

# Antibiotic Use and Overuse for Appendicectomy in Antigua and Barbuda

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## ABSTRACT

*The use of antibiotics for appendicectomy in Antigua and Barbuda, from January 1998 to December 1999, was examined with respect to current Surgical Infection Society guidelines from developed countries. There were 143 cases of appendicectomy performed at Holberton Hospital. The mean patient age and standard deviation (SD) was  $28.1 \pm 15.8$  years, 57% female. Pathology showed inflamed appendix only in 56%, peri-appendiceal abscess/perforation in 17%, "fibrosed" appendix in 10% and normal appendix in 17%. Postoperative infection (wound infection, fever > three days) was seen in 7/24 (29%) of cases with peri-appendiceal abscess/perforation and 2/119 (1.7%) of the other cases. A subset of 88 cases had antibiotic use reviewed: 3/88 (3.4%) were given no antibiotics, 7/88 (8%) were given one antibiotic, 5/88 (5.7%) were given two antibiotics, 72/88 (81.8%) were given three antibiotics and 1/88 (1.1%) was given four antibiotics. Parenteral antibiotics were given a mean and SD of  $5.39 \pm 1.94$  days followed by oral antibiotics in 18/88 (20.5%) cases. Those with appendiceal abscess/perforation were treated parenterally for mean and SD of  $6.56 \pm 2.35$  days, not significantly different from others. Most frequent antibiotics used were gentamicin, metronidazole and ampicillin/penicillin/ cloxacillin/cephradine (81.8%). The Surgical Infection Society recommends starting prophylactic antibiotics before surgery, using appropriate spectrum agents for less than 24 hours if not contaminated and less than five days if infected. It may be possible to safely reduce antibiotic use for appendicectomy in Antigua and Barbuda.*

## Uso y Abuso de Antibióticos en la Apendicectomía en Antigua y Barbuda

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## RESUMEN

*Se examinó el uso de los antibióticos en apendicectomías en Antigua y Barbuda, en el período comprendido de enero de 1998 a diciembre de 1999, sobre la base de las guías actuales de la Sociedad de Infecciones Quirúrgicas de los países desarrollados. Un total de 143 casos de apendicectomía fueron atendidos en el Hospital Holberton. La edad media de los pacientes y la desviación estándar (DE) fue  $28.1 + 15.8$  años, 57% mujeres. La patología mostró apéndice inflamado sólo en el 56% de los casos, absceso periapendicular/perforación en 17%, apéndice "fibroso" en el 10% y apéndice normal en el 17%. Se vio infección postoperatoria (infección de heridas, fiebre > tres días) en 7/24 (29%) de los casos con absceso periapendicular/perforación y 2/119 (1.7%) de los otros casos. A un subconjunto de 88 casos se le revisó el uso de antibióticos: a 3/88 (3.4%) no se les dio antibióticos, 7/88 (8%) recibieron un antibiótico, 5/88 (5.7%) recibieron dos antibiótico, 72/88 (81.8%) recibieron tres antibióticos, y 1/88 (1.1%) recibió cuatro antibióticos. Se suministraron antibióticos parenterales para una media y DE equivalente a  $5.39 \pm 1.94$  días, seguidos de antibióticos orales en 18/88 (20.5%) casos. Los pacientes con absceso apendicular/perforación fueron tratados parenteralmente para una media y DE equivalente a  $6.56 + 2.35$  días, sin diferencia significativa con respecto a los otros. Los antibióticos más frecuentes fueron la gentamicina, el metronidazol, y la ampicilina/ penicilina/ cloxacilina/ cefradina (81.8%). La Sociedad de Infecciones Quirúrgicas recomienda que se comience con antibióticos profilácticos antes de la cirugía, usando agentes de espectro apropiado durante menos de*

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*24 horas si no hay contaminación y menos de 5 días si hay infección. El uso de antibióticos en la apendicectomía puede reducirse sin peligro en Antigua.*

