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An approach to complicate diverticular disease. A retrospective study in an Acute Care Service recently established

AIM: *Acute diverticulitis is a frequent disease in the Western Countries. The increase number of patients admitted in the Surgery Departments led the necessity of new Scores and Classifications in order to clarify, in absence of clear guidelines, the best treatments to offer in the different situations.*
METHODS: *A retrospective study of ninety-nine patients treated in our Department from June 2010 and March 2015.*
RESULTS: *In our study 41 patients were treated conservatively, the remaining 58 were operated, 56 laparotomic and 2 laparoscopic. 5 patients submitted US guided drainage of abscess which failed in 2 cases. 25 submitted Hartmann's Procedure (HP), 29 Primary Resection and Anastomosis (PRA), 3 Contemporary Closure of Perforated Diverticula (CC) and just 2 Laparoscopic Peritoneal Lavage and Drainage (LPL). We related different Hinchey groups and up-groups with the treatments approached, identifying patients risk factors, ASA score and complications.*
DISCUSSION: *The treatment of perforated diverticulitis is debated. CT scan is becoming an useful instrument to make a correct diagnosis. Hinchey I and II patients are preferentially treated conservatively except in cases of complicated presentations. Hinchey III and IV are necessarily treated with surgical approach. We analyze the different types of intervention currently approached.*
CONCLUSION: *We believe in PRA in Hinchey III and IV selected patients, HP is the gold standard in higher ASA scores patients but the low number of stoma reversal remains an open problem. Many studies are ongoing concerning LPL and now there are insufficient data to think of a widespread use of this technique.*

KEY WORDS: CT scan, Diverticular Disease, Hartmann's Procedure, Intr-abdominal abscess, Laparoscopic Peritoneal Lavage and Drainage (LPL), Peritonitis, Primary Resection and Anastomosis (PRAHinchey Classification, US and CT guided drainage

Background

Diverticulosis of colon is caused by a mucosa and submucosa protrusion through the muscle layer, also called pseudodiverticula, and are distinguished from the real ones since the presence of a protrusion of the three tissue layers [1]. It is a common condition in industrialized countries (range estimated between 20% and 60% of population), correlated to high fat and poor fiber diet [2], whereas in rural countries of Africa and Asia is quite uncommon. It is estimated that this disease is present in 0.2% of the worldwide population. The incidence increases with age: it is generally uncommon in people under 40 years old, it affects 5-10% of population in the fifth decades of life, 30% at 60 and over 60% over 80 without sex differences [3]. The acute principal complication, diverticulitis, affects the 1-4% until 10-25%

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Table I - *Hinchey modified classification (Hinchey EJ, Shaal PG, Richards GK: Treatment of Perforated Diverticular Disease of the colon – Adv Surg 1978; 12:85-109).*

Stage		Description
I		pericolic abscess
II	IIa	distant abscess amenable to percutaneous drainage
	IIb	complex abscess associated with/without fistula
III		generalized purulent peritonitis
IV		fecal peritonitis

Table II - *European Association for Endoscopic Surgeons (EAES)*

Grade	Clinical description	Symptoms
I	Symptomatic uncomplicated disease	Fever, crampy abdominal pain, CT evidence of diverticulitis
II	Recurrent symptomatic disease	Recurrence of above
III	Complicated disease	Hemorrhage Abscess Phlegmon Perforation Purulent and fecal peritonitis Stricture Fistula Obstruction

Table III - *Ambrosetti's CT Scan classification*

Mild diverticulitis	Severe diverticulitis
Localized sigmoid wall thickening (<5 mm)	Abscess
Inflammation of pericolic fat	Extraluminal air Extraluminal contrast

