

# A systematic review of stercoral perforation

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## Abstract

**Aim** Stercoral perforation is a rarely suspected life-threatening condition. Early diagnosis is difficult but essential. A comprehensive systematic review was performed to evaluate its presentation, diagnosis and treatment.

**Method** A systematic review was carried out of Embase, MEDLINE, PubMed and Cochrane databases for all articles published between 1998 and 2011. Only studies describing stercoral perforation were included.

**Results** Twenty-four relevant articles were found including 137 patients (median age = 62 years) with stercoral perforation, of whom 81% had chronic constipation. Stercoral perforation was diagnosed by CT scan

in 90% of 31 patients, with the commonest findings being a combination of faecal impaction (84%) and subphrenic (90%) or extraluminal air (61%). The commonest site of perforation was the sigmoid colon (50%) followed by the rectosigmoid junction (24%). The overall mortality was 34%.

**Conclusion** Stercoral perforation should be suspected in elderly and chronically constipated patients with unexplained abdominal pain and investigated appropriately with a CT scan to allow timely and optimal treatment.

**Keywords** Stercoral, stercoral perforation, rectal perforation, constipation

## Introduction

Chronic constipation can lead to faecal impaction in the large bowel which can cause pressure necrosis followed by perforation, known as stercoral perforation (SP) [1]. The condition may be difficult to identify. The patient is often elderly with a history of chronic constipation and presenting in a moribund state. Often the condition is not suspected and the mortality is high. In the last comprehensive review by Maurer *et al.* in 2000 [2], the diagnosis was rarely made preoperatively. Most patients were diagnosed during emergency laparotomy or postmortem.

Given advances in diagnostic techniques, particularly imaging, a systematic review was performed to determine the present role of radiology in aiding early diagnosis and to see whether there was any evidence from the literature of increasing awareness of the condition.

## Method

A literature search was carried out using search engines including PubMed, Embase, MEDLINE, CINAHL,

Ovid and Cochrane databases from 1998 to 2011. The key words used included 'stercoral, perforation', 'perforated', 'perforat\*', 'stercoral perforation', 'peritonitis', 'constipated', 'constipation', 'faecal impaction' and 'fecal impaction'. Only articles that specifically diagnosed a stercoral perforation were incorporated in the study. The last review included all the articles on SP to 1998 [2] and to prevent duplication we added articles published from May 1998 to December 2011. All non-English papers were excluded where a translation was not available. The patient characteristics and predisposing factors for SP were assessed. The clinical and radiological findings, subsequent management and mortality rates were determined. All articles that met the selection criteria were extracted by one reviewer (SC) and the full-text articles were obtained and their references cross-checked. The type and quality of studies were noted. The cases were collated and reviewed independently by the senior authors (JNM and AC). All the available data were pooled and analysed.

## Statistical analysis

All continuous data were pooled and their distribution was expressed as median and range. Individual data

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from each article was used in this calculation. For all categorical variables, a summation of the data was performed and expressed as a percentage of the total number of patients included. The SPSS version 17 statistical package was used for the statistical analysis.

