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Dan C. Martin, M.D.

Google Voice (901) 761-4787

Email danmartinmd@gmail.com

Published Abstract

This retrospective documentation study was designed to study the possible causes associated with a 64% increase in histologic diagnosis of endometriosis between 1982 and 1986. The largest area of increase was associated with the use of operative laparoscopy. There was a minor increase at laparotomy, whereas at hysterectomy there was no appreciable change in histologic diagnosis. Although there was an overall increase in sensitivity (a measure of the surgeon's ability to see and document endometriosis when present) and predictive positivity (surgeon's ability to predict what the pathologist will see) among all subgroups of physicians, the largest increase was associated with increased use of therapeutic laparoscopy. The lowest sensitivities were associated with coexistent pathologies, such as myomata, pelvic cancer, and severe adhesions. (*J Gynecol Surg* 6:275, 1990)

Notes (revised 9/19/2020)

This study of documentation of endometriosis in the chart operative note, history, or discharge summary as coded compared with the histology in the pathology report as coded, with the coding confirmed on manual review, investigated four groups of physicians based on caseload. It also analyzed the type of surgery. There was a wide variation in the sensitivities and predictive positivities in four groups based on surgical volume. Coexistent pathologies were also associated with decreased documentation of endometriosis. The histologic confirmation rate increased from 58% to 78% between 1982 and 1986. This in a study of documentation not clinical performance and addresses the problems of what has become known as big data that relies on documentation.

Low-volume gynecologists had a sensitivity of 41% in chart documentation compared with histologic diagnosis. That contrasted with low intermediate volume physicians at 54%, high intermediate at 73%, and high at 86%. Predictive positivities were 57%, 78%, 74% , and 99% respectively. Moreover, and possibly more indicative, lower sensitivity and predictivity occurred at open abdominal hysterectomy (55% and 66%) and higher values at laparoscopy (88% and 95%). Also, documentation was lowest in the presence of coexistence pathologies such as myomata, pelvic cancer, and severe adhesions. A major deficiency of the study is that it compares a research physician who focused on documentation, physicians with an interest in endometriosis, and physicians in general ObGyn who had no reason to document two diseases. The documentation of one disease was all that was required by insurance companies and quality assurance. This was also a time of development of magnification (Redwine 2003) at laparoscopy that was not used at laparotomy. Moreover, endometriosis was likely not recognized or removed in some cases. (Martin 1999) These concerns do not change the observation that high volume, focused surgeons had better documentation.

The study was limited to cases with endometriosis documented in the operative note or diagnosed on histology, or both. There was no way to document unrecognized endometriosis (microscopic, deep, hidden in adhesions), therefore sensitivities and PNVs were not evaluated.

As a related observation possibly associated with physician focus, Staal et al. (2016) found a wide variation in patient delay to diagnosis with a median total diagnostic delay of 7.4 years and interquartile delays of 2.1 years and 14.1 years. Thus, 25% of patients took longer than 14.1 years for a diagnosis. Delay was shorter for patients with subfertility than for patients with pain with median delays of 1.75 vs. 9.25 years. This wide variation can confound research.

As a tangent, this was an exercise in “garbage in, garbage out” in computerized data. The first computer generated data made it look like the 55 physicians in Memphis had a 90% confirmation. That did not seem reasonable and a manual review of the pathology reports was performed. The review revealed that some of the positives in the computer had the phrase “no evidence of endometriosis” on their pathology reports. The computer had entry field for “endometriosis” and “no endometriosis.” But there was no entry field for “no evidence of.” If the coders were indexing words, then they selected “yes” since the word endometriosis was listed. But, if the coders were indexing the meaning of the phrase, then the correct choice was “no.” Therefore, some patients with no endometriosis had been entered as having endometriosis. After entering the correct data, the confirmation had increased from 58% to 78% comparing 1982 with 1986. That was good, but not amazing.