of people with diverticula in different reporting rates [4] and can imposes a serious risk to patient's life, particularly when elderly. It is associated with a large spectrum of diseases, included peridiverticular inflammation and infection, abscess, fistula, phlegmon, obstruction, stricture, bleeding or perforation with localized or generalized peritonitis [5]. Recently, evidences shown that the first episode is usually the most severe and recurrent attacks are less complicated, probably due to the increased scar tissue around the portion of colon involved in the inflammatory process [6]. The treatment can be conservative or surgical. The main classification for the clinical approach is intra-operatory and it is known as Hinchey system, which was successively modified 7 (Table I). It is based on 4 different stages of abdominal interest. Other pre-operatory classifications are European Association for Endoscopic Surgeons (EAES) (Table II), Peritonitis Severity Score (PSS) and Mannheim Peritonitis Index [44]. Patient's general conditions are evaluated in clinical treatment with ASA and similar scores. Nowadays, the widespread use of the new technologies allows radiologic pre-operatory diagnosis which improves the precision of surgical choices. In [3], Biondo et al. asserted that "in this way CT associated with the use of intravenous and oral contrast and, in ideal conditions, rectal contrast is the diagnostic method of choice. CT is useful for differential diagnosis because the tissue density, vascular ingurgitation and oedema of the mesentery are associated with diverticulitis, while the presence of an intraluminal mass and lymph nodes are more associated with the diagnosis of cancer (Level 3b evidence, Grade B recommendation)". Ambrosetti's CT scan classification for diverticulitis can be used to distinguish cases of mild and severe diverticulitis based on air and abscesses intra-abdominal diffusion (Table III). The increasing use of new technologies, surgeons experiences, intensive cares and new antibiotic approaches are changing the treatment of diverticulitis but the absence of uniformly recognized guidelines imposes a severe valuation for the single person treatment.

The aim of this study is to consider therapies, complications and outcomes of perforated diverticulitis in our continuative series of 99 patients, in according with the principal actual strategies.

Methods

This is a retrospective study on 99 patients who were admitted between June 2010 and March 2015 in Ferrara's Emergency Surgery Department of Sant'Anna University Hospital with diagnosis of acute complicated diverticular disease, including Hinchey 1-4 and ASA 1-4.

The source data includes symptoms, co-morbidities, clinical and radiological findings, mortality, operative intervention (surgical or conservative), length of stay, recovery in Intensive Care Unit, follow-up, previous, actual and discharge therapies. Exclusion criteria includes patients with inflammatory bowel disease and other mechanical obstruction which were not due to diverticulosis. We includes a patient with an history of mammary metastatic abdominal cancer, died one day after surgery. We analyzed our data with statistical Chi-square considering $p<0.05$ as significant.

Diagnosis of diverticular disease was done with clinical and radiological findings, including Rx abdomen, ultrasound and CT scan. Temperature at hospitalization, RCP, white blood cells and leukocytoses were used to confirm our hypothesis. We used the Hinchey and ASA score, according with literature.

Results

In our study, 48 men (48.5%) and 51 women (51.5%) were admitted with a male:female ratio of 1:1.06. The average age was 67 years old (range 30-94, median 69); average men's age was 60, while for women was 73.
At the time of the hospitalization 44 patients (44.5%) had a previous diagnosis of diverticula, 19 of them were males and 25 women. In 26 cases, there was also diagnosis of acute diverticulitis (59%).
Average Body Mass Index was 25.5, median 24.4, and 8 patients were obese (8.1%). Obese patients surgically treated at first hospitalization were 6 (22.8%). Differently, 8 patients were affected by diabetes (8.1%) and 6 of them were operated. Cardio vascular (CV) diseases were present in 48 patients, 20 were treated with antiplatelet therapy, 9 with anticoagulant oral drugs and 17 had allergies in anamnesis. Moreover 69 were previously surgically treated (69.7%).
At the moment of hospitalization 16 patients swallowed oral Mesalazine, in 4 cases this therapy was associated with oral antibiotic (Amixicillin-Clavulanate or Ciprofloxacin); 2 of these submitted surgery. Rifaximine therapy was taken by 16 patients (1 week/month) and in 94 cases at the moment of admission intravenous antibiotic therapy was started in order to reduce intra-abdominal infection (IAI). We used intravenous broad spectrum antibiotic therapy based on the necessity of covering gram positive, gram negative and anaerobes [46], including Amoxicillin-Clavulanate, Amikacin and Metronidazole [13].
The most common presentation was abdominal diffuse pain, followed by left inferior and right inferior abdominal elective pain. Fever was present in 22 cases and rectal bleeding and vomiting in 13. Less common were occlusion and diarrhea (Tables IV).
In our study 38 patients were treated conservatively, 5 submitted ultrasound guided drainage, which failed in 2 cases, furthermore 58 patients were operated: 37 cases within the first 24 hours and 21 after the 24th hours as a failure of non operative therapy (Fig. 1). Medium average time of surgery was 125 minutes.