## Results

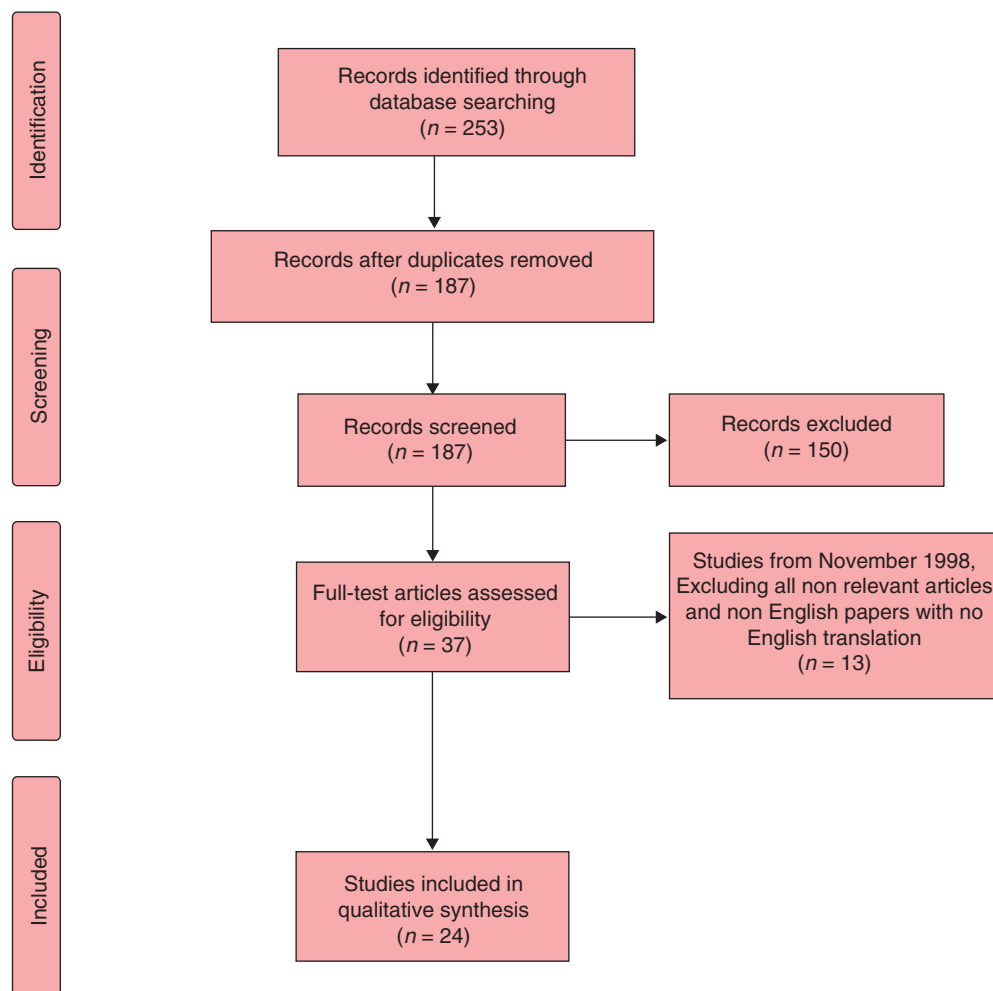
Thirty-seven articles were identified from the literature search, of which 24 from 1998 were found to be relevant (Fig. 1). They included case reports ( $n = 17$ ) and case series of small numbers ( $n = 7$ ) (Table 1), indicating only low evidence data. The case reports and case series were, however, detailed and included information on all end-points of interest with very little missing data. In the case series, individual details of each case were recorded for almost all patients. The level of evidence available did not allow for a meta analysis.

The findings are summarized in Table 2 and included 137 patients to 2011. The median age of the patients was 62 (4–106) years. The gender ratio was 1/1.3 (male/female). Chronic constipation was present in 81%. A CT scan performed in 31 patients since 1998 identified features of SP in 90%. The commonest CT findings were a combination of faecal impaction (84%), subphrenic (90%) or extraluminal (61%) air, pericolic fat stranding (55%) and extraluminal faeces (13%) (Table 3). The commonest site was the sigmoid colon (50%) followed by the rectosigmoid junction (24%). The overall mortality was 34%.

The studies consisted of low level (4 and 5) evidence and therefore a formal sensitivity analysis was not possible.

## Discussion

SP perforation is rare, with only 137 cases in the literature to date. The earliest example was reported in 1894 by



**Figure 1** Prisma flow diagram [21].

**Table 1** All studies of stercoral perforation since 1998.

Study	Year	No. of patients	Mean age (years)	Chronic constipation	Surgery	Hartmann's procedure	Resection and primary anastomosis	Mortality	CT scan performed
Wu [15]	2011	10	77.1	8	10	Not mentioned	Not mentioned	7	10
Nam [22]	2010	8	74	8	8	7	1	2	8
Huang [10]	2006	5	60.2	5	3	3	2	1	1
Heffernan [23]	2005	4	70	4	4	4	No	4	4
Haddad [24]	2005	3	61	3	3	3	No	Nil	1
Matsuo [25]	2002	2	45.5	1	2	2	No	Nil	2
Maurer [2]	2000	7	59	5	0	7	No	Nil	No
Oakeful [26]	2011	1	79	1	1	1	No	Nil	No
McHugh [27]	2011	1	17	1	1	1	No	Nil	No
Matsushita [28]	2011	1	39	1	1	1	No	Nil	1
Lin [29]	2011	1	76	1	Not operated	Not operated	Not operated	1	No
Craft [30]	2011	1	70	1	Not operated	Not operated	Not operated	1	No
Park [31]	2010	1	80	1	1	1	No	Nil	No
Sharma [32]	2010	1	67	0	1	1	No	Nil	1
Hsiao [33]	2010	1	75	0	1	1	No	Nil	No
Ucel [34]	2009	1	106	1	1	1	No	Nil	1
YaNo [35]	2008	1	77	1	1	1	No	1	1
Tsai [36]	2008	1	81	1	1	1	No	Nil	No
Arana [37]	2007	1	75	1	1	1	No	1	Yes
Lundy [5]	2006	1	25	1	1	1	No	Nil	No
Tessier [38]	2002	1	67	1	1	1	No	Nil	No
Patel [39]	2002	1	45	0	1	1	No	Nil	No
Exadactylos [40]	2001	1	62	1	Not operated	Not operated	Not operated	1	No
Tokunaga [11]	1998	1	60	0	1	No	1	Nil	No