Martin DC. Persistent or Recurrent Endometriosis. in Lemay A, Maheus R (eds) Understanding and Managing Endometriosis. The Parthenon Publishing Group, New York, Pages: 233-239

Staal AH, van der Zanden M, Nap AW. Diagnostic delay of endometriosis in the Netherlands. Gynecol Obstet Invest. 2016;81(4):321-4. <https://www.ncbi.nlm.nih.gov/pubmed/26742108>

Redwine David B. ‘Invisible’ microscopic endometriosis: a review. Gynecol Obstet Invest. 55(2): 63-67, 2003 <https://www.ncbi.nlm.nih.gov/pubmed/12771451>

Table 1. Changes in sensitivity and predictive positivity comparing surgical types

Group	1982		1986	
	Sensitivity	Predictive Positivity	Sensitivity	Predictive positivity
Hysterectomy	(42/75) 56%	(42/64) 66%	(57/103) 55%	(57/87) 66%
Laparotomy	(19/28) 68%	(19/33) 58%	(16/25) 64%	(16/19) 84%
Laparoscopy	(6/8) 75%	(6/18) 33%*	(56/64) 88%	(56/59) 95%*

*P < 0.0001

Sensitivity and predictive positivity among the 55 ObGyns performing endometriosis surgery were dependent on surgical volume. There were 31 physicians performing 5 or fewer cases in two six-month segments, 14 performing 6-11 cases, 9 physicians performing 12-26 cases, and one (DCM) performed 127.

The sensitivity and predictive positivity changes for the 31 physicians performing 5 or fewer cases (total 95 cases), the 14 physicians performing 6-11 cases (total 94 cases), the 9 physicians performing 12-26 cases (total 173 cases), and the physician performing 127 cases (DCM) are summarized on Table 2 and Table 2 is then annualized.

Table 2. Changes in sensitivity and predictive positivity comparing physicians case load

Group	1982		1986	
	Sensitivity	Predictive Positivity	Sensitivity	Predictive Positivity
5 or less	(9/22) 41%	(9/19) 47%	(12/29) 41%	(12/21) 57%
6 - 11	(21/37) 57%	(21/32) 66%	(14/26) 54%	(14/18) 78%
12 -26	(30/44) 68%	(30/52) 58%	(35/48) 73%	(35/47) 74%
127	(9/11) 82%	(9/14) 64%	(68/79) 86%	(68/69) 99%

* Six months in 1982 and 1986

Table 2 annualized for the first four columns with 1986 in columns five and six

Cases Annualized*	Physicians	Total Cases Annualized*	Cases per Physician Annualized*	Sensitivity 1986	Predictive Positivity
5 or less	31 (56%)	95	3.1	41%	57%
6 to 11	14 (25%)	94	6.7	54%	78%
12 to 26	9 (16%)	173	19.2	73%	74%
27 to 127	1 (2%)	127	127	86%	99%

* Annualized is the sum of six months in each 1982 and 1986.

Martin DC, Hubert GD, Levy BS. Depth of infiltration of endometriosis. *J Gynecol Surg* 5(1):55-60, 1989. doi:10.1089/gyn.1989.5.55. <https://www.liebertpub.com/doi/pdf/10.1089/gyn.1989.5.55>

This is an analysis of the depth of distribution of infiltrating endometriosis that was used by Cornillie and Koninckx (1990) to develop a concept of 5 mm as a definition for deep infiltrating endometriosis. That contrasts with Davis et al. at 3-mm.

Table 1. Patients (N = 132) with a specific maximum depth of infiltration at laparoscopy or laparotomy.

1mm	2mm	3mm	4mm	5mm	6mm	7mm	8mm	9mm	10mm	>10mm
11%	29%	17%	10%	8%	5%	5%	2%	0%	5%	8%

Techniques that, in theory, are required based on the depth:

≤ 2 mm 40 % Bipolar, thermal, argon laser, & KTP laser coagulation

2 to 5 mm 27% Nd:YAG laser coagulation

≥ 5 mm 33% Excision

https://www.researchgate.net/publication/238632603_Depth_of_Infiltration_of_Endometriosis

Cornillie FJ, Oosterlynck D, Lauweryns JM, Koninckx PR. Deeply infiltrating pelvic endometriosis: histology and clinical significance. *Fertil Steril* 1990, 53:978-83

Cornillie FJ, Lauweryns JM, Seppälä M, Riittinen L, Koninckx PR. Expression of endometrial protein PP14 in pelvic and ovarian endometriotic implants. *Hum Reprod.* 1991, 6(10):1411-5.