Table IV - *Symptoms at admission.*

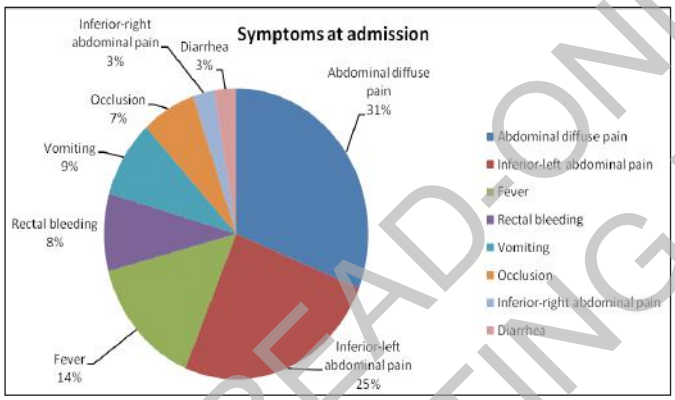


TABLE V - *Anamnesis and Physical Examination (PE) at admission.*

Temp (°C)	37,65
Differential temp. (°C)	0,92
RF (bpm)	81,78
HGB (g/dl)	12,77
WBC (x103/µl)	13,56
Neutrophyls (x103/µl)	11,28
Pre-intervention CRP (mg/dl)	11,24

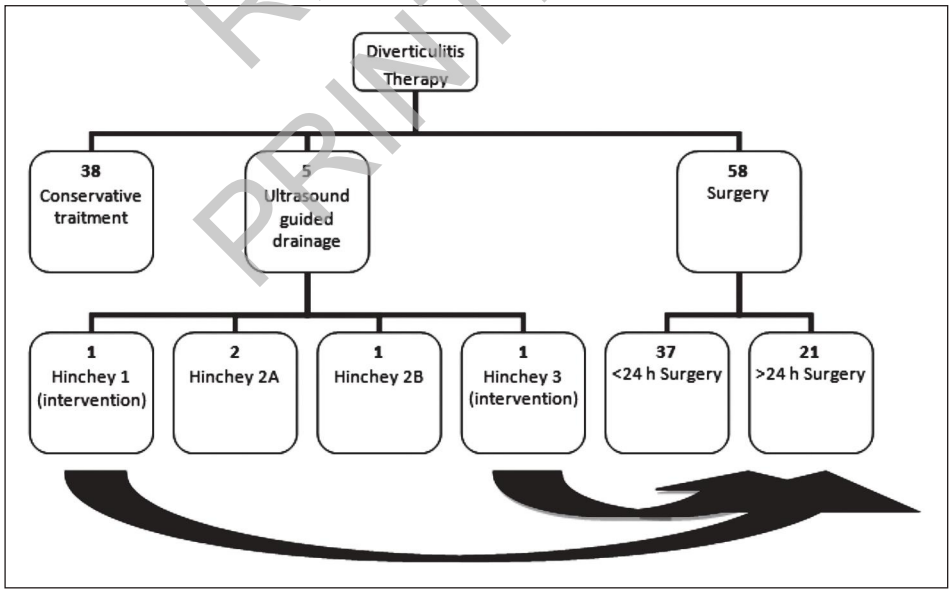


Fig. 1

TABLE VI - *Relation between CT scan and Hinchey modified score and % of cases who submitted CT diagnosis in different Hinchey.*

	Hynchey					
CT scan	1	2A	2B	3	4	Total
no	10	2	1	6	4	23
yes	33	10	6	23	4	76
Total	43	12	7	29	8	99
%	76,7	83,3	85,7	79,3	50,0	76,8

