



Is Appendectomy a Risk Factor for Crohn's Disease Onset or Development in the Western Algerian Population?

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Abstract

Background: Crohn's disease is characterized by damage to the intestines, which can affect the gastrointestinal tract (from the mouth to the anus). The risks of Crohn's disease appear to be linked to changes in the gut *Microbiota* or disturbances in the mucosa and intestinal genetics.

Objectives: We aimed to study the implication of appendectomy on the risk of the development of Crohn's disease in the western Algeria population.

Methods: It was a retrospective analytical study of 403 patients from 2007 to 2020 carried out at the level of general surgery departments and university hospitals in western Algeria.

Results: Four hundred three CD patients were included in our study. Among them, 81 cases have undergone an appendectomy. The average age was 36.88 ± 12.47 , and the most affected location was the ileocecal location with $P = 0.001$. However, no significant association was noted between appendectomy and CD phenotype. Most of them suffered from constipation ($P < 0.0001$), came from urban areas, and presented extra-intestinal manifestations ($P < 0.0001$). Treatment of the disease was often medical, while 68 cases of the 81 appendectomized patients underwent surgery. Early relapse of CD was also observed in appendectomized patients with $P = 0.035$. Moreover, many complications (anal fissures, anal fistula) were also noted but with no significant association.

Conclusions: From our results, it appears that Crohn's disease risk can be associated with a previous appendectomy and mainly manifested by ileocecal localization and constipation.

Keywords: Clinical Evolution, Crohn's Disease, Appendectomy

1. Background

Crohn's disease is characterized by damage to the intestines, which can affect the gastrointestinal tract (from the mouth to the anus), more specifically the terminal small intestine and colon, resulting in chronic, recurring inflammation that can lead to chronic abdominal pain, diarrhea with obstruction and/or perineal lesions (1, 2). It particularly affects young people. Usually, these diseases occur in genetically predisposed individuals when they are subjected to interactions between environmental, genetic, microbiological, and immunological factors (3).

The risks of Crohn's disease appear to be linked to changes in the gut *Microbiota* or to disturbances in the mucosa and intestinal genetics (2).

Appendectomy is the most common surgical procedure in emergency surgery. It may modulate the immune function of the gut, thereby influencing the onset of intestinal inflammation (4). However, many studies have shown a discrepancy. Indeed, some have found that appendectomy is harmful and can lead to seriousness in the course of CD; others have revealed a high risk at the start of appendectomy, while others found nothing (5-8).

This association is continuously present for up to 20 years after an appendectomy, as it may be related to the period immediately following an appendectomy. In the first case, this strongly suggests the existence of an underlying biological mechanism; in the second case, it

may be caused by Crohn's disease not being detected at the time of surgery (9).

2. Objectives

The objective of our study was to analyze the risk of Crohn's disease among patients from the western Algerian population who have undergone an appendectomy. Thus, we seek to study the relationship between the onset of CD, its clinical features, and its course in patients who have had a previous appendectomy.

3. Methods

This is a retrospective analytical study of all patients with Crohn's disease over a 13-year period from January 2007 to January 2020. We have identified 403 patients with CD, including 81 patients who underwent an appendectomy in two western Algeria hospitals: The University Hospital of Oran region (November 1, 1954) and the Abdelkader Hassani University Hospital of Sidi Bel Abbes region (CHU-SBA). We collected as much data as possible from medical records, including several characteristics such as age, sex, location, diagnostic, symptomatological data, etc.

3.1. Statistic Data

Data entry was done in Excel, and statistical processing was performed using SPSS 22.0 software (Statistical Package for the Social Sciences, IBM Corporation; Chicago, IL. August 2013). Our results were presented as means and standard deviation for continuous variables using the independent sample *t*-test and as frequencies and percentages for categorical variables using Pearson's chi-square test (χ^2). The level of its significance was limited by the rate of 5%.

4. Results

Four hundred-three patients with Crohn's disease were identified, including 225 men representing a rate of (55.8%) and 178 women representing a rate of (44.2%). The male/female sex ratio was around 1.3. The mean age at diagnosis was (32.00 ± 13.08) .