Davis GD, Thillet E, Lindemann J: Clinical characteristics of adolescent endometriosis. *J Adolesc Health.* 1993, 14:362-368

AUTHOR'S DRAFT

1 Increased histologic confirmation of endometriosis

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3 Dan C. Martin, M.D.^a

4 Rhonda Ahmic^b

5 Faten A. El-Zeky, Ph.D.^c

6 Roger Vander Zwaag, Ph.D.^c

7 Maggie T. Pickens, C.M.T.^d

8 Kim Cherry^e

9 Baptist Memorial Hospital, University of Tennessee, Memphis
10 Memphis, Tennessee

11

12 a Department of Obstetrics and Gynecology, Baptist Memorial Hospital, University of
13 Tennessee, Memphis

14 b Reproductive Surgery, P.C., Memphis, Tennessee

15 c Department of Health Services Research, Baptist Memorial Hospital

16 d Department of Pathology, Baptist Memorial Hospital

17 e Department of Medical Records, Baptist Memorial Hospital

18

19 Corresponding Author:

20 Dan C. Martin, M.D, see updated address above.

21 ~~910 Madison Avenue, Suite 805~~

22 ~~Memphis, Tennessee 38103~~

23 ~~(901) 529-0674~~

24 ~~FAX: (901) 525-0253~~

25

26 ABSTRACT

27

28 This retrospective documentation study studied the possible causes of a 64% increase in
29 histologic diagnosis of endometriosis between 1982 and 1986. While there was an overall
30 increase in sensitivity and predictive positive among all subgroups of physicians, those with the
31 largest caseloads had the highest absolute values. The lowest sensitivities were associated with
32 coexistent pathologies such as myomata, pelvic cancer and severe adhesions. The largest
33 increase in sensitivity and predictive positivity by surgical approach was associated with
34 increased utilization of therapeutic laparoscopy. This apparent ongoing increase correlates with a
35 continued emphasis on therapeutic laparoscopy.

36

37 INTRODUCTION

38

39 Following the publication of an increasing number of patients with histologic
40 confirmation of endometriosis,[1,2] the number of patients with a diagnosis by the Department
41 of Pathology at the Baptist Memorial Hospital was reviewed. Cases had increased 64% from 111
42 in the last six months of 1982 to 182 cases in the last six months of 1986 although the total
43 number of endometriosis cases noted in Medical Records was reasonably constant with 244
44 cases and 248 cases respectively.

45
46 This retrospective review is of 492 patients with a diagnosis of endometriosis operated on
47 by 54 gynecologists during these intervals. The purpose is to determine the factors associated
48 with the 64% increase in histologic diagnosis of endometriosis.

49 MATERIALS AND METHODS

50
51
52 All patients with a diagnosis of endometriosis were retrospectively identified from
53 records from July 1 to December 31 of both 1982 and 1986. Four databases were examined: The
54 Department of Medical Records database, the Department of Pathology computer records, the
55 operating room day sheets for Baptist Memorial Hospital Medical Center and the operating room
56 day sheets from Baptist Memorial Hospital East. The two hospitals share a common medical
57 records department and department of pathology. Charts were pulled on all outpatient
58 laparoscopies and on all inpatients with a diagnosis of endometriosis. However, all procedures
59 were reviewed individually due to the coding procedures used during the years of this study.

60
61 All charts with a diagnosis of endometriosis were reviewed which included all those with
62 a written diagnosis and all with International Classification of Diseases (ICD-9) diagnostic codes
63 617.0 to 617.9. Those with code 617.0 (adenomyosis) that did not have an additional
64 endometriosis code from pathology were coded as having negative histology (non-
65 endometriotic). This occurred with the sign-out diagnosis from pathology and with the discharge
66 diagnosis from medical records. Also, the computer program for pathology did not distinguish
67 the report's sign-out diagnosis "no evidence of endometriosis" from the term "endometriosis".
68 Due to this, the charts of all patients recognized in any of the four databases were examined
69 individually to assure that they had documentation of a clinical and/or histologic diagnosis of
70 endometriosis. The data was corrected to reflect the true sign-out diagnosis when needed.

