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ORIGINAL ARTICLE

Long-term outcome and management of right colonic diverticulitis in western countries: Multicentric Retrospective Study



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KEYWORDS

Uncomplicated right diverticulitis;
Complicated right diverticulitis;

Summary

Aim of the study: Right colonic Diverticulitis (RD) is rare in Europe; few studies have focused on it and its management is not standardised. The aim of this study was to analyse the clinical presentation (complicated, uncomplicated), acute phase management and long-term outcome of RD in western countries.

Patients and methods: From 2003 to 2017, 93 consecutive patients who presented with RD were retrospectively included at 11 French Hospital Centres.

Abbreviations: RD, Right Diverticulitis; LD, Left Diverticulitis; CRD, Complicated Right Diverticulitis; URD, Uncomplicated Right Diverticulitis; CT, Computed Tomography; BMI, Body Mass Index; ASA, American Society of Anesthesiologists; NSAID, Non-Steroidal Anti-Inflammatory Drug; CRP, C-Reactive Protein.

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Conservative
treatment;
Surgery;
Recurrence

Results: The study population consisted of two groups: Uncomplicated Right Diverticulitis (URD) group (63.5%, ($n = 59$)) and Complicated Right Diverticulitis (CRD) group (36.5%, [$n = 34$]). 84.7% ($n = 50/59$) of URD were treated conservatively. 41.2% ($n = 14/34$) of patients with CRD had emergency surgery (mostly laparotomy) for Hinchey III peritonitis, clinical intolerance or hemodynamic instability. Altogether 5.2% ($n = 2/34$) patients with CRD had surgery after a cooling off period (initially abscess). The overall rate of severe postoperative complications was low (8%). Recurrence rate was low and comparable in both groups: 6.8% ($n = 4/59$) for URD and 8.8% ($n = 3/34$) for CRD, all recurrences occurred in the same locations with an uncomplicated form, 42.9% ($n = 3/7$) of them had elective laparoscopic surgery and the rest were conservatively treated. Median follow up was 33.2 months.

Conclusion: Conservative treatment can be proposed safely and efficiently for URD and for selected patients with CRD. Surgery should be reserved for unstable patients or patients with severe forms of complicated diverticulitis in emergency.

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Introduction

In western countries, diverticulitis mostly affects the left colon and the incidence of right-sided diverticulitis is estimated < 4% [1–4], unlike in Asian populations, where right diverticulitis represents 55–70% of diverticular disease [5]. In Asian countries, the natural history of uncomplicated and complicated left diverticulitis (LD) appears to be different than in western countries, with a rare incidence of LD and a frequently complicated presentation [6].

Thanks to older Caucasian studies dealing with diverticulitis (mainly left colon), it is known that the recurrence rate is low and is estimated at 19% (5% after an initial uncomplicated episode and 23% after an initial complicated episode). Recurrence is rarely associated with complications [7] and the risk of peritonitis even decreases with recurrences [7,8]. Among the recurrent forms, 18% require emergency surgery, 39% elective surgery and 43% have a conservative treatment that is sufficient. Abscessed diverticulitis has a high recurrence rate (61%) after initial conservative treatment; it more frequently develops local complications (fistula, chronic abscess, stenosis 63%) and requires emergency surgery in 26% of cases [9].

Right diverticulitis (RD) management in Asian countries is similar to LD management in western countries [10–14]. The Asian management usually recommended for Uncomplicated Right Diverticulitis (URD) is conservative treatment in the presence of an uncomplicated and well-documented episode, as recurrence rates are low; delayed right colectomy is necessary in very rare cases [10,15–19]. Complicated Right Diverticulitis (CRD) is rare and the percentage of right colectomies is unknown.

To our knowledge, no western study has yet analysed the natural history, management modalities and long-term outcome of CRD and URD. The aim of this study was to analyse clinical presentation (complicated, uncomplicated), management in the acute phase and the long-term outcome of RD in western countries.