**Table 2** Patients with stercoral perforation before and after 1998.

Characteristic	Since 1998	Including those before 1998
No. of cases	56	137
Age (years)*	73 (4–106)	62 (4–106)
Male:female	1:1.5	1:1.3
Chronic constipation	84%	80.86%
Mortality	34%	
Site of perforation		
Rectosigmoid	13 (23.6%)	23.7%
Sigmoid	35 (63.6%)	50.4%
Rectum	4 (7.3%)	6.7%
Descending colon	3 (5.5%)	5.9%
Transverse colon	0	5.9%
Caecum	0	5.2%
Others	0	2.2%

\*Values are expressed as *n*, *n* (%) or median (range), unless specified otherwise.

**Table 3** Characteristics of stercoral perforation identified by CT scan.

CT findings	Values* <i>n</i> (%)
Diagnostic features present	28 (90)
Faecal impaction	26 (84)
Extraluminal faeces	4 (13)
Extraluminal air	19 (61)
Subphrenic gas	28 (90)
Pericolic stranding	17 (55)

\*Total *n* = 31.

Berry to the Pathological Society of London [3]. Grivalsky *et al.* [4] found a stercoral ulcer in 4–6% of 175 autopsies in 1 year. Maurer *et al.* [2] reported seven cases and performed the first extensive review on SP. At that time, 81 cases had been reported in the surgical literature.

SP perforation is a condition commonly seen in the elderly, especially in those with chronic constipation

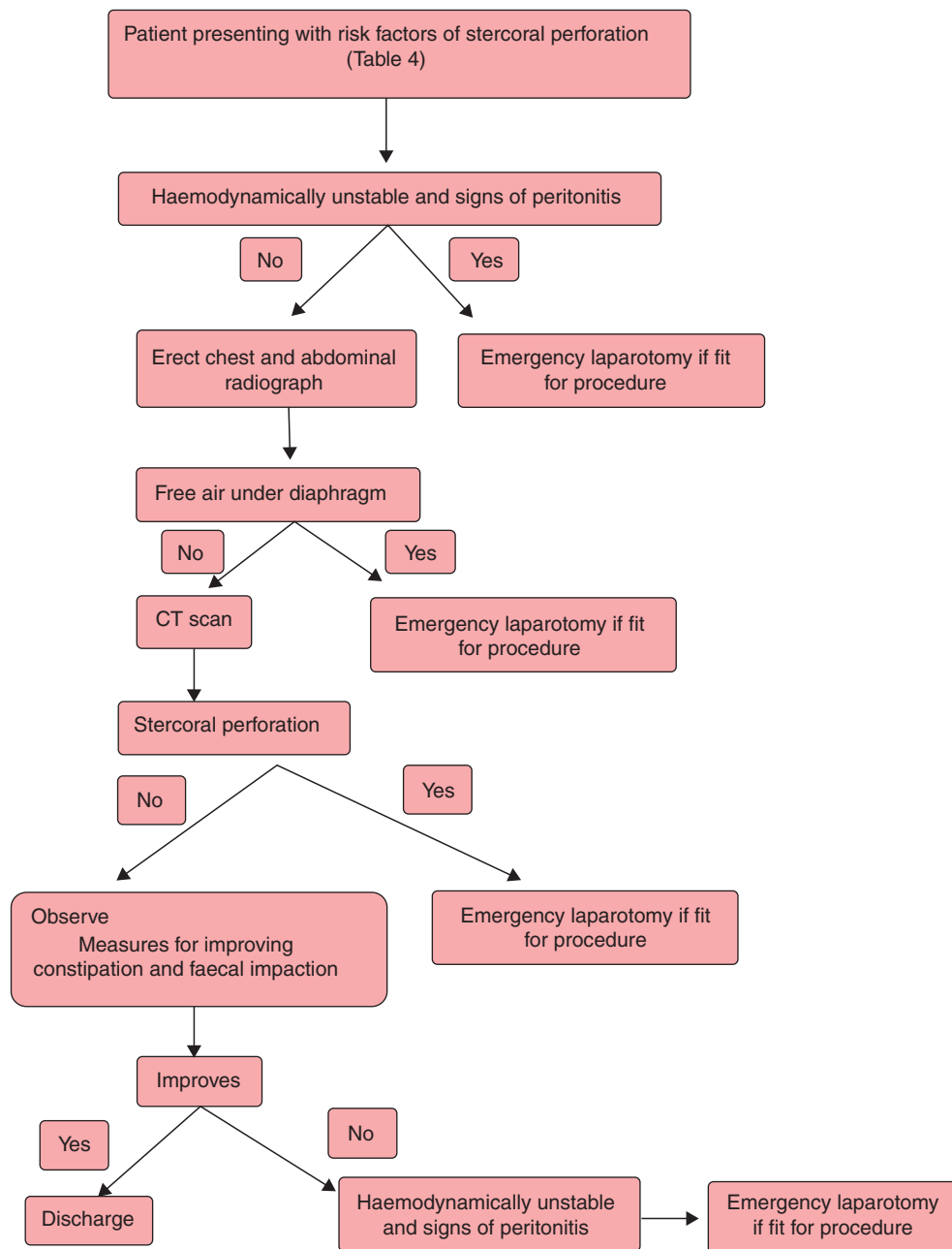
**Table 4** Risk factors for stercoral perforation.

