

# Six Years Experience with Pelvic Inflammatory Disease

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The charts of 197 patients, hospitalized with the diagnosis of pelvic inflammatory disease between 1966 and 1972, were reviewed. During this period, the number of admissions for pelvic inflammatory disease increased proportionately to the reported incidence of gonorrhea. 39.6 percent of the patients had gonococcal pelvic inflammatory disease. A variety of bacteria were cultured from the remainder. Non-

gonococcal pelvic inflammatory disease was associated with significantly longer duration of fever, longer hospital stay and greater incidence of need for surgical drainage procedures. No significant differences in clinical course or outcome in gonococcal or non-gonococcal pelvic inflammatory disease could be shown between groups receiving penicillin in various doses or combinations of antimicrobials.

**A** resurgence of gonorrhea to near epidemic proportions has been noted throughout the United States. In the female, this disease is frequently complicated by acute Pelvic Inflammatory Disease (PID). Acute PID is an important cause of morbidity, occasional mortality, and may lead to the significant long term complications of infertility and recurrent pelvic pain.

The experience with acute pelvic inflammatory disease at the Sacramento Medical Center was reviewed for the six-year period from March 1966 through February 1972. This paper will report our efforts to correlate the clinical course, need for surgical intervention, complications, and preservation of normal function with the etiology and therapeutic regimen.

## Introduction

The clinical diagnosis of acute PID is frequently difficult since it must be differentiated from other causes of acute

lower abdominal pain. Traditionally, the diagnosis has been made on the basis of acute, low-seated abdominal pain with two or more of the following: abnormal vaginal discharge, fever, vomiting, menstrual irregularity, dysuria, symptoms of proctitis, marked pelvic tenderness, adnexal swelling or mass, or a sedimentation rate greater than 15. Jacobson and Westrom performed 900 consecutive laporoscopies in patients thought to have pelvic inflammatory disease by the above criteria.<sup>1</sup> The diagnosis was confirmed in 623 cases (69.4 percent); 93 (10.2 percent) were found to have other conditions; and 184 (20.4 percent) appeared to be normal. The clinical criteria which had the highest correlation were: 1) history of acute lower abdominal pain; 2) temperature greater than 38 degrees centigrade; 3) marked tenderness on bimanual examination; and 4) pelvic mass or swelling.

There is considerable controversy regarding estimates of the proportion of cases in which the gonococcus is the primary etiologic agent. These range from Durfee's "fewer than one percent"<sup>2</sup> to Curran's "over 80 percent."<sup>3</sup> A number of previous investigators have performed bacteriologic studies to determine the etiology of PID<sup>4,5</sup> and regimens of antimicrobics have been suggested on the basis of these findings.<sup>5,6</sup> Current practice is to combine penicillin G with one of the aminocyclitols, or use ampicillin alone or in combination to provide activity against the gonococcus,

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streptococcus, anaerobic streptococcus, *Escherichia coli*, and staphylococcus. As there is no consensus regarding etiology, a wide variety of treatment regimens and dosage schedules have been advocated. Many clinicians have the impression that increased doses of penicillin result in decreased morbidity, decreased hospitalization, and more rapid solution of the inflammatory process, and doses of more than thirty million units per twenty-four hours are no longer uncommon.<sup>7</sup> However, doses of this magnitude have been associated with hemolytic anemia, seizures, and electrolyte imbalances.

## Methods

The records of hospitalized patients admitted with the diagnosis of acute PID were reviewed in this study. The criteria of Wright and Laemmel<sup>8</sup> as confirmed by Jacobson and Westrom were utilized.<sup>1</sup> Other causes of lower abdominal or pelvic pathology were ruled out. The following diagnostic criteria were used:

1. History of acute lower abdominal pain.
2. Fever greater than 38 degrees centigrade.
3. One or more of the following:
  - a. Marked adnexal tenderness on bimanual examination.
  - b. Pelvic mass or swelling.
  - c. Pain on cervical motion.