Materials and methods

Patients

From January 2003 to December 2017, 93 consecutive patients who presented with RD were retrospectively included at 11 French Hospital Centres (CHU in Tours, Lille,

Rouen, Besançon, Paris La Pitié-Salpêtrière, Nantes, Angers, Caen, federal Hospital of Dax and Salon-de-Provence). All included patients underwent abdominal computed tomography (CT) scan for acute abdominal pain.

RD diagnosis (complicated and uncomplicated)

RD was defined as abdominal pain due to an inflammation of a diverticula located between the ileo-caecal valve and the left transverse colon. RD was considered uncomplicated when CT scan showed bowel wall thickening, sub-mucosal thickening with diffuse low enhancement, peri-colic fat stranding, along with evidence of peri-colic phlegmon [20].

Abdominopelvic CT findings were categorized by using the modified Hinchey classification, with patients classified as having stages Ib, II, III, and IV diverticulitis, as well as fistula, obstruction or perforated-blocked diverticulitis being defined as having CRD [21].

The diagnosis of diverticulitis was made based on either intraoperative findings or CT scans.

Disease recurrence was diagnosed when patients presented with recurrent symptoms associated with the same CT scan signs listed above [20].

Clinical features

The following patient demographic characteristics were collected: age, gender, Body Mass Index (BMI) score, American Society of Anesthesiologists (ASA) score and comorbidities (smoking, diabetes mellitus, elevated blood pressure, cardiovascular disease, cortico-steroids, immunosuppressor, Non-Steroidal Anti-Inflammatory Drug (NSAID) taking and previous appendectomy or diverticulectomy). The following clinical data upon admission were also collected for each patient: body temperature above 38°C, abdominal pain over 7 days, white blood cell count and C-reactive protein (CRP).

Treatment characteristics

Based on patient evaluation and RD severity, management consisted of conservative treatment only (antibiotics with or without percutaneous drainage), emergent surgery and elective surgery following conservative treatment. Based on each management modality, oral diet type, antibiotic duration, and overall in-hospital stay were collected for each

patient. Recurrent RD episodes were recorded similarly to first RD episodes.

Intraoperative course

The following intraoperative variables were collected for all patients: time interval between RD episode and surgical procedure, surgical indication (failed conservative treatment and elective surgery, emergent surgery) procedure performed (appendectomy alone, appendectomy and diverticulectomy, right colectomy with diversion or primary anastomosis and ileocelectomy with diversion or primary anastomosis), surgical approach (conversion was defined as the completion of the right colectomy procedure through either an enlarged incision or an abdominal incision measuring ≥ 6 cm) and operative time.

Postoperative outcomes

Postoperative morbidity and mortality were defined as events occurring during hospital stay or within 30 and 90 postoperative days. Postoperative complications were classified according to Dindo-Clavien, their management (medical, radiological, surgical) and their severity [22]. Postoperative complications included ileus, intra-abdominal abscess, wound infection and anastomotic leakage.

Postoperative follow up

Patients were systematically clinically examined at 4 to 6 weeks after discharge from hospital. The length of hospitalisation was measured from the time of surgery to the date of discharge from hospital. Follow-up information was obtained from medical records, direct consultation with patients and/or telephone interview. At the end of the follow up, the status of all patients were assessed, i.e. mortality, recurrence and lost to follow-up. The endpoint of data collection was December 2017. Patient follow up was carried out from the time of surgery to this endpoint, until death if occurring prior to this date, or until the date of last contact. Loss to follow-up was defined as a follow up of less than 3 months, in the absence of death. Median follow up was 33 months.

Statistical Analysis

Statistical analyses were performed using IBM SPSS Statistics version 20 (IBM SPSS Inc., Chicago, IL, USA). Continuous variables are expressed as their means \pm standard deviations, or as their medians and ranges (min, max). Categorical variables are reported as numbers and percentages. Mean values between the two groups were compared using Student's *t*-test or the Mann–Whitney U test, when necessary. Comparisons between percentages were made using the χ^2 test or Fisher's exact test, as appropriate, for the qualitative variables. Statistical significance was defined as a *P*-value of < 0.05 .