Chronic constipation
Elderly patient, nursing home resident
Evidence of faecal impaction
Increasing abdominal pain unexplained by constipation alone

(81%). However, there are also reports in younger patients, all associated with long-term constipation [5]. There is an association with the long-term use of opiates, nonsteroidal antiinflammatory drugs, tricyclic

antidepressants, hypothyroidism, diabetic enteropathy and hemiparesis [6–8], all of which predispose to constipation. Faecal impaction was found to be present in 42% of patients in a geriatric ward [9], and thus elderly, nursing home-dependent, bedridden or narcotic-dependent patients are at a high risk.

The perforations are typically circular, about 1 cm in diameter and located on the antimesenteric border of the bowel, findings which were confirmed by intra-operative colonoscopy [10].

**Figure 2** Algorithm for the management of chronic constipation in patients with abdominal pain.

If peritonitis is recognized, an emergency laparotomy should be performed. Although there are a few reports of successful primary repair [11] the usual procedure is a Hartmann's procedure with resection of the site of perforation. A primary repair may be justified where peritoneal contamination is minimal and the patient is stable [12]. Limited resection and vacuum-assisted closure (VAC), followed by a second-look procedure, have been tried with success but cannot be recommended for routine use [13].

Successful management depends on early diagnosis as the mortality is high – 34% in the present review, which is similar to that for perforated diverticular disease which can be as high as 45% in Hinchey Stage 4 disease [14]. Interestingly, not all patients have clinically evident peritonitis, as shown by Wu *et al.* [15], who noted that eight of 10 patients did not have any clinical signs of peritonitis on admission. Many patients will have evidence of faecal impaction in the rectum on digital examination or on abdominal radiography. It is unwise to perform an enema at this stage because this may be associated with large-bowel perforation in constipated patients [16–18].

A CT scan should be performed in a patient with the risk factors outlined in Table 4. The findings of SP include discontinuity of the bowel wall, presence of faecal material either protruding through the colonic wall or lying free within the peritoneal cavity, and extraluminal air [19]. A previous study has suggested that pericolic stranding, perfusion defect and dense mucosa are the most sensitive CT signs of SP, as observed in about 80%, 70% and 62.5% of patients, respectively [15]. In this review the CT scan showed features suggestive of SP in 90% of cases. Subphrenic or extraluminal air was identified more commonly than from a plain film. In patients with suspicion of SP a CT scan is therefore essential.