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## INTRODUCTION

Antibiotics for the prevention of postoperative infection after appendicectomy have been demonstrated to be superior to placebo (1). Surgical site infections accounted for 25% of nosocomial infection in an intensive care unit in Trinidad (2). Generous use of antibiotics in developing countries has been justified based on poor nutritional status of patients and possible lack of hygiene (3, 4). Attempts have been made in developed countries to reduce the use of antibiotics in abdominal surgery (5–9). The Surgical Infection Society recommends starting antibiotics two hours before the operation, using drugs with the appropriate spectrum and using one dose prior to operation, using them for less than 24 hours in contaminated cases and less than five days for infected cases (7,8). A single dose of a first or second generation cephalosporin is recommended for contamination or inflammation (5, 6). Holberton Hospital in Antigua and Barbuda is the only full service hospital in the country, handling roughly 90% of surgical cases for this country of about 70 000 people with per capita income US \$5,000. This study represents a review of appendicectomy cases at Holberton Hospital with respect to antibiotic use and outcome.

## METHODS

A retrospective review of all cases of appendicectomy at Holberton Hospital between January 1998 and December 1999 was undertaken. Information from the records included age, gender, pathological findings, diagnosis of postoperative infection, length of stay and antibiotic use. Postoperative infection was defined as a fever persisting more than three days after surgery or a wound infection. Surgical outcome measures included death, infection rate and length of hospital stay. Antibiotic use data included duration and type of antibiotic. Statistical analysis was performed using two-sample t test and chi-square analysis as appropriate, employing STAT101 software (Addison-Wesley Minitab Inc., Reading, Massachusetts, 1993). Significance level greater than 0.05 was reported as non-significant.

## RESULTS

There were 143 patients who underwent appendicectomy in the study period. The mean age and SD at operation was 28.1 ± 15.8 years with a range of 3 to 83 years. There were 57% female patients. Pathology showed an inflamed appendix only in 80/143 (56%), inflamed appendix with peri-appendiceal abscess or perforation in 24/143 (17%), a "fibrosed" appendix in 15/143 (10%) and a normal appendix in 24/143 (17%). The false positive diagnosis of appendicitis was 17% and perforation incidence was 17% from these

pathologic data. Postoperative infection (wound infection or fever > 3 days postoperatively) was seen in 7/24 (29%) patients with peri-appendiceal abscess or perforation and in 2/119 (1.7%) patients in the other categories. The mean length of stay and SD was 8.13 ± 4.81 days, with a range of 3 to 30 days. There were no surgical deaths in the study period.

Information on antibiotic use was available for a subset of 88 of 143 (70%) of the patients. A total of 85/88 patients (96.6%) received antibiotics before and after operation for a mean and SD of 5.39 ± 1.94 days, range 2 to 12 days. Those with peri-appendiceal abscess or perforation received antibiotics for a mean and SD of 6.56 ± 2.35 days, not significantly different from patients not having those findings. Those with normal appendix were treated for 5.00 ± 2.04 days, not significantly different from the group as a whole. The antibiotics given parenterally are shown in the Table. No

Table: Antibiotics given parenterally for appendicectomy in Antigua and Barbuda

No antibiotics:	3/88	3.4%
One antibiotic:	7/88	8%
Ampicillin	3/88	
Cephadrine	2/88	
Metronidazole	1/88	
Cefotaxime	1/88	
Two antibiotics:	5/88	5.7%
Gentamicin/Ampicillin	3/88	
Metronidazole/Ceftazidime	1/88	
Gentamicin/Metronidazole	1/88	
Three antibiotics:	72/88	81.8%
Gentamicin/Ampicillin/Metronidazole	37/88	
Gentamicin/Penicillin/Metronidazole	19/88	
Gentamicin/Cephadrine/Metronidazole	11/88	
Gentamicin/Cloxacillin/Metronidazole	5/88	
Four antibiotics:	1/88	1.1%
Gentamicin, Cloxacillin/ Penicillin/ Metronidazole		

parenteral antibiotics were given in 3.4% of cases, one antibiotic in 8% of cases, two antibiotics in 5.7% of cases, three antibiotics in 81.8% of cases and four antibiotics in 1.1% of cases. Additional oral antibiotics were given to 18/88 (20.5%) patients.

