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Natural History of Incidentally Detected Colonic Diverticulosis in Young Adults: A Retrospective Cohort Study

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Abstract

Purpose

Colonic diverticulosis is frequently detected incidentally at colonoscopy. Although the incidence of diverticular disease is rising fastest among young adults, natural-history data derive almost exclusively from older Western cohorts. We aimed to determine the risk of complications in young patients with incidentally detected, previously uncomplicated diverticulosis.

Methods

We conducted a retrospective longitudinal cohort study of patients aged 40 years or younger with colonoscopy-confirmed colonic diverticulosis at the Ambulatory Care Centre, Hamad Medical Corporation, Qatar (January 2015–December 2021). Patients with any diverticular complication at or before the index colonoscopy were excluded. Cumulative incidence of a first episode of acute diverticulitis or diverticular bleeding was estimated by Kaplan–Meier analysis; incidence rates were expressed per 1000 person-years.

Results

Of 144 patients identified, 98 were eligible, contributing 527 person-years (median follow-up 5.6 years). Median age was 36.2 years; 62.2% were male and 50.0% obese. Diverticula were right-sided in 32.7%, left-sided in 29.6%, and bilateral in 21.4%. Six patients (6.1%) developed a first complication (four diverticulitis, two bleeding), an incidence of 11.38 per 1000 person-years (95% CI 4.18–24.77). The 5-year cumulative incidence was 3.9% (95% CI 1.3–11.6) for any complication, 2.5% for diverticulitis, and 1.4% for bleeding. No event occurred within two years. All diverticulitis episodes were uncomplicated and medically managed, both bleeds were self-limited, and no patient required surgery.

Conclusion

Incidentally detected diverticulosis in young patients carried a low 5-year complication risk with a benign course, arguing against the historically quoted risk. Small event numbers warrant cautious interpretation.

Introduction

Colonic diverticulosis is one of the most common incidental findings at colonoscopy. Its prevalence rises steeply with age, affecting roughly one in ten adults by the age of 40 and more than half of those beyond the sixth decade in Western populations [1, 2]. In the great majority of cases the diverticula are asymptomatic and are detected during examinations performed for unrelated indications, and only a minority of affected individuals ever progress to acute diverticulitis or diverticular haemorrhage [1, 3]. It

is this large, silently affected group that poses the everyday clinical question: what is their forward risk? The epidemiology of the disease has also changed. The incidence of acute diverticulitis has risen across both industrialised and developing nations and, contrary to the long-standing perception of a disorder confined to the elderly, the largest relative increases have occurred among adults younger than 50 years, with acute hospitalisations growing fastest in young men [3, 4, 5].

This shift carries direct clinical consequences, because diverticular disease presenting at a young age has historically been regarded as a distinct and more aggressive entity associated with higher rates of complicated presentation and recurrence [6]. Such concerns once prompted recommendations for earlier elective surgery in younger patients; as the natural history has become better characterised, that guidance has been revised, and current society guidelines hold that the decision to operate should be individualised rather than dictated by age or by the number of previous episodes [6, 7, 8]. Considerable uncertainty nevertheless persists as to how a young patient with incidentally discovered, previously uncomplicated diverticulosis will fare over time. The most robust longitudinal data derive from older, predominantly male, Western cohorts. In a large retrospective analysis of United States veterans with incidentally detected diverticulosis, the long-term cumulative risk of a first episode of acute diverticulitis was only approximately 4%, far below the traditionally quoted 10–25% lifetime risk, yet that cohort had a mean age of 62 years [9].

There are also mechanistic and geographic reasons to question whether estimates from elderly Western populations apply to younger patients. The classical model attributes left-sided sigmoid diverticula to age-related degeneration of the colonic wall together with elevated intraluminal pressure [1, 10]. In younger and Asian individuals, by contrast, diverticula are more often right-sided or bilateral and have traditionally been considered congenital, true diverticula reflecting a structural predisposition rather than acquired degeneration [10]. In a multiracial Asian colonoscopy series, disease was confined to the right colon in the large majority of affected patients and showed a clear ethnic predilection, supporting a genetic contribution [11]. Twin and familial studies indicate that heritable factors account for a substantial share of susceptibility, and a large genome-wide association analysis has implicated genes governing neuromuscular function and connective-tissue integrity [12, 13]. Data from Middle-Eastern populations remain sparse.

We therefore performed a retrospective longitudinal cohort study of patients aged 40 years or younger in whom colonic diverticulosis was incidentally identified at colonoscopy at a large tertiary centre in Qatar. The primary objective was to determine the cumulative incidence of a first episode of acute diverticulitis or diverticular bleeding during follow-up. Secondary objectives were to describe the baseline demographic, clinical, and endoscopic characteristics of the cohort, including the anatomical distribution of diverticula; to characterise the clinical course and management of incident complications; and to explore, in a hypothesis-generating manner, features potentially associated with progression.