Constipation is present in up to 10% of the population [20] and an elderly, chronically constipated patient with increasing abdominal pain without clinical peritonitis may either be developing SP or already have it subclinically. An early CT scan will easily diagnose the condition and should lead to a decrease in the interval to surgery, which is the most important factor for reducing mortality. A simple algorithm for management of patients with chronic constipation who present with abdominal pain is given in Fig. 2.

In summary, doctors working in emergency units should be aware of the possibility of SP in elderly patients with chronic constipation and increasing abdominal pain. Imaging by plain abdominal X-ray followed by CT when the diagnosis is in doubt should be performed before the administration of enemas.

## Author contributions

Study conception and design: S. Chakravarty, J. Nunoo-Mensah, A. Chang; acquisition of data: S. Chakravarty; analysis and interpretation of data: S. Chakravarty, J. Nunoo-Mensah, A. Chang; writing of manuscript: S. Chakravarty, J. Nunoo-Mensah, A. Chang.

## References

- 1 Serpell JW, Nicholls RJ. Stercoral perforation of the colon. *Br J Surg* 1990; **77**: 1325.
- 2 Maurer CA, Renzulli P, Mazzucchelli L *et al.* Use of accurate diagnostic criteria may increase incidence of stercoral perforation of the colon. *Dis Colon Rectum* 2000; **43**: 991e8.
- 3 Berry J. Dilatation and rupture of sigmoid flexure short report. *BMJ* 1894; **1**: 301.
- 4 Grivalsky HT, Bowerman CI. Stercoraceous ulcers of the colon: relatively neglected medical and surgical problem. *JAMA* 1959; **171**: 1941e6.
- 5 Lundy JB, Gadacz TR. massive fecal impaction presenting with megarectum and perforation of a stercoral ulcer at the rectosigmoid junction. *South Med J* 2006; **99**: 525–7.
- 6 Wang S, Sutherland JC. Colonic perforation secondary to fecal impaction: report of a case. *Dis Colon Rectum* 1977; **20**: 335e6.
- 7 Abella ME, Fernandez AT. Large fecalomas. *Dis Colon Rectum* 1967; **10**: 401e4.
- 8 Hakami M, Mosavy SH, Tadaion A. Stercoral perforation of the sigmoid colon: report of two cases. *Dis Colon Rectum* 1975; **18**: 512–3.
- 9 Read NW, Abouzekry L, Read MG, Howell P, Ottewell D, Donnelly TC. Anorectal function in elderly patients with fecal impaction. *Gastroenterology* 1985; **89**: 959e66.
- 10 Huang WS, Wang CS, Hsieh CC *et al.* Management of patient with stercoral perforation of the sigmoid colon: report of five cases. *World J Gastroenterol* 2006; **12**: 500e3.
- 11 Tokunaga Y, Hata K, Nishitai R, Kaganoi J, Nanbu H, Ohsumi K. Spontaneous perforation of the rectum with possible stercoral etiology: report of a case and review of the literature. *Surg Today* 1998; **28**: 937–9.
- 12 Constantinides VA, Tekkis PP, Athanasiou T, Aziz O, Purkayastha S, Remzi FH *et al.* Primary resection with anastomosis vs. Hartmann's procedure in nonelective surgery for acute colonic diverticulitis: a systematic review. *Dis Colon Rectum* 2006; **49**: 966–81.
- 13 Perathoner A *et al.* Damage control with abdominal vacuum therapy (VAC) to manage perforated diverticulitis with advanced generalized peritonitis—a proof of concept. *Int J Colorectal Dis* 2010; **25**: 767–74.
- 14 Morris CR, Harvey IM, Stebbings WS, Hart AR. Incidence of perforated diverticulitis and risk factors for death in a UK population. *Br J Surg* 2008; **95**: 876–81.