Results

Clinical and radiological features

The study population thus consisted of two groups: URD group (63.5%, [$n=59$]) and CRD group (36.5%, [$n=34$]) (Table 1). Median age was 54 years (23–87) and median BMI

was 24.3 kg/m² (16–39). The male/female gender ratio was 0.63 for the whole series. Eighty seven percent ($n=81$) of patients were considered at low risk (ASA 1 and 2). There were more women in the CRD group than in the URD group (76.5% ($n=26$) vs. 55.9% ($n=33$); $P=0.0729$). There were fewer smokers in the CRD group than in the URD group, without this difference being significant (14.7% [$n=5$] vs. 33.9% [$n=20$]; $P=0.0539$). Steroid and immunosuppressor, as well as NSAID consumption were higher in the CRD group than in the URD group, without this difference being significant (5.9% ($n=2$) vs. 3.4% ($n=2$); $P=0.6214$ and 11.8% ($n=4$) vs. 6.8% ($n=4$); $P=0.4576$, respectively). There was no significant association between severity of the acute diverticulitis and site or number of diverticula. Body temperature $\geq 38^\circ\text{C}$, white blood cell count and CRP did not differ between the two groups. According to the Hinchey classification, 70.6% ($n=24$) of patients presented with Hinchey I diverticulitis, 17.6% ($n=6$) with Hinchey II, and 11.8% ($n=4$) with Hinchey III. No patients presented with Hinchey IV diverticulitis.

Treatment modality

Fewer patients were treated conservatively in the CRD group than in the URD group (50.0% ($n=17$) vs. 84.7% ($n=50$); $P=0.0114$) and more patients were scheduled for emergency surgery in the CRD group (41.2% [$n=14$] vs. 8.5% [$n=5$]; $P=0.0114$) (Table 2 and Fig. 1). Nevertheless, the number of patients who underwent elective surgery after initial conservative treatment was similar between both groups (5.9% [$n=2$] vs. 6.8% [$n=4$] respectively; $P=1.0000$). Antibiotics and diet durations did not vary according to RD episode severity (12.0 vs. 11.6 days $P=0.3688$ and 1.8 vs. 1.3 days $P=0.2283$, respectively). Length of hospital stay was longer in the CRD group (9.9 vs. 5.2 days; $P=0.0430$).

Intraoperative course

Overall, 26.9% ($n=25$) of patients underwent surgical treatment (19 in an emergent setting and 6 in an elective setting) (Table 3). Median time to emergent surgery was 0 days. Regarding the elective setting, median time to surgery was shorter in the CRD group (106 vs. 195 days $P=0.5923$). In the URD group, 5 patients underwent emergent surgical treatment: 4 misdiagnoses and 1 failure of conservative treatment. The diagnosis of appendicitis was suspected in the presence of right abdominal pain, biological inflammatory syndrome and scan images suggestive of acute appendicitis. In retrospect, after surgical exploration, it was contact appendicitis with caecal diverticulitis. In the CRD group 14 (41.2%) patients underwent emergency surgery: 2 misdiagnoses, 9 acute abdomens and 3 failures of medical treatment. In the URD group, procedures performed for emergency surgery were as follows: 2 appendicectomies (contact appendicitis), 1 diverticulectomy alone and 2 ileocelectomies with primary anastomosis. In the CRD group, procedures performed for emergency surgery were as follows: 8 right colectomies and 4 ileocelectomies with primary anastomosis and 2 right colectomies with primary diversion (both were Hinchey III).

In the URD group, all surgeries ($n=9$) were started with laparoscopy and only one was converted (emergency surgery for suspected appendicular peritonitis, CRP 264 and the procedure performed was an ileocelectomy and cholecystectomy). For emergency surgery in the CRD group, just one of the 14 was full laparoscopic (right colectomy for CRD perforated-blocked with acute abdomen).