Methods

Study design and setting

This was a retrospective, longitudinal observational cohort study conducted at the Department of Gastroenterology, Ambulatory Care Center, Hamad Medical Corporation (HMC), Doha, Qatar, and is reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement [14]. HMC is the principal public healthcare provider in the State of Qatar and serves a large, ethnically diverse population. All clinical activity is recorded in a single institution-wide electronic medical record (Cerner Millennium), which permits longitudinal capture of encounters across all HMC facilities, including emergency, inpatient, and outpatient contacts.

Participants and eligibility

We reviewed all colonoscopies performed between 1 January 2015 and 31 December 2021 in patients aged 40 years or younger at the time of the procedure. Patients were eligible if colonic diverticulosis was documented at endoscopy. The index colonoscopy was defined as the earliest procedure demonstrating diverticulosis; where a patient had undergone more than one colonoscopy, only the first was used to define cohort entry.

Incidence describes the occurrence of a first event among people who are free of the outcome at baseline. Patients who had already sustained acute diverticulitis or diverticular bleeding at or before the index colonoscopy were therefore not at risk of a first event, and including them would have measured recurrence rather than incidence. Thirty-four such patients were excluded. Patients with inflammatory bowel disease and those with invalid records were also excluded. No a priori sample-size calculation was performed; all eligible patients within the study period were included.

Data collection and definitions

Data were abstracted from the electronic record using a standardised collection form. Because free-text fields are truncated in automated database extracts, every chart was reviewed manually to avoid under-ascertainment of prior and incident complications. Recorded variables comprised demographics, body mass index (BMI), comorbidities, medication exposure, index colonoscopy findings (indication, extent of examination, anatomical distribution of diverticula), and all subsequent clinical encounters.

Incident acute diverticulitis was defined as a first episode occurring after the index colonoscopy, diagnosed clinically and confirmed on computed tomography (CT) where imaging was performed. Incident diverticular bleeding was defined as haematochezia attributed to colonic diverticula after endoscopic exclusion of an alternative source; where no active bleeding or stigmata were identified, attribution was recorded as presumptive. A complete colonoscopy was defined as intubation of the caecum or terminal ileum. Steroid exposure referred to systemic corticosteroids only. Variables

documented as “not documented” were treated as missing data and were not interpreted as negative findings.

Follow-up and censoring

Follow-up commenced at the index colonoscopy and continued until the earliest of a first incident diverticular complication, death, or the last documented clinical contact within the HMC system. All patients were followed until 30 June 2026, which was the final date of data capture; no clinical encounter recorded after that date was considered.

Statistical analysis

Continuous variables are summarised as mean ± standard deviation (SD) or median (interquartile range, IQR), and categorical variables as number (percentage). Percentages are calculated with the full analytic cohort (N = 98) as the denominator; where a variable had more than 20% missing data, the complete-case percentage is additionally reported in the footnotes to Table 1. Cumulative incidence of a first diverticular complication was estimated by the Kaplan–Meier method at 1, 3, and 5 years, with 95% confidence intervals (CI) derived by the Greenwood method, and median follow-up by the reverse Kaplan–Meier method. Incidence rates were expressed per 1000 person-years with exact Poisson confidence intervals. As a sensitivity analysis, cumulative incidence was re-estimated with the Aalen–Johansen estimator, treating the single death during follow-up as a competing risk.

Table 1

Baseline characteristics of the cohort (N = 98) *Colonoscopy-confirmed colonic diverticulosis, patients ≤ 40 years, 2015–2021*

Characteristic	Value	Missing, n
Demographics		
Age at index, years — mean ± SD	35.0 ± 4.5	0
Age at index, years — median (IQR)	36.2 (33.5–38.2)	
Male sex — n (%)	61 (62.2)	0
Anthropometry		
BMI, kg/m² — mean ± SD	30.7 ± 7.2	6
BMI < 25 (normal / underweight) — n (%)	18 (18.4)	
BMI 25–29.9 (overweight) — n (%)	25 (25.5)	
BMI ≥ 30 (obese) — n (%)	49 (50.0)	
Comorbidities — n (%)		
Diabetes mellitus	17 (17.3)	7
Hypertension	16 (16.3)	9
Dyslipidaemia[a]	21 (21.4)	33
Connective tissue disorder[b]	1 (1.0)	0
Medication exposure — n (%)		
NSAID use — regular[c]	31 (31.6)	20
Systemic steroid — regular[c]	1 (1.0)	20