71
72 This study subsequently correlated data from all sources and entered it on a VAX/VMS
73 which was analyzed by SPSS-X program. The analyses were performed by characteristics
74 including laparotomy, laparoscopy, hysterectomy, abdominal hysterectomy, vaginal
75 hysterectomy, physician name, physician load, tissue submitted, history of endometriosis, other
76 sign-out diagnoses, histologic diagnosis of endometriosis, other histologic diagnoses, tissue sites,
77 and physician type.

78
79 The sensitivity and predictive positive value of these procedures were calculated
80 comparing the rate of histologic diagnosis of endometriosis in the presence or absence of a
81 diagnosis of endometriosis. In this analysis, the sensitivity is the ratio of the number of patients

82 clinically diagnosed and histologically confirmed to all patients with a histological diagnosis of
83 endometriosis. The predictive positive value is the ratio of patients clinically diagnosed with
84 endometriosis and histologically confirmed to all patients with a clinical diagnosis of
85 endometriosis. The specificity was not calculated as all patients in this study were positive by
86 medical records sign-out diagnosis and / or by a pathology report.
87

88 RESULTS

89
90 The laparoscopy rate increased from 40% (98) of 244 cases in 1982 to 43% (106) of 248
91 cases in 1986. At the same time excision and biopsy of endometriosis increased at laparoscopy.
92 This correlated with a rise in tissue confirmation at laparoscopy from 8% (8) of 98 cases in 1982
93 to 60% (64) of 106 cases in 1986. There was also an associated with an improved diagnostic
94 accuracy of specimens sent to pathology. Endometriosis was histologically present in 40% (8) of
95 20 cases in 1982 with specimens sent to pathology from laparoscopic cases, while 96% (64) of
96 67 cases were confirmed in 1986.
97

98 The laparotomy rate decreased from 19% (46) of 244 cases in the last six months of 1982
99 to 12% (29) of 248 cases in the last six months of 1986. Endometriosis was histologically present
100 in 88% (37) of 42 cases in 1982 when specimens were sent to pathology from laparotomy cases,
101 while 71% (20) of 28 cases were confirmed in 1986.
102

103 The rate at hysterectomy increased from 38% (97) of 244 cases in 1982 to 46% (113) of
104 248 cases in 1986. This increase was in abdominal hysterectomies from 35% (85) of 244 cases in
105 1982 to 42% (105) of 248 cases in 1986, while the rate in vaginal hysterectomies decreased from
106 5% (12) of 244 cases in 1982 to 3% (8) of 248 cases in 1986. Endometriosis was histologically
107 present in 66% (66) of 99 cases in 1982 when specimens were sent to pathology from
108 hysterectomy cases, while 68% (77) of 113 cases were confirmed in 1986.
109

110 The changes in predictive positivity and in sensitivity are seen in Table 1. The increase in
111 predictive positivity associated with laparoscopy was statistically significant. ($P < 0.0001$). Other
112 values were not.
113

114 The sensitivity and predictive positivity changes for the 31 physicians performing 5 or
115 fewer cases (total = 95 cases), the 14 physicians performing 6 to 11 cases (total = 94 cases), the 9
116 physicians performed 12 to 26 cases (total = 173 cases) and the physician performing 27 to 127
117 cases (total = 127 cases) are summarized in Table 2.
118

119 There were 28 different, coexistent diagnoses for patients who had a diagnosis made by
120 the pathologist but not by a gynecologist (i.e. sensitivity = 0%). Eight of these were diagnoses
121 that represent subtle variations of endometriosis . Those included cul-de-sac lesions,
122 hemosiderin, and nonspecific inclusions. Seven of the 28 were for histologic diagnoses including
123 myomata and cancer. The others were for clinical diagnoses such as pelvic pain, dysfunctional
124 bleeding, abnormal uterine bleeding or for vaginal and/or intrauterine diagnoses such as

125 endometrial hyperplasia, prolapsed uterus or pelvic relaxation. Among the 66 patients in this
126 category undergoing hysterectomy; 10 (15%) had subtle variations, 16 (24%) had myomata, 5
127 (8%) had cancers, 7 (11%) had other histologic diagnoses and 28 (42%) had clinical
128 symptomatology as the only listed diagnosis. At exploratory laparotomy, there were 16 patients
129 in this category. Of those, 7 (44%) had subtle lesions, 4 (25%) had ovarian cysts, 1 (6%) was
130 undergoing tubal anastomosis and 4 (25%) had clinical symptoms listed as their diagnosis. At
131 laparoscopy, there were 10 patients. Of these, 3 (30%) had subtle lesions, 1 (10%) had an ovarian
132 cyst, and 6 (60%) had clinical symptomatology listed as their diagnosis.