Table 1 Clinical and radiological features.

Variables	Uncomplicated Right colonic Diverticulitis (URD) (n = 59)	Complicated Right colonic Diverticulitis (CRD) (n = 34)	All Right colonic Diverticulitis (n = 93)	P value
Age				
Median (range)	54 (26–87)	55 (23–85)	54 (23–87)	0.7212
Gender				
Female (%)	33 (55.9%)	26 (76.5%)	59 (63.4%)	0.0729
Male (%)	26 (44.1%)	8 (23.5%)	34 (36.6%)	
ASA				
1	37 (62.7%)	17 (50%)	54 (58.1%)	0.4193
2	16 (27.1%)	11 (32.4%)	27 (29%)	
3	6 (10.2%)	6 (17.6%)	12 (12.9%)	
4	0	0	0	
BMI				
Median (range)	24.9 (19–39)	23.4 (16–34)	24.3 (16–39)	0.2928
Comorbidity				
Smoking (%)	20 (33.9%)	5 (14.7%)	25 (26.9%)	0.0539
Cardiovascular (%)	5 (8.5%)	5 (14.7%)	10 (10.8%)	0.4887
Diabetes (%)	4 (6.8%)	5 (14.7%)	9 (9.7%)	0.2793
Arterial Hypertension (%)	14 (23.7%)	13 (38.2%)	27 (29%)	0.1596
Steroids or immunosuppressants (%)	2 (3.4%)	2 (5.9%)	4 (4.3%)	0.6214
NSAIDs (%)	4 (6.8%)	4 (11.8%)	8 (8.6%)	0.4576
Clinical features				
Body temperature > 38° (%)	23 (38.9%)	13 (38.2%)	36 (38.7%)	0.8256
Abdominal pain over 7 days (%)	5 (8.4%)	5 (14.7%)	10 (10.8%)	0.4887
Biological data				
WBC count (10.3/mm ³)	13.4 (4–27)	12.4 (3–17)	13 (3–27)	0.0731
CRP (mg/L)	114.3 (3–347)	129.8 (2–354)	119.9 (2–354)	0.8285
Pneumoperitoneum (%)	0	15 (44.1%)	15 (17%)	< 0.0001
Site of diverticulitis				
Right only (%)	31 (50.8%)	13 (35.2%)	44 (47.3%)	0.2017
Right and left (%)	28 (45.7%)	21 (58.8%)	49 (52.7%)	0.2027
Number of diverticula				
Solitary (%)	15 (23.7%)	12 (32.3%)	27 (29.0%)	0.3487
Multiple (%)	44 (71.2%)	22 (58.8%)	66 (71.0%)	0.3487
Hinchey				
I (%)	0	24 (70.6%)	24 (25.8%)	
II (%)	0	6 (17.6%)	6 (6.5%)	
III (%)	0	4 (11.8%)	4 (4.3%)	
IV (%)	0	0	0	

ASA: American Society of Anesthesiologists; BMI: body mass index; NSAID: non-steroidal anti-inflammatory drug; WBC: white blood cells; CRP: C-reactive protein.

The 2 patients who underwent delayed surgery after an episode of CRD were abscessed forms and had no recurrence or persistent symptoms. The 4 indications for elective surgery in the URD group were as follows: 1 patient had 4 recurrent episodes, 1 patient had 1 recurrent episode, 1 had 2 recurrent episodes with persistent symptoms and the last had chronic symptoms.

All elective procedures were right colectomies and were laparoscopic. In the URD group, operative time was shorter for emergency surgery than for elective surgery (median times 75 vs. 190 minutes $P=0.7078$). Operative time for

emergency surgery was longer in the CRD group than in the URD group (120 vs. 75 mins $P=0.1505$).