Characteristic	Value	Missing, n
Demographics		
SD, standard deviation; IQR, interquartile range; BMI, body mass index; NSAID, non-steroidal anti-inflammatory drug.		
Percentages use N = 98 as the denominator; where data are missing, interpret against the “Missing, n” column.		
Complete-case percentages for variables with > 20% missing data: dyslipidaemia 21/65 (32.3%); regular NSAID use 31/78 (39.7%); regular systemic steroid use 1/78 (1.3%).		
[a] Variables with substantial missingness (dyslipidaemia 34%) are presented descriptively only; smoking, irritable bowel syndrome, chronic constipation, and family history were excluded from analysis (Supplementary Table S1, Online Resource 1).		
[b] Per protocol, connective tissue disorder recorded as “not documented” was coded as absent.		
[c] Medication exposure was graded Regular / Occasional / Never / Not documented; only the “Regular” stratum is shown.		

Exploratory comparisons between patients with and without an incident complication used the Mann–Whitney U test for continuous variables and the Fisher exact test for categorical variables. Given that only six events were observed, no multivariable modelling was undertaken, as the number of events would not support reliable estimation; all comparative analyses are therefore regarded as exploratory and hypothesis-generating. Variables with more than 50% missing data were excluded from analysis and are reported in Supplementary Table S1. A two-sided p value below 0.05 was considered statistically significant. All analyses were performed using the Python programming language, version 3.14.6 (Python Software Foundation), with two open-source statistical packages: lifelines, version 0.30.3, for survival analysis, and SciPy, version 1.18.0, for hypothesis testing.

Results

Cohort derivation

A total of 144 patients aged 40 years or younger with colonoscopy-confirmed colonic diverticulosis were identified during the study period. Forty-three were excluded at initial screening (prior acute diverticulitis, 30; diverticular bleeding at or before the index procedure, 3; active inflammatory bowel disease, 9; other, 1), leaving 101 patients provisionally eligible. On full chart review, a further three were excluded (active inflammatory bowel disease, 1; diverticulitis pre-dating the index colonoscopy, 1; invalid record, 1), yielding a final analytic cohort of 98 patients with incidentally detected, previously uncomplicated diverticulosis (Fig. 1).

Baseline characteristics

The median age at index colonoscopy was 36.2 years (IQR 33.5–38.2), and 61 patients (62.2%) were male. The mean BMI was 30.7 ± 7.2 kg/m², with 49 patients (50.0%) meeting criteria for obesity. Diabetes mellitus was documented in 17 patients (17.3%), hypertension in 16 (16.3%), and dyslipidaemia in 21 (21.4%; 32.3% of the 65 patients in whom the variable was recorded). Regular non-steroidal anti-inflammatory drug (NSAID) use was recorded in 31 patients (31.6%; 39.7% of the 78 patients with documented medication history) (Table 1).

The index colonoscopy was complete in 95 patients (96.9%). Diverticula were right-sided in 32 patients (32.7%), left-sided in 29 (29.6%), and bilateral in 21 (21.4%); the remaining 16 (16.3%) were pan-colonic, confined to the transverse colon, or not further specified (Table 2, Supplementary Fig. S1.). The commonest indications for the index procedure were rectal bleeding (28 patients), abdominal pain (18), altered bowel habit (14), screening (10), and anaemia (8) (Table 2).

Table 2

Index colonoscopy characteristics (N = 98) *Indication, completeness of examination, and anatomical distribution of diverticula at the index procedure*

Characteristic	n (%)	Characteristic	n (%)
Indication for index colonoscopy		**Extent of examination**	
Rectal bleeding	28 (28.6)	Complete (caecum or terminal ileum reached)	95 (96.9)
Abdominal pain	18 (18.4)	Incomplete	3 (3.1)
Altered bowel habit	14 (14.3)	up to hepatic flexure	1 (1.0)
Screening	10 (10.2)	up to mid ascending colon	1 (1.0)
Anaemia / iron deficiency	8 (8.2)	up to sigmoid colon	1 (1.0)
Polyp surveillance	2 (2.0)	**Anatomical distribution of diverticula**	
Known diverticulosis, surveillance	2 (2.0)	Right-sided	32 (32.7)
Incidental finding on imaging	2 (2.0)	Left-sided	29 (29.6)
Weight loss	2 (2.0)	Bilateral	21 (21.4)
Pre-operative / other work-up	2 (2.0)	Pan-colonic	6 (6.1)
Other	10 (10.2)	Transverse colon only	5 (5.1)
		Not specified	5 (5.1)
		Grouped distribution (overlapping categories)	
		Any right-colon involvement[a]	59 (60.2)
		Any left-colon involvement[a]	56 (57.1)

Percentages are of the full analytic cohort (N = 98) and may not total 100 owing to rounding.

