertion occurred in 3 cases (3.1%) within 48 hours and in 1 case (1.0%) within 7 days. Within 48 hours from the procedure, incidence of fever and increased WBC count was 10.3% and 9.3%, respectively, though at 7 days all were resolved. Pain, leak, and bleeding at the site of PEG placement were prevalently mild within 48 hours (74.2%, 12.4%, 13.4% of patients, respectively) and subsided within 7 days (2.1%, 0%, 0%). One case (1.0%) of minor antibiotic side effect occurred. Two patients died due to complications not related to the procedure. **Conclusion**: The combined use of short-term cefotaxime and clindamycin seems to be effective in reducing incidence of acute complications due to PEG placement without increasing side-effects.

Key words

Percutaneous endoscopic gastrostomy – antibiotic prophylaxis – clindamycin – cefotaxime – site infection.

Introduction

Percutaneous Endoscopic Gastrostomy (PEG) is an endoscopic procedure for placing a tube for feeding into the stomach through the skin. PEG is commonly performed to avoid malnutrition and its related risks in patients with longstanding eating difficulties due to various pathological conditions that impair swallowing, such as neurological impairment, dysphagia, dementia, trauma or malignant diseases.

PEG procedure could be performed by using either the pull-type or the push-type technique. Both methods are performed under endoscopic guidance. Although the “push” technique seems to have a lower rate of short-term complications than the pull-type, its management may be more challenging [1]. Moreover, the complication rate with the pull method is significantly reduced when antibiotic prophylaxis is used [2]. In fact, complications at the gastrostomy site occur in about one third of all treated patients, and include wound infection, peristomal leakage, bleeding, ulcer and clogging [3-7]. Among these, wound infection is the most relevant side-effect. Patients receiving antibiotic prophylaxis for PEG placement have a lower rate of peristomal wound infection, which leads to an overall cost reduction [8-10]. Data from a meta-analysis demonstrate that a single intravenous dose of a broad spectrum antibiotic (i.e. cephalosporin) administered before the procedure is effective in reducing the incidence of wound infection, with an absolute risk reduction of 14-17% [11-13]. Intravenous antibiotic prophylaxis is expensive and could increase the risk of resistant organisms [14-16]. On the other hand, wound infections can lead to the development of a more severe condition (i.e. necrotizing fasciitis) that has a high mortality rate. Furthermore, they increase costs and cause longer hospital stays. Various prophylactic antibiotic regimens have been tested with reasonable success but there...
is still no general consensus on the type, dose and duration of antibiotic prophylaxis.

The purpose of our study was to evaluate the efficacy of a new antibiotic regimen in preventing acute post-procedure complications of pull-type PEG. Thus, patients were put on combined antibiotic therapy of clindamycin and cefotaxime started perioperatively when inserting the PEG tube and maintained for 48 hours.

**Methods**

**Patients**

We enrolled patients referred to the Endoscopy Unit of King Fahad Hospital, Armed Forces Hospital Southern Region Program, for PEG placement due to non-malignancy reasons. Evidence of band ligation or sclerotherapy, portosystemic shunting procedure or surgery for portal hypertension in the past, precedent antibiotic course and presence of comorbidity such as massive bleeding, shock and coagulation disorders, were considered exclusion criteria. Furthermore, patients did not receive any antibiotics at least 48 hours prior to PEG insertion.

**Procedure**

All patients fasted for at least six hours before the procedure. A standard endoscopic pull-through technique employing a GIF Q180 Evis Exera II endoscope (Olympus Corporation, Tokyo, Japan) combined with a Pull Endovine 20 Fr 6.7 mm Standard PEG kit (Boston Scientific Corporation, MA, USA) was used to insert the PEG. The catheter was pulled down through the mouth, into the stomach and out through the abdomen, and anchored with an external bolster of the PEG sited slightly away from the abdomen wall to avoid pressure necrosis.

**Treatment**

The prophylaxis antibiotic regimen consisted of cefotaxime 1 gram i.v. every 8 hours and clindamycin 600 mg i.v. every 8 hours, starting at the time of the procedure and maintained up to 48 hours after the procedure. The dosage was adjusted according to the patient serum creatinine level. Patients with alanine aminotransferase increased more than 3 times normal at the time of procedure received metronidazole 500 mg i.v. every 8 hours instead of clindamycin.

**Follow-up**

Follow-up lasted 7 days after the procedure. A standardized doctor’s visit ensured homogeneous evaluation of the local wound manifestations. The physician performed the blind assessment of the outcomes. The following parameters were evaluated within 48 hours and 1 week from PEG insertion: pain/tenderness, fever, maximum white blood cells count, leakage/drainage, bleeding, pus/discharge and PEG tube function. Pus was defined as presence of macroscopic evidence of suppurating exudates. Furthermore, culture sensitive of the site of insertion and antibiotic side-effects were also investigated. Indication for PEG placement and co-morbidities were noted for each patient.