Postoperative features

Mortality was zero for the whole series. According to the Clavien-Dindo classification, the postoperative complication (stage I and II) rate in the URD group was no different after emergency surgery than after elective surgery (60% [$n=3/5$] vs. 50% [$n=2/4$]; $P=0.5238$ respectively). The postoperative complication (stage I and II) rate following emergency

Table 2 Type of treatment and recurrence characteristics.

	Non Complicated Right Colonic Diverticulitis (n = 59)	Complicated Right Colonic Diverticulitis (n = 34)	All Right Colonic Diverticulitis (n = 93)	P value
Type of treatment				
Conservative treatment only (%)	50 (84.7%)	17 (50.0%)	67 (72.0%)	0.0114
Emergency surgery (%)	5 (8.5%)	14 (41.2%)	19 (20.4%)	
Elective surgery (%)	4 (6.8%)	2 (5.9%)	6 (6.5%)	1.0000
Radiological drainage (%)	0	1 (2.9%)	1 (1.1%)	1.0000
Antibiotics duration, days (range)	11.6 (0–21)	12 (0–42)	12 (0–42)	0.2283
Median diet duration, days (range)	1.3 (0–7)	1.8 (0–5)	1 (0–7)	0.2858
Median length of stay, days (range)	5.2 (1–19)	9.9 (2–34)	5 (1–34)	0.0430
Colonoscopy (%)	26 (44.1%)	12 (35.3%)	38 (40.9%)	0.1233
Recurrence characteristics				
Number of recurrences (%)	4 (6.8%)	3 (8.8%)	7 (7.5%)	0.7035
Median time to recurrence, months (range)	27.9 (5.1–70.6)	13.3 (1.4–30.6)	20.6 (1.4–70.6)	0.4832
Same localisation of recurrence (%)	4/4 (100%)	3/3 (100%)	7/7 (100%)	1.0000
Uncomplicated presentation (%)	4/4 (100%)	3/3 (100%)	7/7 (100%)	1.0000
Treatment of the recurrence				
Conservative treatment only (%)	1/4 (25%)	3/3 (100%)	5/7 (71.4%)	0.4286
Emergency surgery (%)	0	0	0	1.0000
Elective surgery (%)	3/4 (75%)	0	2/7 (28.6%)	0.4286
Radiological drainage (%)	0	0	0	1.0000
Number of Recurrences \geq 2	2 (3.4%)	0	2 (2.1%)	0.5311
Follow up (months)	35.9 (0–127)	27 (1–121)	33.2 (0–127)	0.6241

surgery was higher in the CRD group than in the URD group (71.4% $n=10/14$ vs. 60% $n=3/5$ $P=1.000$). For the entire series, the rate of serious postoperative complication (grade III and IV) was low, 8% $n=2/25$.

Of the 5 patients with an URD undergoing emergency surgery, 3 had a postoperative complication: 1 postoperative ileus and 2 wound abscess. Among the 4 patients operated after a cooling off period following an episode of URD, 3 had a postoperative complication: 1 postoperative ileus, 1 a grade II complication related to a perianastomotic obstruction and 1 grade III with haemoperitoneum requiring surgical reintervention.

Among the 14 patients in the CRD group who underwent emergency surgery, we identified 11 postoperative complications: 6 grade I complications (including 3 postoperative ileus and 3 wound abscess), 4 grade II complications (including 1 acute pancreatitis, 1 acute respiratory distress syndrome and 2 central line infections) and 1 grade IV complication (acute renal failure with dialysis required). Of the 2 patients with CRD who had elective surgery, 1 had a wound abscess and the other had a medically treated anastomotic fistula.

Recurrence characteristics and treatment

Median follow up was 33.2 months for the whole series (Table 2). Recurrence rate was 7.5% for the whole series, 8.8% ($n=3/34$) in the CRD group vs. 6.8% ($n=4/59$) in the URD group ($P=0.7035$). All recurrences ($n=7/7$) occurred

at the same location and there were all uncomplicated. Time to recurrence was shorter after CRD than after URD (median 8 vs. 7.8 months $P=0.4476$). All recurrences of CRD ($n=3/7$) were treated conservatively with medical treatment only, whereas 50% ($n=2/4$) of URD recurrences had elective surgery.