A complete examination was defined as intubation of the caecum or terminal ileum.

Anatomical distribution was taken from the endoscopist's report at the index procedure; where segments were not specified, the case was classified as "not specified".

[a] Grouped categories overlap, since bilateral and pan-colonic disease contribute to both; they are shown because segment-level categories alone understate the extent of right-colon involvement.

Follow-up and incidence of complications

The cohort contributed 527 person-years of follow-up, with a median follow-up of 5.6 years (IQR 3.2–7.5). One patient died during follow-up from a non-diverticular cause. Six patients (6.1%) developed a first diverticular complication: four acute diverticulitis and two diverticular bleeding. The incidence rate of any first complication was 11.38 per 1000 person-years (95% CI 4.18–24.77); for acute diverticulitis, 7.59 per 1000 person-years (95% CI 2.07–19.43); and for diverticular bleeding, 3.79 per 1000 person-years (95% CI 0.46–13.70) (Table 3 Supplementary Fig. S2).

Table 3

Incidence of diverticular complications *Analytic cohort N = 98; total follow-up 527 person-years; median follow-up 5.6 years*

Outcome	Events, n	Incidence rate per 1000 PY (95% CI)	Cumulative incidence, % (95% CI)		
			1 year	3 years	5 years
Any diverticular complication	6	11.38 (4.18–24.77)	0.0 (0.0–0.0)	2.5 (0.6–9.6)	3.9 (1.3–11.6)
Acute diverticulitis	4	7.59 (2.07–19.43)	0.0 (0.0–0.0)	2.5 (0.6–9.6)	2.5 (0.6–9.6)
Diverticular bleeding	2	3.79 (0.46–13.70)	0.0 (0.0–0.0)	0.0 (0.0–0.0)	1.4 (0.2–9.7)
PY, person-years; CI, confidence interval.					
Incidence rates are events per 1000 person-years with exact Poisson 95% confidence intervals.					
Cumulative incidence at 1, 3, and 5 years was estimated by the Kaplan–Meier method (1 − S[t]), with 95% confidence intervals by the Greenwood method; follow-up was censored at the last documented contact.					
A competing-risks (Aalen–Johansen) analysis accounting for the single death gave a 5-year cumulative incidence of 3.9% for any complication, effectively identical to the Kaplan–Meier estimate.					
Estimates are based on 6 events and are therefore imprecise (wide confidence intervals); they are descriptive and hypothesis-generating.					

The Kaplan–Meier cumulative incidence of any first diverticular complication was 0% at 1 year, 2.5% (95% CI 0.6–9.6) at 3 years, and 3.9% (95% CI 1.3–11.6) at 5 years (Fig. 2). The corresponding 5-year cumulative incidence was 2.5% (95% CI 0.6–9.6) for acute diverticulitis and 1.4% (95% CI 0.2–9.7) for diverticular bleeding. A competing-risks analysis accounting for the single death yielded a 5-year cumulative incidence of 3.9% for any complication, effectively identical to the Kaplan–Meier estimate (Fig. 2).

Characteristics and course of incident complications

Time from index colonoscopy to first complication ranged from 25 to 103 months, and no complication occurred within the first two years of follow-up. Five of the six patients were male, and ages at index

ranged from 27 to 39 years. All four episodes of acute diverticulitis were confirmed on CT and were uncomplicated, with no abscess, perforation, or fistula, and all were managed medically with antibiotics. Five of the six patients required hospital admission. Both bleeding episodes were self-limited and required neither endoscopic nor radiological haemostasis. No patient underwent surgery for diverticular disease during follow-up (Table 4).

Table 4
Characteristics of the six incident diverticular-complication cases *Ordered by time from index colonoscopy to complication*

Case	Age / sex	Complication	Diverticular distribution	Time to event (months)	Hospital admission	Index year
1	38 / M	Diverticulitis	Bilateral	25	Yes	2016
2	39 / M	Diverticulitis	Right-sided	31	Yes	2020
3	27 / M	Bleeding	Left-sided	46	No	2021
4	36 / M	Diverticulitis	Pan-colonic	71	Yes	2015
5	38 / M	Diverticulitis	Left-sided	75	Yes	2019
6	34 / F	Bleeding	Bilateral	103	Yes	2017
M, male; F, female.						
All four diverticulitis episodes were confirmed on computed tomography, were uncomplicated (no abscess, perforation, or fistula), and were managed medically; no patient underwent surgery.						
Both bleeding episodes were self-limited; colonic diverticula were reported at colonoscopy as the likely source of bleeding, and neither endoscopic nor radiological haemostasis was required.						
Right-colon involvement was present in several cases, consistent with the right-predominant distribution observed in this young, predominantly Middle-Eastern and South-Asian cohort.						
Only the year of the index colonoscopy is reported, in order to preserve patient de-identification.						