TABLE VII - *Relation between CT scan and Hinchey super groups and % of cases who submitted CT diagnosis in different groups.*

CT scan	1	2A-B	3-4	Total
no	10	3	10	23
yes	33	16	27	76
Total	43	19	37	99
%	76,7	84,2	73,0	76,8

TABLE VIII - *Relation between sepsis and Hinchey modified score and % of cases with sepsis in different Hinchey.*

	Hincey					
Sepsis	1	2A	2B	3	4	Total
no	38	7	5	9	4	63
yes	5	5	2	20	4	36
Total	43	12	7	29	8	99
%	11,6	41,7	28,6	69,0	50,0	36,4

TABLE IX - *Relation between sepsis and Hinchey super groups and % of cases with sepsis in different groups.*

Sepsis	1	2A-2B	3- 4	Total
no	38	12	13	63
yes	5	7	24	36
Total	43	19	37	99
%	11,6	36,8	64,9	36,4

TABLE X - *Relation between ASA score and Hinchey modified score.*

	Hinchey					
ASA score	1	2A	2B	3	4	Total
1	11	4	1	3	0	19
2	13	3	2	11	3	32
3	13	3	3	13	3	35
4	6	2	1	2	2	13
Total	43	12	7	29	8	99

TABLE XI - *Relation between ASA score and Hinchey super groups.*

ASA score	1	2A-2B	3- 4	Total
1	11	5	3	19
2	13	5	14	32
3	13	6	16	35
4	6	3	4	13
Total	43	19	37	99

Diagnosis was made by exploiting abdominal radiography in 18 cases, even though 7 were implemented with CT scan and 15 patients submitted ultrasound, which was not determinant in any case. In 76 cases CT scan was done. At admission, we performed blood exams with anamnesis and physical examination (Table V). Patients submitted surgery in 69.6% of cases without a previous CT scan, while only in 55.3% made surgery with CT scan ($p>0.05$).

We considered two approaches: the first follows standard modified Hinchey classification [7] while in the latter we defined three disjoint super groups depending on the standard therapy guidelines: 1 as mild where patients are usually treated with antibiotic, 2A-2B as intermediate where the treatments are conservative if pathology is confined and 3-4 as heavy where a surgical approach is applied.

CT scan was performed only in 76.7% of Hinchey 1, 83.3% in 2A and 85.7% of 2B, 79.3% in 3 and 50% in 4; even considering our classification the percentage is high in all groups but not significant ($p>0.05$) (Tables VI, VII).

The relation between Hinchey groups and super groups with sepsis was significant ($p<0.05$) (Tables VIII, IX) while the correlation with ASA score was not significant ($p>0.05$) (Tables X, XI).

Surgery was performed in 58 cases and, as previously referred, we divided patients on the time of the operation (<24 hours and >24 hours), depending on symptoms, CT scan when done, ASA score, sepsis and principal co-morbidities as diabetes and cardio-vascular diseases. Different types of operations were made: Hartmann's Procedure (HP) (25 patients), Primary Resection and Anastomosis (PRA) without ileostomy (29 patients) and Contemporary Closure of Perforated Diverticula (CC) in 3 patients. We performed Laparoscopic Peritoneal Lavage and drainage