Of these 403 MC patients, 81 (20.1%) underwent an appendectomy. The median age at diagnosis was 36.88 ± 12.47 , with a female number equal to 41 cases. About half of these appendectomy patients came from urban areas and presented extra-intestinal manifestations (36 cases, $P < 0.0001$). Add to this, the consumption of alcohol was also noted in those patients with a $P < 0.0001$ (Table 1).

As shown in Table 2, the most common location was the ileocecal location in the appendectomized group with a rate of (62; $P = 0.001$). However, colonic localization was noted in 29 appendectomized patients.

Regarding the appendectomy and CD phenotype, we did not note any significance. The inflammatory type was the most dominant, with a rate of 44 (54.3%) cases compared to the stenosing and fistulous types.

In these appendectomized patients, one part complained of abdominal pain, the other of occlusive Sd, and a significantly higher number of patients complained of constipation $P < 0.0001$. (Table 2).

Treatment of the disease is often medical. In fact, among the 81 patients with appendectomy, 18 patients took immunosuppressive treatments, 10 cases received 5-ASA, and 10 cases received corticosteroid therapy.

When medical treatment was not enough, surgical treatment was resorted to. In fact, of the 81 appendectomized patients, 68 patients underwent surgery.

Early relapse of CD was also observed in appendectomized patients with $P = 0.035$. However, late relapse was not found to be significant in those patients (Table 3).

We noted the manifestation of many complications but no significant association between CD and appendectomy, such as anal fissures, anal fistula, and a single case of cancer. (Table 3).

5. Discussion

Factors such as smoking, alcoholism, and an appendectomy are risk factors for patients with CD. Studies on the correlation between CD and appendectomy have been taken by many researchers; in fact, some studies have shown that appendectomy is not a risk factor for CD. While other data show that appendectomy is implicated in increasing the onset of the disease and worsening the prognosis (2, 6, 7, 10).

The retrospective study showed that the mean age at which patients were diagnosed was 32.00 ± 13.08 , as reported by Andersson's study (9, 11). Among patients with CD, 81 (20.1%) cases underwent appendectomy, coinciding with the findings of several authors (1-13) who noted that patients who underwent appendectomy were generally at high risk of being hospitalized for CD. However, the highest rate was in urban areas, where the average age was 36.88 ± 12.47 , and half of them were female (3, 9).

Our results showed a significant relation ($P < 0.0001$) between alcoholic patients and some smoking patients, which is in line with other studies where tobacco,

Table 1. Patients' Medical Features of Crohn's Disease in Nonappendectomized and Appendectomized Patients

Variables	Appendectomized, No. (%)	Non-appendectomized, No. (%)	P-Value
Number of patients	81 (20.1)	322 (79.9)	
Age	36.88 ± 12.47	38.18 ± 14.23	0.23 ^a
Gender; female	41 (51)	137 (42.5)	0.19 ^b
Active tobacco	9 (11.1)	34 (10.6)	0.88 ^b
Alcoholism	19 (23.5)	4 (1.2)	< 0.0001 ^b
Region			0.001 ^b
Urban	66 (81.5)	275 (85.4)	
Rural	6 (7.4)	40 (12.4)	
Extra-intestinal manifestation	36 (44.4)	58 (18.0)	< 0.0001 ^b

^a Sample *t*-test^b Chi-square test.**Table 2.** The Distribution of CD Patients About Clinical Features and Patients with/Without Appendectomy

Variables	Appendectomized, No. (%)	Non-appendectomized, No. (%)	P-Value ^a
Location of disease			
Colonic	29 (35.8)	125 (38.8)	0.617
Ileocecal	62 (76.5)	180 (55.9)	0.001
Tube digestif haut	4 (4.9)	23 (7.1)	0.478
Behavior			
Inflammatory.T	44 (54.3)	185 (57.5)	0.611
Stenosing.T	36 (44.4)	115 (35.7)	0.147
Fistula.T	10 (12.3)	33 (10.2)	0.58
Ano-perineal. T	1 (1.2)	11 (3.4)	0.30
Symptoms			
Occlusive syndrome	22 (27.2)	99 (30.7)	0.52
Sub occlusive	17 (21)	68 (21.1)	0.97
Abscess	8 (9.9)	38 (11.8)	0.62
Fistula	13 (16)	51 (15.8)	0.96
Abdominal Pain	25 (30.9)	76 (23.6)	0.178
Perineal syndrome	5 (6.2)	15 (4.7)	0.575
Constipation	22 (27.2)	13 (4)	< 0.0001

^a Data analyzed by chi-square test.

alcoholism, and appendectomy were found to be risk factors in affected patients of MC (2, 14).