## DISCUSSION

Appendicectomy is the most common abdominal operation performed on an emergency basis worldwide (10). The diagnosis and treatment of appendicitis has led to a decrease in

mortality (10–13). Improved diagnosis has included the use of ultrasonography and computerized tomography (10–13). To a large extent, the diagnosis is still based on clinical findings, with difficulties in diagnosis persisting in children and the elderly (14). In this series of appendicectomy cases from Antigua and Barbuda, including both adults and children, the false positive rate of diagnosis was 17% and the perforation incidence was 17%. In one series from Jamaica in the late 1980s, there was positive pathology in 75% of cases with no abnormality seen in 25% (15). In studies from developed countries, a normal appendix is found in 13% to 30% of cases (8, 14–16) with perforation found in 15% to 30% (14, 16). Children and the elderly may have double the rate of false positive diagnosis and perforation (10, 11, 14, 16). Perforation may increase the complication rate, mostly from infection, to 39% (13). The rates of false positive diagnosis and perforation with appendicectomy in Antigua and Barbuda were comparable to those seen in developed countries.

Antibiotics have been shown to be effective when given prophylactically to patients with suspected appendicitis prior to surgery (1, 5–9). Attempts have been made to develop antibiotic protocols for use of antibiotics for appendicitis (5–9, 18–21). The most effective drug appears to be metronidazole with gentamicin or ampicillin, or a first or second generation cephalosporin (5–9, 18–21). A distinction should be made between cases with normal appendix, inflammation alone and perforation or abscess. Parenteral antibiotics should be given prior to the initial incision. For cases of normal appendix, no further antibiotic is recommended; for cases with inflammation, a second dose could be given in the first 24 hours; and for infected cases, antibiotics could be continued for five days or longer based on course and cultures (5–9, 18–22). The rate of infection in contaminated cases in Antigua and Barbuda, 29%, and in non-contaminated cases, 1.7%, are comparable to rates of 13% to 47% for contaminated and 1.2% to 9% for non-contaminated cases overseas (16–20).

This series of cases from Antigua and Barbuda would suggest that patients with normal appendix or inflammation, 73% of cases, could have been safely given a single dose (for normal or inflamed appendix) or two doses of antibiotic (for contaminated cases) rather than for an average of five days. This problem is not limited to Antigua and Barbuda, as other surgical services in other countries have noted “chaos” with respect to the use of prophylactic antibiotics (7, 22). In these two reports from the United States of America (USA) and Taiwan, “appropriate” use of antibiotics was seen in 23% to 26% of cases (7, 22). A cost saving of 92% would be possible with a single dose cefazolin and 69% with four doses (22). Some studies have emphasized the lack of experimental data and call for additional controlled studies in perioperative antibiotic use (23, 24).

Although antibiotic resistance may vary from one locale to another, the patterns may be statistically different

but not warrant a change in recommendations. Holberton Hospital in Antigua and Barbuda has more antibiotic-resistant gram negative organisms than a comparable community hospital in the USA (25), but in most of the Caribbean region, antibiotic sensitivity patterns of gram negative bacteria do not differ significantly (26), so guidelines might be employed regionally rather than locally.

This report details the use and documents the possible overuse of antibiotics in the management of appendicitis in Antigua and Barbuda. Over 83% of cases were given three or more antibiotics for more than five days. Little distinction was made between those with normal findings, inflammation or contamination. Although liberal use of antibiotics have been justified in the developing countries of the Caribbean, lack of effectiveness, cost and increasing antibiotic resistance should raise questions. Additional research involving antibiotic use for surgical procedures in the Caribbean is warranted.

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