Discussion

This study has reported the first European series to include large numbers of patients focusing on right colonic diverticulitis. Ninety-three patients were reviewed, and their clinical presentation, management and recurrence were analysed. The rate of complicated episode occurrence was 36.6% ($n=34/93$). Eighty four percent ($n=50/59$) of patients with uncomplicated forms were treated conservatively whereas 6.8% ($n=4/59$) of them had elective surgery. In contrast concerning patients who presented with complicated diverticulitis, emergency surgery was realized in 41.2% ($n=14/34$) whereas 5.9% ($n=2/34$) of them had elective surgery. Recurrence rate was low and comparable in both groups (6.8% and 8.8%, respectively) and all recurrences occurred at the same locations and in an uncomplicated form. The rate of severe postoperative complications was low (8%).

This western study sought to analyse the natural history of RD with a large number of patients admitted into specialised colorectal centres considering the incidence of this

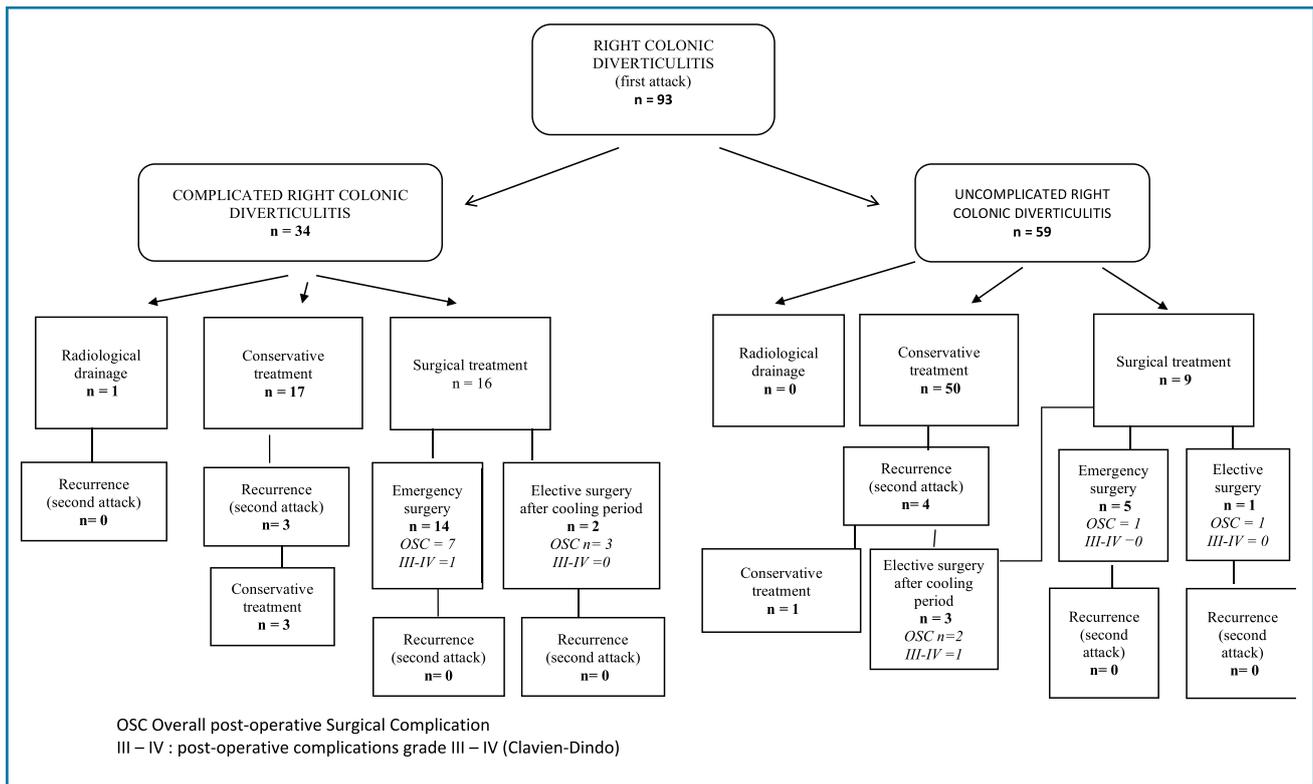


Figure 1. Flowchart, natural history.