- 15 Wu CH, Wang LJ, Wong YC *et al*. Necrotic stercoral colitis: importance of computed tomography findings. *World J Gastroenterol* 2011; **17**: 379–84.
- 16 Paran H, Butnaru G, Neufeld D, Magen A, Freund U. Enema-induced perforation of the rectum in chronically constipated patients. *Dis Colon Rectum* 1999; **42**: 1609–12.
- 17 Messina M, Ferrucci E, Meucci D, Roggi A, Lagana C. Enema-induced intestinal perforation. A case report. *Minerva Chir* 2003; **58**: 409–12.
- 18 Topcu T. Colorectal perforation due to self administered retrograde enema. *TJTES* 2003; **9**: 297–9.
- 19 Kumar P, Pearce O, Higginson A. Imaging manifestations of faecal impaction and stercoral perforation. *Clin Radiol* 2011; **66**: 83–8.
- 20 Probert CS, Emmett PM, Heaton KW. Some determinants of whole-gut transit time: a population-based study. *QJM* 1995; **88**: 311–5.
- 21 Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *PLoS Med* 2009; **6**: e1000097.
- 22 Nam JK, Kim BS, Kim KS, Moon DJ. Clinical analysis of stercoral perforation of the colon. *Korean J Gastroenterol* 2010; **55**: 46–51.
- 23 Heffernan C, Pachter HL, Megibow AJ, Macari M. Stercoral colitis leading to fatal peritonitis: CT findings. *AJR Am J Roentgenol* 2005; **184**: 1189–93.
- 24 Haddad R, Bursle G, Piper B. Stercoral perforation of the sigmoid colon. *ANZ J Surg* 2005; **75**: 244–6.
- 25 Matsuo S, Eguchi S, Azuma T *et al*. An unusual perforation of the colon: report of two cases. *Surg Today* 2002; **32**: 836–9.
- 26 Oakenful C, Lambrianides AL. Stercoral perforation of the rectum. *Emerg Med Australas* 2011; **23**: 224–7.
- 27 McHugh S, Todkari N, Moloney T, Leahy A. Stercoral perforation in a 17-year old. *Ir J Med Sci* 2011; **180**: 581–2.
- 28 Matsushita T, Yumoto Y, Fukushima K *et al*. Stercoral perforation of the colon during pregnancy. *J Obstet Gynaecol Res* 2011; **37**: 1685–8.
- 29 Lin IT, Bair MJ, Chen HL, Lee CH. An atypical and fatal case of stercoral perforation of sigmoid colon. *Int J Geront* 2011; **5**: 62–3.
- 30 Craft L, Prahlow JA. From fecal impaction to colon perforation. *Am J Nurs* 2011; **111**: 38–43.
- 31 Park J, LaBella G, McDonough S, Tender PM, Isho M, Tangen L. A stercoral sigmoid ulcer masquerading as perforated diverticulitis. *Am Surg* 2010; **76**: 346–7.
- 32 Sharma M, Agrawal A. Case report: stercoral sigmoid colonic perforation with fecal peritonitis. *Indian J Radiol Imaging* 2010; **20**: 126–8.
- 33 Hsiao TF, Chou YH. Stercoral perforation of colon: a rare but important mimicker of acute appendicitis. *Am J Emerg Med* 2010; **28**: 112.e1–2.
- 34 Ucel E, Filiz AI, Sucullu I, Ozdemir Y, Kurt Y. Fecal impaction causing perforation of the sigmoid colon: a case report. *Anatol J Clin Investig* 2009; **3**: 145–7.
- 35 Yano T, Wakabayashi H, Yachida S, Okano K, Izuishi K, Suzuki Y. A stercoral perforation of the colon with an obvious faecal mass diagnosed by computed tomography. *ANZ J Surg* 2008; **78**: 214–5.
- 36 Tsai AY, Chao ST, Yang HM. Stercoral perforation of the sigmoid colon. *Int J of Geront* 2008; **2**: 233–5.
- 37 Arana-Arri E, Cortés H, Cabriada V, Lekerika N, García-Verdugo A, Shengelia-Shapiro L. Giant faecaloma causing perforation of the rectum presented as a subcutaneous emphysema, pneumoperitoneum and pneumomediastinum: a case report. *Eur J Emerg Med* 2007; **14**: 351–3.
- 38 Tessier DJ, Harris E, Collins J, Johnson DJ. Stercoral perforation of the colon in a heroin addict. *Int J Colorectal Dis* 2002; **17**: 435–7.
- 39 Patel VG, Kalakuntia V, Forston JK, Weaver WL, Joel MD, Hammami A. Stercoral perforation of the sigmoid colon: report of a rare case and its possible association with nonsteroidal anti-inflammatory drugs. *Am Surg* 2002; **68**: 62–4.
- 40 Exadaktylos A, Papagrigoriadis S. Chronic constipation—a lethal danger in patients with systemic scleroderma. *Eur J Emerg Med* 2001; **8**: 333–5.