Exploratory comparisons and data completeness

No statistically significant differences were observed between patients with and without an incident complication in age, BMI, sex, diabetes, hypertension, dyslipidaemia, or regular NSAID use (all $p > 0.05$; Supplementary Table S2). Patients who developed a complication were more often male (5 of 6, 83%, versus 61%) and had a numerically higher mean BMI, but neither difference approached significance.

Documentation was incomplete for several lifestyle and comorbidity variables: smoking status was not recorded in 51 patients (52%), irritable bowel syndrome in 80 (82%), chronic constipation in 64 (65%), family history of colorectal cancer in 79 (81%), and family history of diverticulosis in all 98 (100%). These

variables were excluded from analysis (Supplementary Table S1). Missingness was low for BMI (6%), diabetes (7%), and hypertension (9%), and intermediate for dyslipidaemia (34%) and medication exposure (20%).

Discussion

In this cohort of 98 patients aged 40 years or younger with incidentally detected, previously uncomplicated colonic diverticulosis, the 5-year cumulative incidence of a first diverticular complication was 3.9%, comprising 2.5% for acute diverticulitis and 1.4% for diverticular bleeding. Complications, when they occurred, were uniformly uncomplicated and managed without surgery. To our knowledge, this is among the first studies to describe the natural history of incidental diverticulosis restricted to a young population.

The future risk of complications in this young population is low. This contrasts sharply with the widely quoted figure that 10–25% of individuals with diverticulosis will eventually develop diverticulitis, an estimate derived largely from pre-colonoscopy era data drawn from symptomatic and referral populations, in which the denominator of asymptomatic disease was necessarily unknown [1]. Our findings instead align with contemporary colonoscopy-based estimates. In a large cohort of United States veterans with incidentally detected diverticulosis, the cumulative risk of acute diverticulitis was approximately 4% over a median of nearly seven years, falling to about 1% when only radiologically confirmed episodes were counted [9]. Similarly, in a Dutch cohort of 433 patients with colonoscopically diagnosed diverticulosis followed for a mean of 14 years, 7% developed diverticulitis, corresponding to an incidence of 4.8 per 1000 person-years, with a mean interval to diverticulitis of 5.9 years [15]. Our observed rate of 7.6 per 1000 person-years for diverticulitis is of the same order, despite a cohort three decades younger, suggesting that the modest risk associated with incidental diverticulosis is not confined to older patients.

This observation carries clinical weight precisely because the young are the group in whom diverticular disease is increasing most rapidly [3, 4, 5]. Existing natural-history data derive overwhelmingly from older, predominantly male, Western cohorts, and it has not previously been demonstrated that their reassuring conclusions extend to patients in their twenties and thirties. Data from the Arabian Gulf are particularly sparse; a recent large Saudi colonoscopy series characterised age- and sex-related patterns of colonic findings but did not examine the subsequent course of diverticulosis [16]. Our results therefore provide an empirical basis for counselling a young patient in whom diverticula are found incidentally: over the succeeding five years, the probability of developing diverticulitis or diverticular bleeding appears to be of the order of a few percent.

An apparent contrast exists between our findings and reports that young patients with diverticular disease experience more aggressive disease. A recent Italian tertiary-centre study found that young adults presented more often with complications such as abscess and perforation and had worse subsequent outcomes than older patients [17]. We would suggest that this reflects a difference in study

population rather than a true contradiction. Studies of that design enrol patients with established diverticular disease, including those presenting with a complication, whereas our cohort was deliberately restricted to patients whose diverticulosis was incidental and previously uncomplicated. The two designs answer different questions: how severely diverticular disease behaves once it is diagnosed, as against how likely silent diverticulosis is to cause a complication. Our data speak only to the latter, and the reassurance they offer should not be extended to young patients who have already had a complication.

The anatomical distribution observed in our cohort merits comment. Right-sided diverticula were at least as common as left-sided disease, and a further fifth of patients had bilateral involvement, a pattern that differs markedly from the sigmoid-predominant distribution typical of older Western populations [1]. Right-sided disease is recognised to occur at a younger age and is considerably more frequent in Asian populations, in whom it may account for the majority of diverticular disease [10, 11]. The interpretation of this pattern remains contested. The traditional view holds that right-sided diverticula, particularly when solitary, are congenital true diverticula involving the full thickness of the bowel wall, in contrast to the acquired diverticula of the distal colon [10]. A more recent systematic review, however, concluded that most right-sided diverticulosis is acquired rather than congenital, and probably reflects the same underlying process as left-sided disease [18]. Our data cannot adjudicate between these positions, but they do suggest that age-related degeneration alone is an insufficient explanation for diverticula arising in patients in their twenties, and that constitutional factors contribute; this is supported by the demonstrated heritability of diverticular disease and by genome-wide association data implicating neuromuscular and connective-tissue genes [12, 13]. Whether young-onset, right-predominant diverticulosis is a biologically distinct phenotype remains a hypothesis generated by, rather than demonstrated in, our data.