pathology in Caucasian patients. In the Asian population, RD has a reported incidence of up to 55% compared to 12.1% and 32.6% for left and bilateral diverticulitis, respectively [23]. Because few European studies have analysed RCD, it was legitimate to question the natural history of this pathology in the Caucasian population, especially since the management of right diverticulitis is not standardised in our countries. Failing a consensus on management, each centre could have different practices with a possible centre effect. Also, the decision to perform emergency or elective surgery, and the exact type of proposed surgery were all dependent on the primary surgeon.

In terms of anthropometric results, our study found a median age of 54 years with a male sex ratio of 0.57; these results differ from the reported Asian series, where patients were mainly male (58.1%) and younger (43.4 ± 13.7 years) [5,6,20]. This is in accordance with reported studies that stated that there is an ethnic and genetic component, explaining the higher prevalence of RCD in the Asian population, which may therefore explain the differences in population characteristics that have been found [16]. Most patients did not present with many comorbidities (79% of patients were classified ASA I or II), which is in accordance with recently reported series [6]. Surprisingly, no association was found between the use of immunosuppressive drugs or NSAIDs and the occurrence of CRD.

On CT examination, diverticula were generally not very numerous but not unique, while Park described small numbers of diverticula in most cases and even frequently isolated [12].

A total of 36.6% ($n=34$) of patients had complicated diverticulitis, which seems greater than in the pre-existing literature where the rate varied between 3.3 and 9.5% [18,24].

Among URD cases, 91.5% ($n=54/59$) were medically treated in the acute phase. Only 6.8% ($n=4$) of them recurred, all in uncomplicated form. Regarding CRD, 55% ($n=19/34$) were treated conservatively in the acute phase and only 8.8% ($n=3/34$) recurred in an uncomplicated form and had subsequent conservative treatment. A conservative strategy seems reasonable and safe for URD and in some selected patients with CRD (Hinchey Ib, II, perforated-blocked). This is consistent with previous studies that have highlighted the value of initial conservative treatment for these patients [5,12,15,24]. Park HC even offered oral antibiotic therapy without associated diet (compared to IV antibiotic therapy and diet) for URD (based on the fact that recurrence rate was comparable) [12].

A total of 8.5% ($n=5/59$) of patients underwent emergent surgical management for URD, of which 4 had suspected appendicitis and one had a failed medical treatment. Several Asian studies have reported similar results, with patients undergoing surgery for suspected appendicitis. This was explained by the absence of systematic initial CT scan and the fact that appendicitis is the most frequent clinical diagnosis for right iliac fossa pain associated with mild inflammatory syndrome [23,25]. In our study, all patients had initial CT scans, but the diagnosis of appendicitis was suspected when confronted with an inflammatory aspect of the appendix. Among these 4 patients with suspected appendicitis, only 2 had an appendicectomy (which was considered "appendicitis of contiguity"). The value of appendicectomy in these situations is debatable [26,27].

Concerning the emergency surgical management of CRD, surgery was indicated in case of Hinchey peritonitis greater than III, poor clinical tolerance, haemodynamic instability or failure of primary medical treatment. In 2001, Chiu had already proposed emergency colectomy for grade III and

Table 3 Operative features.