It was acknowledged that some patients with definite PID were excluded as Jacobson and Westrom found over 50 percent of patients with confirmed salpingitis at laparoscopy did not have a temperature elevation above 38 degrees centigrade. However, by applying such criteria it was anticipated that only patients with definite adnexal inflammatory disease would be studied.<sup>1</sup>

The records of 267 individuals admitted during the six-year period with the diagnosis of acute pelvic inflammatory

disease were reviewed. The diagnostic criteria for inclusion in this study were met by 197 patient records. These charts were then reviewed for diagnosis by culture. All study patients had endocervical cultures obtained by swab which were inoculated as soon as possible onto chocolate agar and Thayer-Martin medium. Surgical specimens were cultured aerobically and anaerobically. During the last two years of the study calcium alginate rather than cotton-tipped swabs were used, and Amies charcoal transport media were employed when swabs could not be immediately inoculated. Correlation of differences in clinical course with the isolated bacteria was attempted. The clinical parameters studied were: 1) duration of fever; 2) duration of hospitalization; 3) incidence of surgery; and 4) successful pregnancy as an indicator of preservation of the normal function. Patients were then grouped according to therapeutic agent and duration of parenteral therapy, and the same features were compared.

The two tailed "t" test of difference in means was applied in comparing duration of fever and hospitalization between etiologic groups. In comparing differences in rate of surgical intervention, the "test of difference" was used, as it was in comparing rates of successful pregnancy. The therapeutic regimens were compared by directly applying a two-dimensional graph for the gonococcal and non-gonococcal groups.

Figure 1

REPORTED CASES OF GONORRHEA IN SACRAMENTO COUNTY AND SACRAMENTO MEDICAL CENTER ADMISSIONS FOR ACUTE PID BY YEAR

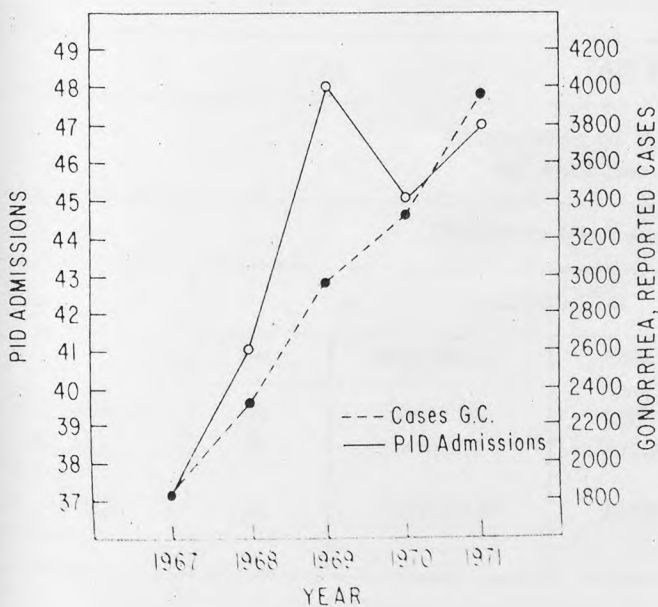


TABLE I

### Organisms Cultured from Patients with Non-gonococcal Pelvic Inflammatory Disease and Pelvic Abscess.

(Percentage and number of cultures.)

Organism	Study Group	Falk	Lukasik
<i>Escherichia coli</i>	12.5%(3)	15.7%(85)	36.5%
Anaerobic streptococci	4.2%(1)	14.8%(80)	—
Beta-hemolytic streptococci	4.2%(1)	—	7.7%
Alpha-hemolytic streptococci	12.5%(3)	—	13.4%
Group D streptococci	—	—	11.5%
Klebsella species	8.3%(2)	—	—
Diphtheroids	8.3%(2)	—	—
<i>Staphylococcus aureus</i>	4.2%(1)	4.6%(25)	7.7%
<i>Staphylococcus epidermidis</i>	—	—	7.7%
<i>Bacteroides fragilis</i>	4.2%(1)	—	6.7%
<i>Proteus</i> species	4.2%(1)	—	3.8%
No growth	37.4%(19)	64.9%(350)	—

## Results

### Incidence

The reported cases of gonorrhea in Sacramento County<sup>9</sup> and the admissions to the Sacramento Medical Center for acute PID were both found to be sharply increased during the study period. Figure 1 shows these increases as plotted by year.

### Etiology

Of the 197 patients meeting the diagnostic criteria for inclusion in this study, 78 (39.6 percent) were found to have *Neisseria gonorrhoeae* on endocervical culture. It is acknowledged that the gonorrhea organism is difficult to culture and the incidence of gonorrheal PID is probably higher. Of the 119 patients with apparent non-gonococcal disease, 21 underwent a laparotomy, culdocentesis or culpotomy with intraperitoneal or abscess culture. These results are listed in the first column of Table I.