The clinical course of the complications we observed was benign. All four episodes of diverticulitis were uncomplicated and resolved with antibiotics, both bleeds were self-limited, and no patient required surgery. This is consistent with the evolution of clinical guidance away from early elective resection in young patients and with current expert recommendations that elective surgery be considered on an individualised basis rather than according to the number of episodes [6, 8, 19]. Notably, no complication occurred within the first two years, and events were distributed across the entire follow-up period rather than clustering early, suggesting that risk accrues gradually rather than being concentrated soon after diagnosis. In the absence of any evidence that surveillance alters outcome, our findings do not support routine follow-up of asymptomatic young patients with incidental diverticulosis.

We were unable to identify factors associated with progression. Patients who developed complications were more often male and had a somewhat higher BMI. Both obesity and regular NSAID or aspirin use are established risk factors for diverticulitis and diverticular bleeding in large prospective cohorts and tobacco smoking has been associated with a modest increase in risk in meta-analysis [20–23]. These exposures were common in our young population: half the cohort was obese and almost a third were regular NSAID users. Nevertheless, with only six events no comparison approached statistical

significance and no multivariable analysis was justifiable. This limitation is intrinsic to the study of a low-incidence outcome in a modestly sized cohort, and we would caution against interpreting these exploratory comparisons as evidence for or against any individual risk factor. Adequately powered case-control or multicentre cohort studies will be required to address this question.

This study has several strengths. Every record was reviewed manually rather than by automated text extraction, which under-ascertained prior complications because free-text endoscopy fields are truncated in database exports. Patients with a complication at or before the index procedure were excluded, so the estimate reflects the incidence of a first event rather than recurrence. Because HMC is the principal public healthcare provider in Qatar and operates a single institution-wide electronic record, emergency, inpatient and outpatient contacts across every facility were captured for each patient. Follow-up was long, at a median of 5.6 years, in an age group for which no comparable longitudinal data exist.

Several limitations should also be acknowledged. The study was retrospective, single-centre, and confined to patients undergoing colonoscopy, a clinically selected group; the cohort is therefore not population-representative, and the prevalence of diverticulosis among young residents of Qatar cannot be inferred from these data. Only six events occurred, so all estimates carry wide confidence intervals, the study was not powered to identify risk factors, and no multivariable analysis was undertaken. Follow-up relied on documented contact within a single health system; patients who sought care elsewhere or left the country may have been censored prematurely, which would underestimate incidence. Attribution of both bleeding episodes was presumptive, as no active bleeding or stigmata of recent haemorrhage were identified at colonoscopy, although no alternative source was found in either case [24]. Documentation of several lifestyle and family-history variables was substantially incomplete, precluding their analysis.

Conclusion

Among young patients in whom colonic diverticulosis is discovered incidentally at colonoscopy, the risk of subsequently developing acute diverticulitis or diverticular bleeding appears low, with a 5-year cumulative incidence of approximately 4%, and complications that do occur follow a benign, medically manageable course. These findings do not support the historically quoted high lifetime risk, nor do they justify routine surveillance or prophylactic intervention in this population. The relatively high proportion of right-sided and bilateral disease suggests that diverticulosis in the young may not be simply an early manifestation of the classical age-related disorder and merits further investigation. Given the small number of events, these results should be regarded as descriptive and require confirmation in larger, multicentre studies.

Abbreviations

ACC

Ambulatory Care Center
BMI
body mass index
CI
confidence interval
CT
computed tomography
HMC
Hamad Medical Corporation
IBD
inflammatory bowel disease
IQR
interquartile range
NSAID
non-steroidal anti-inflammatory drug
PY
person-years
SD
standard deviation
STROBE
Strengthening the Reporting of Observational Studies in Epidemiology.

Declarations

Funding No funding was received for conducting this study.

Competing interests The authors have no relevant financial or non-financial interests to disclose.

Ethics approval This retrospective chart review study involving human participants was in accordance with the ethical standards of the institutional and national research committee and with the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards. The study was approved by the Medical Research Center Institutional Review Board of Hamad Medical Corporation, Doha, Qatar (approval number MRC-01-26-449).