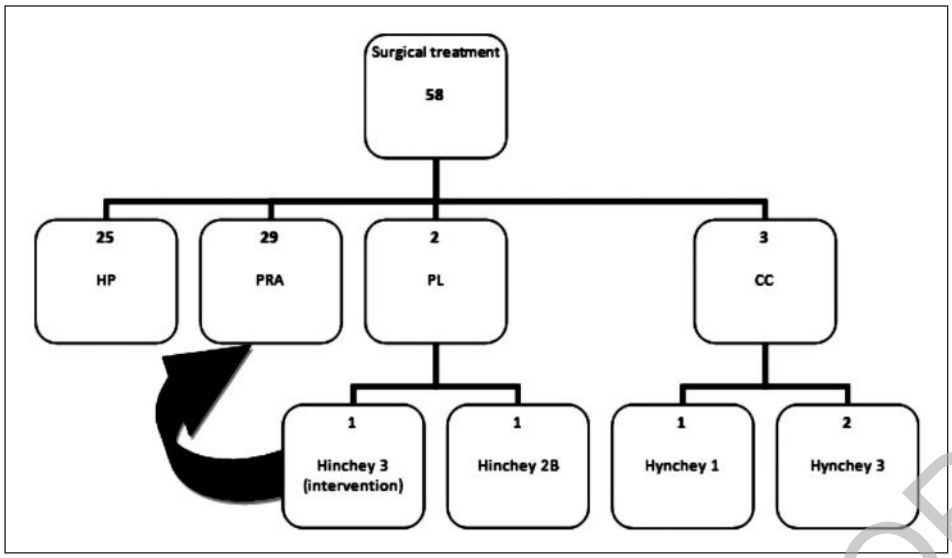


Fig. 2

(LPL) without resection in two patients (Fig. 2). The first one was discharged after 7 days in good clinical conditions, the second one was re-admitted after one week and a PRA was performed. The small number of CC and LPL without complications led us to not consider them for statistical evaluations. Complicated and re-operated LPL was considered as a PRA >24 hours.

We classified HP and PRA operations with CT diagnosis, Hinchey groups and super groups. Only 23.7% of patients which submitted HP had a previous CT scan, while 72.4% of patients who were submitted at PRA had a CT scan diagnosis. There was not a statistical significant relation ($p>0.05$) between CT scan and surgery (Tables XII, XIII).

HP and PRA were related with Hinchey groups and super groups. After the exclusion of CC and LPL, our approach is proved to be clinically significant ($p<0.05$) (Tables XIV, XV). Nine patients Hinchey 1 submitted PRA (20.9%) and just one patient HP (2.3%). The analysis made on these patients revealed that operation was approached in two cases for bleeding, in four cases for inflammatory stenosis in chronic diverticulosis, one patient was occluded and two had an inflammatory pseudo-tumor.

The relation between Hinchey and PRA is not statistically significant while analyzing the same one with HP (following our classification and considering a bias based on a small number of cases) this shown a significant correlation

Table XII - *Relation between CT scan diagnosis, patients who submitted HP and % of cases operated in both groups.*

		HP		
CT scan	no	yes	Total	**% surgery**
no	16	7	23	30,4
yes	58	18	76	23,7
Total	74	25	99	25,3

Table XIII - *Relation between CT scan diagnosis, patients who submitted PRA and % of cases operated in both groups.*

		PRA		
CT scan	no	yes	Total	% surgery
no	14	9	23	60,9
yes	56	20	76	73,7
Total	70	29	99	29,3

Table XIV - *Relation between type of treatment in different modified Hinchey and percentages.*

			Hinchey			
Treatment	**1**	**2A**	**2B**	**3**	**4**	**Total**
Conservative	32	5	3	1	0	41
HP	1	3	1	14	6	25
PRA	9	4	2	12	2	29
CC	1	0	0	2	0	3
LPL	0	0	1	0	0	1
Total	43	12	7	29	8	99
%/tot	**1**	**2A**	**2B**	**3**	**4**	**Total**
Conservative	74,4	41,7	42,9	3,4	0,0	162,4
HP	2,3	25,0	14,3	48,3	75,0	164,9
PRA	20,9	33,3	28,6	41,4	25,0	149,2
CC	2,3	0,0	0,0	6,9	0,0	9,2
LPL	0,0	0,0	14,3	0,0	0,0	14,3

Table XV - *Relation between type of treatment in different Hinchey super groups (excluding CC and LPL).*

Treatment	1	2A-2B	3 4	Total
Conservative	32	8	1	41
HP	1	4	20	25
PRA	9	6	14	29
Total	42	18	35	95

TABLE XVI - *Relation between PRA in different modified Hinchey and in super groups with percentages*