133

134 DISCUSSION

135

136 Much has been written about the ability to use laparoscopes and the uses of therapeutic
137 laparoscopy to decrease the use of laparotomy and to increase the accuracy of surgery. However,
138 this has been based on the individual performances of a small group of physicians champions
139 with a specific interest in therapeutic laparoscopy. A concern voiced at meetings was that the
140 decreased laparotomy rate noted by individuals might be offset by compensatory increase in
141 laparotomy by other physicians in a hospital This study seeks to answer those concerns by
142 addressing the experience of 54 gynecologists identified as operating on patients with
143 endometriosis at the Baptist Memorial Hospitals in the last six months of 1982 and/or 1986. In
144 this group, excisional specimens at laparoscopy increased from 20 (8%) of cases in 1982 to 67
145 (27%) of cases in 1986 while those at laparotomy decreased from 46 cases (19%) in 1982 to 29
146 cases (12%) in 1986.

147

148 This study was also designed to identify the causes associated with a 64% increase in the
149 histologic diagnosis of endometriosis seen following a review prompted by a 1987 paper.[1]
150 While there was an overall increase in predictive positivity among all subgroups of physicians,
151 those with the largest endometriosis caseloads had the highest sensitivity and predictive positive
152 values. The reasons for this were not in the scope of this retrospective documentation study.
153 However, when investigating the associations of the low sensitivity at hysterectomy and
154 laparotomy when compared to laparoscopy, it was noted that 42% of patients at hysterectomy
155 and 31% at laparotomy as compared to 10% at laparoscopy had non-endometriotic intrapelvic
156 pathology documented. The finding of pelvic pathologies such as myomata, ovarian cancer and
157 severe pelvic adhesions was associated with a decreased sensitivity and documentation.
158 However, this was not statistically significant ($P=.12$).

159

160 The statistically significant increase in predictive positivity at laparoscopy when
161 comparing 1982 and 1986 is parallels an increase in diagnosis and confirmation of endometriosis
162 using therapeutic laparoscopic techniques.[1,2] Additional reports demonstrate the protean
163 appearance of endometriosis and document the increased resolution and accuracy obtained using
164 the improved field of view and the intrinsic magnification of laparoscopy.[3-11]

165

166 The extent of diagnostic and therapeutic laparoscopy appears to be understated due to the
167 opening of an outpatient surgery center during the period of this study. Although physicians

168 generally performed their laparoscopies at one of the two study hospitals in 1982, they had begun
169 to utilize the outpatient surgical center by 1986. Thus, the true number of laparoscopies
170 represented within the system is higher than that suggested by this study.

171

172 With a continued emphasis on laparoscopy,[12-20] the increase in therapeutic
173 laparoscopy, increase in accuracy and decrease in laparotomy appears to be continuing. Ongoing
174 analysis is needed to confirm this trend and to determine the changing impact.

175

176

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220

221 Table 1. Changes in sensitivity and predictive positivity comparing surgical types.

Group	1982		1986	
	Sensitivity	Predictive Positivity	Sensitivity	Predictive positivity
Hysterectomy	(42/75) 56%	(42/64) 66%	(57/103) 55%	(57/87) 66%
Laparotomy	(19/28) 68%	(19/33) 58%	(16/25) 64%	(16/19) 84%
Laparoscopy	(6/8) 75%	(6/18) 33%*	(56/64) 88%	(56/59) 95%*

227 *P < 0.0001

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229

230 Table 2. Changes in sensitivity and predictive positivity comparing physicians by case load.

Group	1982		1986	
	Sensitivity	Predictive Positivity	Sensitivity	Predictive Positivity
5 or less	(9/22) 41%	(9/19) 47%	(12/29) 41%	(12/21) 57%
6 - 11	(21/37) 57%	(21/32) 66%	(14/26) 54%	(14/18) 78%
12 -26	(30/44) 68%	(30/52) 58%	(35/48) 73%	(35/47) 74%
27 - 127	(9/11) 82%	(9/14) 64%	(68/79) 86%	(68/69) 99%

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