The total number of cultures was greater than 21 because two or more isolates were obtained from some patients as treatment progressed. The nine cultures with no growth may have been due to anaerobic organisms which are frequently difficult to culture successfully. In addition, the non-gonococcal patients frequently had different organisms isolated on endocervical and intraperitoneal cultures.

Table I also compares the results of Falk's study in which 551 patients with PID underwent culdocentesis<sup>5</sup> and the results of a study by Lukasik who cultured the fallopian tubes of 17 patients with acute flairs of chronic PID.<sup>4</sup> Similar results were also reported by Nekele and Lucas in 18 patients operated on for tubo-ovarian abscess.<sup>10</sup>

### Treatment Regimen and Clinical Course

Although some 51 different treatment regimens were employed, these were grouped into six basic treatment groups listed in Table II. The number of days of increased temperature and total hospital days are related to penicillin dosage in Figure 2. There was no difference between treatment groups for the gonorrheal patients. However, those patients with non-gonorrheal PID showed an increase in both the days of elevated temperature and hospital days with in-

creasing dosage of penicillin. While no explanation for this trend is apparent, possibly the physician's tendency to treat the patient with the most severe illness with the largest amount of medication is reflected.

Table III compares the clinical course for patients treated with penicillin alone, penicillin plus streptomycin, and with other regimens. No statistically significant differences were found.

Figure 2

AVERAGE HOSPITAL DAYS AND DAYS ELEVATED TEMPERATURE RELATED TO DAILY PENICILLIN DOSE FOR PATIENTS WITH GONORREAL ACUTE PELVIC INFLAMMATORY DISEASE (▲▲) AND NONGONORREAL ACUTE PELVIC INFLAMMATORY DISEASE (●●)

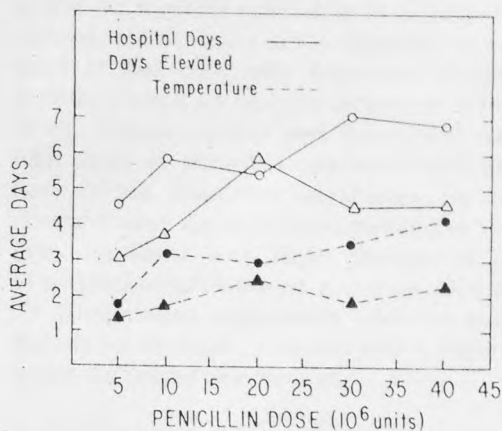


TABLE II

#### Therapeutic Groups

1. Penicillin less than 5 million units/24 hours.
2. Penicillin 5-10 million units/24 hours.
3. Penicillin 11-20 million units/24 hours.
4. Penicillin 21-30 million units/24 hours.
5. Penicillin greater than 30 million units/24 hours.
6. Other treatment regimens.

TABLE III

#### Comparison of Hospital Course for Antibiotic Regimens

(Expressing Mean and Range in Days)

	GONOCOCCAL			NON-GONOCOCCAL		
	No.	Days Temp.	Hosp. Days	No.	Days Temp.	Hosp. Days
Penicillin Only	28	1.38(0.5-10)	3.08(1-12.5)	22	3.05(0.5-15)	4.77(1-16)
Penicillin plus Streptomycin	36	2.00(0.5-5)	4.74(2-14)	73	3.03(0.5-31)	6.10(1-31)
Other Antibiotic Regimens	14	1.67(0.5-4.5)	4.54(2-10)	24	3.05(0.5-8.5)	5.64(2-14)

## Etiology and Clinical Course

Patients were separated into two groups based on the presence or absence of *Neisseria gonorrhoeae* on endocervical culture. The results of review of clinical courses are listed in Table IV. The increase in days of elevated temperature and hospitalization, as well as in surgical intervention, is significant for the non-gonorrheal patient group, and was consistent through all six treatment groups. There was no significant difference between etiologic or treatment groups with regard to numbers of additional episodes of PID or incidence of spontaneous abortion.