Consent to participate The requirement for informed consent was waived by the approving Institutional Review Board because the study involved retrospective review of existing medical records without patient contact or intervention, and all data were de-identified prior to analysis.

Consent to publish Not applicable. No individually identifiable data, images, or personal details are reported; all patient-level information presented is de-identified and cannot be traced to any individual.

Data availability The de-identified data supporting the findings of this study are available from the corresponding author upon reasonable request, subject to institutional approval from Hamad Medical Corporation. Patient-level data are not publicly available in order to protect participant confidentiality.

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Figures

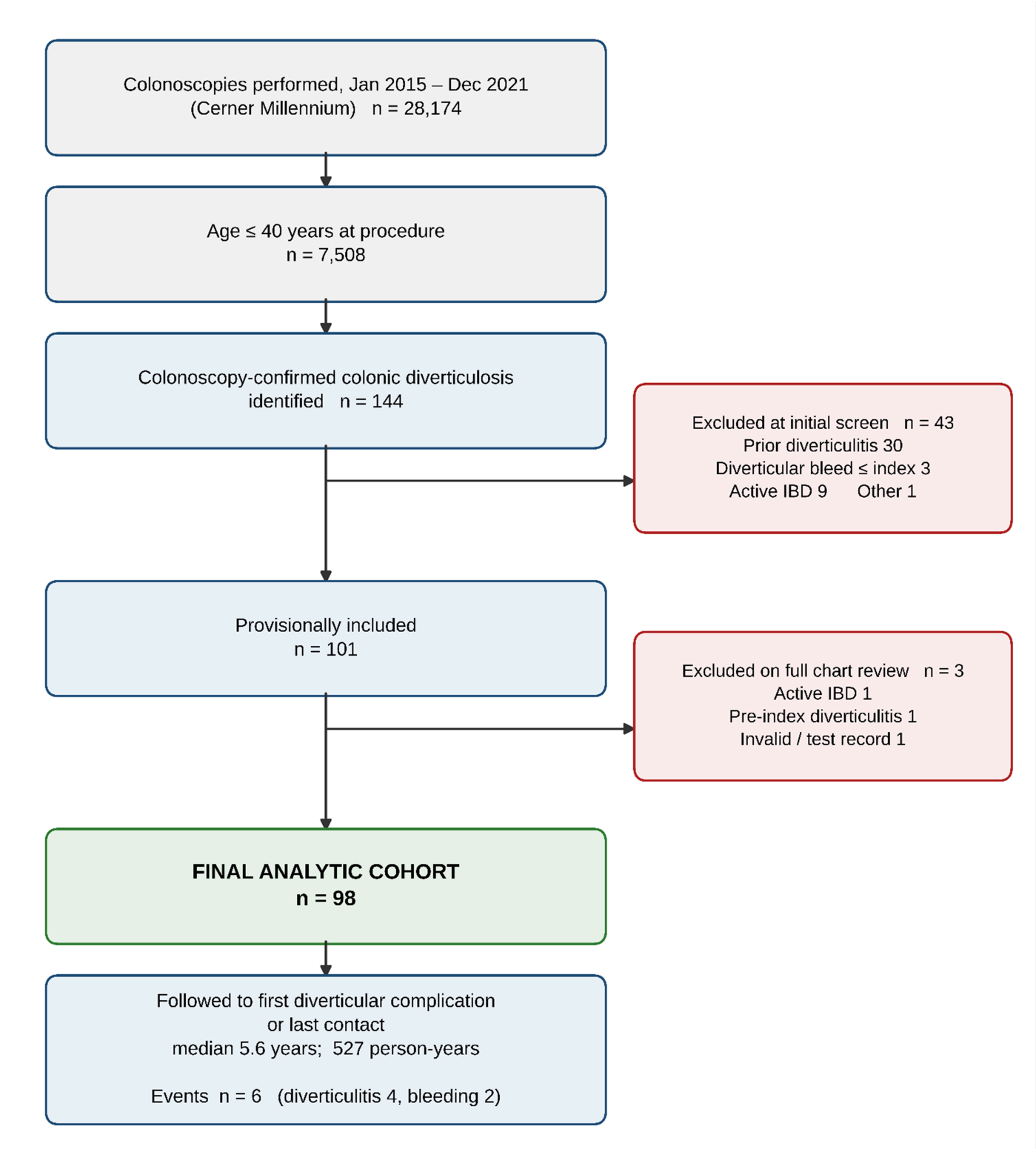


Figure 1

Cohort derivation and follow-up. Flow diagram showing identification of patients aged ≤40 years with colonoscopy-confirmed colonic diverticulosis between January 2015 and December 2021, sequential application of exclusion criteria, and the final analytic cohort. Of 144 patients identified, 43 were excluded at initial screening and a further 3 on full chart review, leaving 98 patients with incidentally detected, previously uncomplicated diverticulosis followed for a median of 5.6 years (527 person-years), during which 6 incident complications occurred