The onset of CD may lead to more cases of ileal disease, as acute abdominal pain in the lower right quadrant may indicate so-called ileal Crohn's disease (3). However, our study found that the most common location was the ileocecal location. We have noticed evidence for a significant association between ileocecal location and appendectomy performed before CD with a rate of ($P = 0.001$), corresponding to the results of other authors who

found a significant positive association of appendectomy in the ileocecal location. However, other localization may appear, namely the colonic localization followed respectively by a localization of the top of the digestive tract with a non-significant rate (3, 8, 11, 14, 15).

Once again, our results confirmed that there was no significant association between appendectomy and phenotype. Indeed, the inflammatory type was the most dominant, followed respectively by the stenosing type, the fistulous type, and the anoperineal type, which coincides

Table 3. Therapeutic Needs and Complications in Non-appendectomized and Appendectomized Patients

Variables	Appendectomized, No. (%)	Non-appendectomized, No. (%)	P-Value ^a
Treatment			
Surgery	68 (84)	280 (87)	0.481
5-ASA	10 (12.3)	74 (23)	0.035
Immunosuppressants	18 (22.2)	77 (23.9)	0.74
Corticosteroids	10 (12.3)	42 (13)	0.86
Biotherapy	7 (8.6)	42 (13)	0.27
Early relapse	25 (30.9)	63 (19.6)	0.028
Late relapse	20 (24.7)	93 (28.9)	0.45
Complication			
Anal fissure	17 (21)	66 (20.5)	0.92
Anal fistula	21 (25.9)	73 (22.7)	0.53
Ano-perineal abscess	14 (17.3)	48 (14.9)	0.59
Ano-perineal stenosis	3 (3.7)	18 (5.6)	0.49
Cancer	1 (1.2)	0	0.046

^a Data analyzed by Chi-square test

with the results of Cosnes et al., Benaissa et al. and Chen et al. (3, 15, 16), where they revealed that an anterior appendectomy did not influence the phenotype or course of CD.

Crohn's disease often presents with symptoms. Indeed, among the 81 appendectomy patients, 25 cases suffered from acute abdominal pain in the lower right quadrant, which is similar to Andersson's studies (9, 17). Abdominal pain caused by the onset of Crohn's disease and not detected at the time of appendectomy may also partly explain the association, as some authors indicate (18).

We also observed constipation in patients having undergone a previous appendectomy with a more significant number of patients ($P < 0.0001$) than those suffering from occlusive Sd, subocclusive Sd, fistula, abscess, and ano-perineal Sd. These results were confirmed by those of Feuerstein and Cheifetz, and Liu et al. (2, 13).

With data from several series (2, 3), we also reported that more than half of our patients ($P < 0.0001$) suffered from extra-intestinal manifestations.

Diversifying the risks in patients with CD will help us to predict their course and plan their treatment, reducing the need for surgery.

(19). Indeed, a few patients have taken 5-ASA ($P = 0.035$), others immunosuppressive treatments, corticosteroid therapy, and a few have taken biotherapies (9). However, when medical treatment is not enough, surgery is performed (3, 8, 20).

The risk of early relapse of CD for patients having contracted an appendectomy of $P = 0.028$ was observed, and this followed successive relapses. However, the late relapse did not reveal any significance in the appendectomized patients. In addition, most studies have shown that the risk of instantaneous relapse is higher after appendectomy (< 12 months) and decreases over time (13).

Likewise, we noticed complications that were meaningless. Seventeen cases of anal fissure and 21 cases of anal fistula have been reported. A study in France showed that there was an increased risk of anal fistula narrowing in patients with a previous appendectomy; however, there was no impact on the severity of the disease (3).

5.1. Conclusions

From our results, it would appear that the risk of Crohn's disease is associated with a previous appendectomy and may be the onset of the disease. In addition, the association between a previous appendectomy and CD was manifested by ileocecal localization and by symptoms such as constipation.

Footnotes

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