	Non Complicated Right Colonic Diverticulitis (n = 9)		P value	Complicated Right Colonic Diverticulitis (n = 16)		P value	All Right Colonic Diverticulitis (n = 25)	P value
	Emergency surgery (n = 5)	Elective surgery (n = 4)		Emergency surgery (n = 14)	Elective surgery (n = 2)			
Time to surgery, days (range)	0 (0–2)	195 (90–300)		0 (0–23)	106 (105–107)		0 (0–300)	
Indication surgery								
Suspected appendicitis (%)	4/5 (80%)	0		2/14 (14.3%)	0		6 (24%)	
Acute abdomen (%)	0	0		9/14 (64.3%)	0		9 (36%)	
Failure of conservative treatment (%)	1/5 (20%)	0		3/14 (21.4%)	0		4 (16%)	
Elective surgery (%)	0	4/4 (100%)		0	2/2 (100%)		6 (24%)	
Procedure performed								
Appendectomy alone (%)	2/5 (40%)	0		0	0		2 (8%)	
Appendectomy and diverticulectomy (%)	0	0		0	0		0	
Diverticulectomy alone (%)	1/5 (20%)	0		0	0		1(4%)	
Right colectomy primary anastomosis(%)	0	4/4 (100%)		8/14 (57.1%)	2/2 (100%)		14 (56%)	
Right colectomy with diversion (%)	0	0		2/14 (14.3%)	0		2 (8%)	
Ileocollectomy primary anastomosis (%)	2/5 (40%)	0		4/14 (28.6%)	0		6 (24%)	
Ileocollectomy diversion (%)	0	0		0	0		0	
Type of surgery								
Open surgery (%)	0	0		9/14 (64.3%)	0		9 (36%)	
Laparoscopic surgery (%)	4/5 (80%)	4/4 (100%)		1/14 (7.1%)	2/2 (100%)		11(44%)	
Conversion (%)	1/5 (20%)	0		4/14 (28.6%)	0		5 (20%)	
Operative time, min, (range)	75 (60–160)	190 (170–210)		120 (50–315)	137.5 (125–150)		123 (50–315)	

IV [23] and Telem in case of perforation or haemodynamic instability [28].

In our study, only one patient who underwent CT-guided drainage did not present with recurrence or persistent symptoms. A recent study reported the analysis of patients with abscessed diverticulitis treated by CT-guided drainage and found that they presented with complicated recurrence (63% of the recurrent episodes were complicated by abscess, fistula, peritonitis or occlusion), thus justifying elective surgery after the initial drainage [9].

According to our results, the laparoscopic approach seems suitable for elective surgery. In contrast, primary laparotomy or conversion laparotomy was more frequent for emergency surgery in CRD. Some studies support laparoscopy, even for emergency surgeries for CRD because patients had comparable length of hospitalisation and complication rates, despite longer operating times [5,29].

In this study, the recurrence rate was 7.5% for the whole series, with no difference found between the 2 groups and with a median time to onset of 20.6 months. The Asian literature reports recurrence rates ranging from 9.9 to 19%, with recurrence mainly occurring during the following year [10,24]. There are many published series analysing recurrence risk factors, but most are heterogeneous. Ha [24] failed to identify a risk factor, but Park HC [11], who focused on recurrence risk factors specifically following uncomplicated diverticulitis, identified multiple diverticula and the fact that diverticulitis is intraperitoneal as promoting recurrence. It seems important to underline that all recurrences occurred in uncomplicated mode, which is consistent with a conservative treatment of the initial episode and its recurrence; this is in accordance with the fact that in a recent study, the Hinchey classification was not found to be a risk factor of recurrence [10].

Conclusion

With this series covering a European population of 93 patients with right colon diverticulitis, conservative treatment can be proposed safely and efficiently for URD and for selected patients with CRD, given the low recurrence rate and the favourable progression with medical treatment. Surgery should be reserved for unstable patients or patients with severe forms of complicated diverticulitis in emergency and could be discussed after a cooling off period in the event of persistent symptoms with multiple recurrences.

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Disclosure of interest

The authors declare that they have no competing interest.

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