**Peristomal infection**

The peristomal region was examined daily, cleaned, and bandaged without antiseptic ointments. Peristomal site features were noted and scored as proposed by Jain et al (17). The presence of erythema and of exudate were scored on a scale of 0 to 4; induration was scored on a scale of 0 to 3. Criteria for infection were a maximum combined score of 8 or higher, or the presence of microscopic and microbiologic evidence of suppurating exudate.

**Statistical analysis**

This study was designed as a cross-sectional observational study. Therefore, data are shown as mean and median values, ranges and rates.

**Results**

From January 2009 to June 2010, 97 patients underwent PEG procedure. Median age of the study population was 67 years (range 18-95 years). Sixty-nine patients were males (71.1%). Table I shows the indications for PEG placement and comorbidities in the 97 patients included in the study. The indication for the procedure was mainly neurological disorders with cerebrovascular accident being the primary indication (43.3%). Diabetes mellitus and hypertension

<table>
<thead>
<tr>
<th>Indication to PEG placement</th>
<th>(%)</th>
<th>Comorbidities</th>
</tr>
</thead>
</table>
| Cerebrovascular accident, bedridden | 42 (43.3) | 23 DM+HTN
| | | 7 HTN
| | | 6 DM
| | | 2 CRF
| | | 1 DM+HTN+CRF
| | | 1 CRF + line sepsis
| Multinfarct dementia | 23 (23.7) | 12 DM+HTN
| | | 7 HTN
| | | 3 DM
| | | 1 CRF
| Recurrent aspiration | 14 (14.4) | 7 DM+HTN
| | | 2 DM
| | | 2 HTN
| | | 1 CRF+DM+HTN
| Parkinsonism and dysphagia | 10 (10.3) | 5 HTN
| | | 3 DM+HTN
| | | 1 DM
| | | 1 HTN+DM+CRF
| Anoxic brain injury | 4 (4.1) | 3 DM+HTN
| | | 1 CRF
| Motor neuron disease | 2 (2.1) | none
| Behcet’s disease with neurological damage | 1 (1.0) | none
| Polymyositis | 1 (1.0) | HTN

were the most frequent comorbidities (64.9% and 75.2% of patients, respectively).

The success rate of percutaneous placement of catheter into the stomach was 100%. In two cases feeding was delayed for 24 hours. However, all PEG tubes were functioning within one week. Two patients died between the 2nd and 7th day: one patient died during hemodialysis and the other died from respiratory arrest secondary to Cor pulmonale. None of the deaths was related to the procedure.

Wound infection occurred in three cases within 48 hours of the observational period (3.1%). The evaluation carried out seven days after the procedure showed that all three cases were resolved although one new case of wound infection occurred (1.0%). We also evaluated the characteristics of the site of insertion of the PEG tube and these data are shown in Table II. Fever and WBC count were considered markers of possible infection. Fever was present in 10 patients (10.3%) within 48 hours from the procedure, but in none within seven days. Nine patients (9.3%) reached a WBC count higher than 10^4/cc within seven days, and all had fever. Although mild abdominal wall pain and tenderness was prevalent in the 48 hours after the procedure, this side effect subsided within one week. Drainage, leakage, and site bleeding were all minimal and resolved within one week.

### Table II. Incidence of acute complications post-PEG procedure.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>n (%) within 48h</th>
<th>n (%) within 1 week</th>
</tr>
</thead>
<tbody>
<tr>
<td>max WBC count &gt;10^4</td>
<td>Per Liter</td>
<td>0 (0%)</td>
<td>9 (9.3%; 9/9 had fever)</td>
</tr>
<tr>
<td>fever</td>
<td></td>
<td>10 (10.3%)</td>
<td>none</td>
</tr>
<tr>
<td>&gt;37.5°C</td>
<td></td>
<td>7 (7.2%)</td>
<td>none</td>
</tr>
<tr>
<td>&gt;38.0°C</td>
<td></td>
<td>3 (2.1%)</td>
<td>none</td>
</tr>
<tr>
<td>abdominal wall pain &amp;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>tenderness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>mild</td>
<td></td>
<td>72 (74.2%)</td>
<td>2 (2.1%; in both severe at 48h)</td>
</tr>
<tr>
<td>moderate</td>
<td></td>
<td>21 (21.6%)</td>
<td>none</td>
</tr>
<tr>
<td>severe</td>
<td></td>
<td>4 (4.1%)</td>
<td>none</td>
</tr>
<tr>
<td>drainage/leak</td>
<td>minimal</td>
<td>12 (12.4%)</td>
<td>none</td>
</tr>
<tr>
<td>moderate</td>
<td></td>
<td>1 (1.0%)</td>
<td>none</td>
</tr>
<tr>
<td>severe</td>
<td></td>
<td></td>
<td>none</td>
</tr>
<tr>
<td>pus presence</td>
<td></td>
<td>3 (3.1%)</td>
<td>1 (1.0%)</td>
</tr>
<tr>
<td>bleeding</td>
<td>minimal</td>
<td>13 (13.4%)</td>
<td>none</td>
</tr>
<tr>
<td>moderate</td>
<td></td>
<td></td>
<td>none</td>
</tr>
<tr>
<td>severe</td>
<td></td>
<td></td>
<td>none</td>
</tr>
</tbody>
</table>