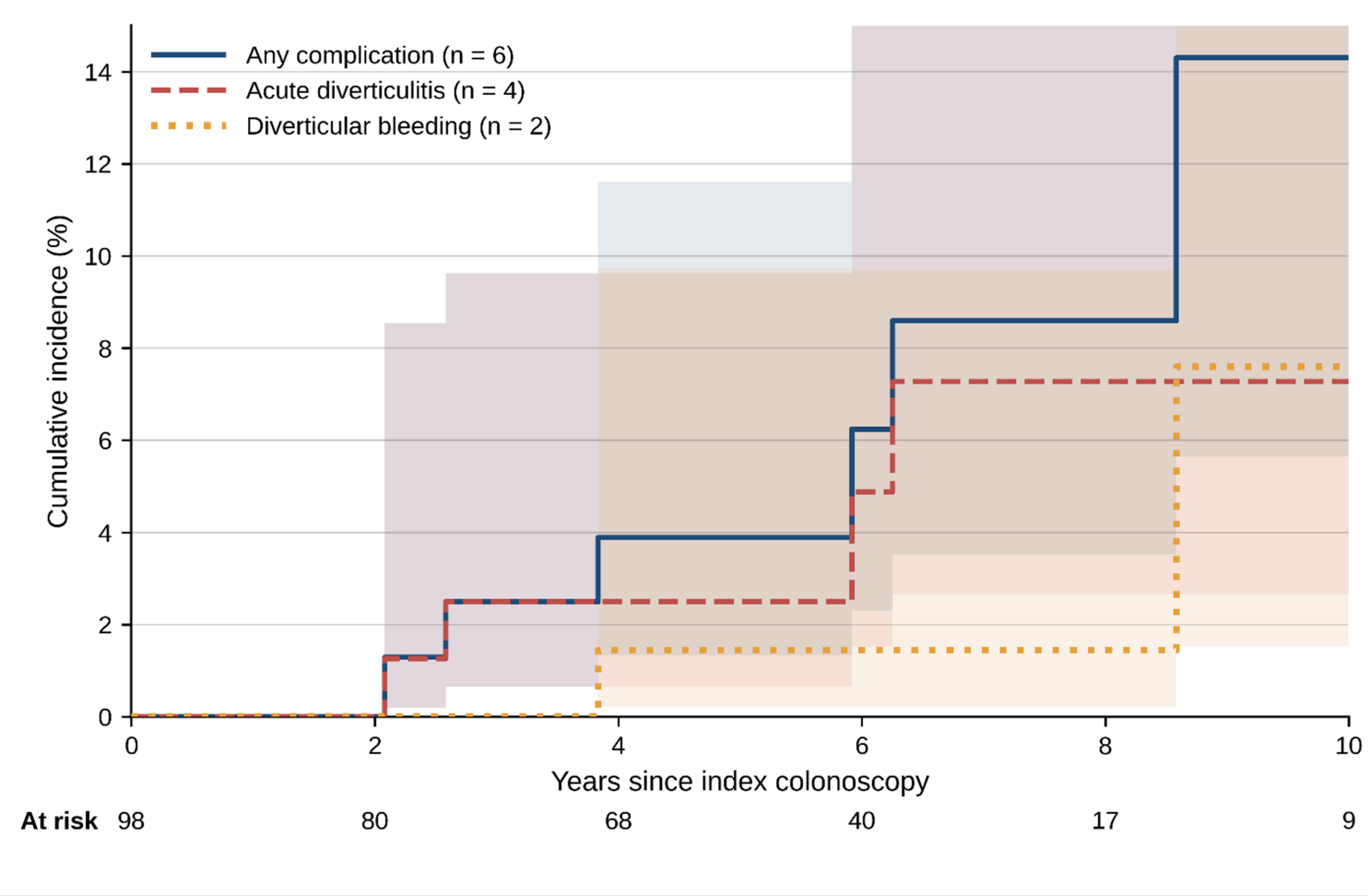


Figure 2

Cumulative incidence of diverticular complications. Kaplan–Meier curves showing the cumulative incidence of any first diverticular complication (composite), acute diverticulitis, and diverticular bleeding from the date of the index colonoscopy. Shaded bands represent 95% confidence intervals; the numbers of patients remaining at risk are shown beneath the x-axis. The 5-year cumulative incidence was 3.9% for any complication, 2.5% for acute diverticulitis, and 1.4% for diverticular bleeding

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