**TABLE IV**

**Comparison of Clinical Course for  
Gonorrheal and Non-Gonorrheal PID  
in Days Giving Mean and Range in Days**

	Gonorrheal	Non-Gonorrheal	Statistical Significance
Number	78 (39.6%)	119 (60.4%)	
Days Elevated Temperature	1.71 (0.5-10)	3.015 (0.5-31)	p < 0.005
Hospital Days	4.02 (1-14)	5.77 (1-31)	p < 0.005
Patients Requiring Surgery	3 (3.85%)	22 (18.5%)	p < 0.008
Death	0	1	

## Preservation of Normal Function

On review, 65 charts had documentation adequate to allow for the determination of the patients having, or not having had a successful pregnancy following their episode of PID. Information on the number of patients using contraception or attempting to become pregnant was not available and would have to be carefully evaluated in any future study. However, the number of women years at risk of pregnancy was equal between the various treatment groups. Thirteen of these 65 women had successful pregnancies. More pregnancies than predicted occurred in the non-gonorrheal patients who received: 1) more than 11,000,000 units of penicillin per 24 hours; 2) continued parenteral therapy for more than 36 hours after becoming afebrile (temperature less than or equal to 37 degrees centigrade); and 3) streptomycin as well as penicillin. However, in no case were these differences found to be statistically significant, possibly because of the small numbers involved. These points await further study.

## Discussion

Patients suffering from non-gonorrheal PID have a more

serious illness than those with gonococcal PID, for they experience increased morbidity, longer febrile phases, and protracted hospitalization. In addition, there was a significantly greater need for surgical intervention with one in seven patients (21 of 119) requiring exploratory laparotomy, drainage of pelvic abscess or other pelvic surgery. Also, there was one death in the non-gonococcal group. In the patient with acute PID, the endocervical culture for *Neisseria gonorrhoeae* would appear to be an extremely valuable diagnostic aid of both therapeutic and prognostic significance.

A diverse group of gram positive, gram negative, and anaerobic bacteria were again confirmed as causing non-gonococcal PID. While many feel that non-gonorrheal PID is due to secondary invaders in a patient who first had gonorrheal PID, many of the organisms cultured are pathogenic in their own right. Regardless of underlying pathogenesis, there is an obvious difference in both the severity of the disease process and the clinical course. Although high doses of penicillin combined with an aminocyclitol have certain theoretical advantages, no improvement in clinical course could be documented in this study. However, treatment with larger dosages of penicillin (over 11,000,000 units/24 hours) in combination with streptomycin administered parenterally until the patient had been afebrile for 36 hours correlates with a higher rate of subsequent successful pregnancies.

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## References

- Jacobson L, Westrom L. Objectivized diagnosis of acute pelvic inflammatory disease. Diagnostic and prognostic value of routine laparoscopy. *Am J Obst and Gyn* 105:1088-98, December 1969.
- Durfee RB. Infections of the female genital tract. In Hoepflich PD (ed.). *Infectious Diseases*. Hagerstown, Maryland, Harper and Row, Inc, 1972, pp 475-498.
- Miller JD, Curran J, Holmes KK, Kellog DS. Symposium: The gonorrhea epidemic. *Contemporary Ob/Gyn* 1:54-86, February 1973.
- Lukasik J. A comparative evaluation of the bacteriological flora of the uterine cervix and fallopian tubes in cases of salpingitis. *Am J Obst and Gyn* 87:1028-1035, 1963.
- Falk V. Treatment of acute non-tuberculous salpingitis with antibiotics alone and in combination with glucocorticoids. *Acta Obst Gyn Scand* 44: Supplement, 6:3-118, 1965.
- Woodruff JD, Paverstein, CJ. *The Fallopian Tube*. Baltimore, Maryland, Williams and Wilkins Co, 1969, pp 117-150.
- Acosta AA, Mabray CR, Kaufman RH. Intrauterine pregnancy and co-existent pelvic inflammatory disease. *Obst and Gyn* 37:282-285, February 1971.
- Wright NH, Laemmle P. Acute pelvic inflammatory disease in an indigent population. *Am J Obst and Gyn* 101:979-990, August 1968.
- Venereal disease — Sacramento County annual report. Sacramento Department of Public Health, 1972.
- Nekel WA, Lucas WE. Management of tubo-ovarian abscess. *Obst and Gyn* 32 382-386, September 1968.