Culture of peristomal tissue was obtained from all 97 patients. Ninety-five cultures (98%) did not isolate any bacteria. Two cultures were positive for contamination by coagulase negative staphylococcus and mixed growth, respectively. Adverse events were investigated during treatment and until the end of the follow-up. No patients presented liver enzymes elevation more than three times normal and clindamycin could be administered to all of them. One patient (1.0%) had localized itching to the forearm after clindamycin and was therefore switched to metronidazole 500 mg every 12 hours. Thus, per-protocol and intention-to-treat analysis did not significantly differ (PP 3.1% and ITT 3.1%). No other side-effects occurred.

### Discussion

Infection at the insertion site occurs in about 30% of patients undergoing PEG procedure. Incidence of wound infection evaluated by a recent meta-analysis ranged between 7.5% to 50% when patients received placebo i.v. or no medication at all [9, 10]. All studies but two included in the analysis used a single dose of a broad spectrum antibiotic obtaining an absolute risk reduction of 14-17% as compared to placebo, and wound infection incidence ranged from 0% to 33%.

Our study supports the findings of other authors [18, 19] demonstrating that the percutaneous method (PEG) of installing a catheter into the stomach is safe and effective. Moreover, although this study lacked a controlled arm, our data were comparable with results of other studies, thus proving the efficacy of antibiotic prophylaxis in PEG procedure. All in all, our study showed that a short-term clindamycin and cefotaxime prophylaxis had a very high efficacy in preventing PEG insertion associated infections with a favourable safety profile. In particular, despite the inclusion of patients with a substantial comorbidity burden, clinical evidence of infection (fever, leukocytosis) had approximately 10% incidence, and local complications were prevalently mild. Worthy of noting was that the results of peristomal cultures, which in our study were obtained in all the population, showed that occurrence of site infection was limited to <5% of the patients, thus confirming the efficacy of the prophylaxis. Lastly, the proposed regimen was very well tolerated as no major side effect occurred and one patient alone had to be switched to metronidazole for the occurrence of a minor side effect. Recently, a single dose of cephalosporin was recommended as first choice prophylaxis by the British Society of Gastroenterology [20]. However, RCT studies employing this antibiotic schedule in various groups of patients showed a variable efficacy. These subjects in many cases included patients that had to be well enough to give informed consent. Further, it should be considered that often, in everyday practice, patients are already receiving antibiotic treatment. Moreover, as a consequence of malnutrition and comorbidities, these patients are vulnerable to infections. For the same reasons they cannot be considered a homogeneous group and the prophylaxis treatment should be tailored singularly. Thus, in selected cases a combined therapy for a prolonged period could be useful and might be considered as first-line prophylaxis. However, this approach cannot be employed indiscriminately to every patient referred for PEG placement. In fact, the PEG insertion rate is continuously increasing and an ideal prophylaxis should be effective, inexpensive and offer an easy course avoiding antibiotic resistance. A first study was already performed in this direction, which demonstrated that a single dose of the
oral solution of co-trimoxazole (20ml) deposited in the PEG catheter was at least as effective as cefuroxime prophylaxis, with important time and cost savings [21].

Lastly, PEG devices pass through the oropharynx during insertion and antibiotic prophylaxis should be specifically aimed at oropharyngeal bacteria. It is well known that Staphylococcus aureus is the most commonly implicated organism in peristomal infection and that methicillin-resistant Staphylococcus aureus (MRSA) is becoming increasingly common in hospitalized patients. One may argue that our antibiotic course could be effective for community-acquired MRSA infection but not beneficial against hospital-acquired MRSA infection. In this regard, there is no consensus on the best approach to this clinical situation. One option could be to employ a traditional regimen and eventually to add Vancomycin later if a severe infection develops in spite of antibiotic prophylaxis. It could be useful to evaluate nasopharyngeal MRSA colonization before PEG placement [16]. Also, other studies have suggested the use of an overtube that reduces the risk of peristomal infection but mild complications related to the overtube are frequent [22].

### Conclusion

The combined use of cefotaxime and clindamycin twice daily for 48h seems to be effective in reducing the incidence of acute complications due to PEG placement without an increased side-effects rate. Other studies comparing this regimen with other antibiotic schedules must be performed before proposing this regimen in everyday clinical practice.

### Conflicts of interests

None to declare.

### References