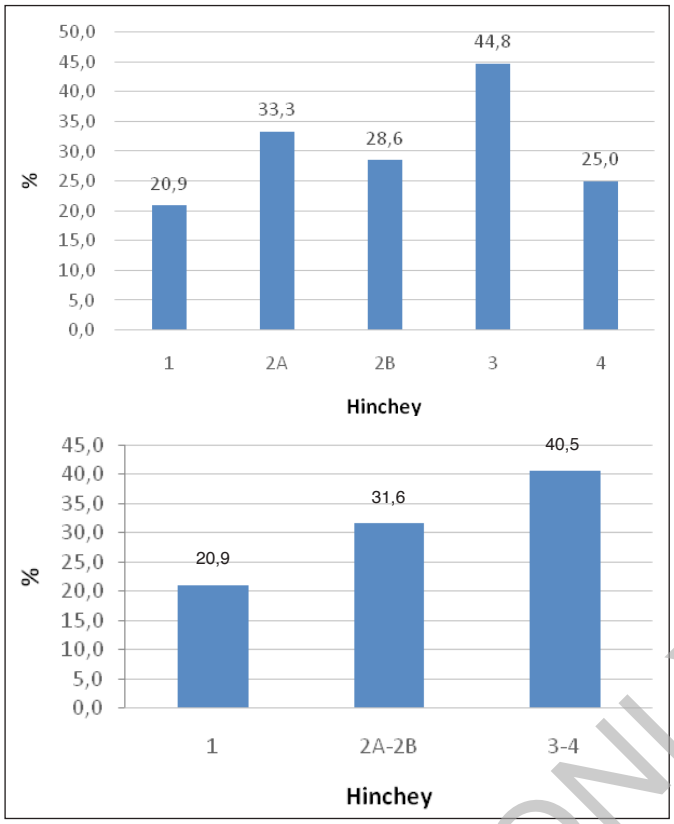
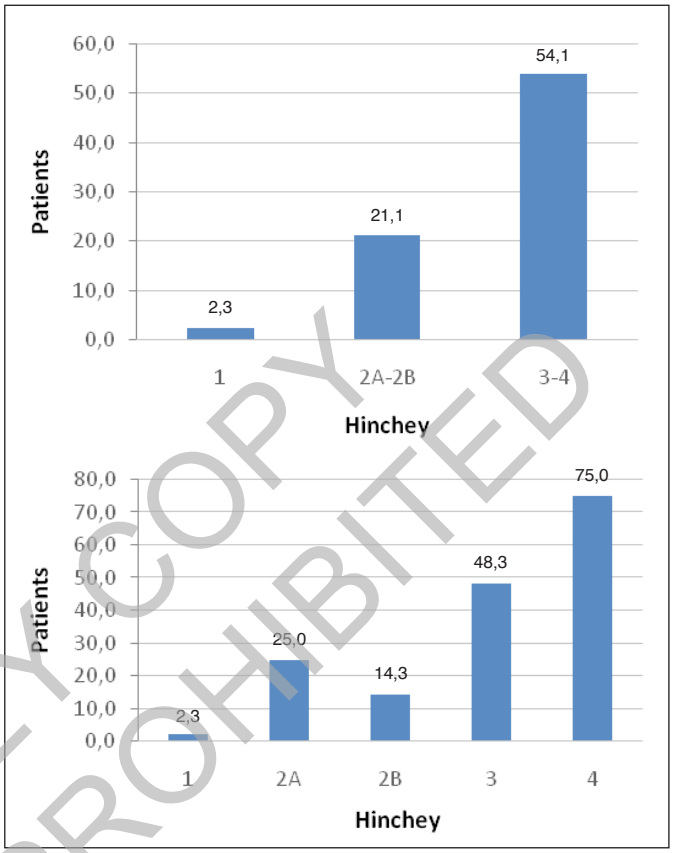


TABLE XVII - *Relation between HP in different modified Hinchey and in super groups with percentages.*



(Tables XVI, XVII). Furthermore we considered relationship between treatments and co-morbidities. The results evidenced that diabetes, cardiovascular diseases and obesity cannot be considered correlated with the type of the treatment (Tables XVIII, XVIII *bis*, XIX, XX, XXI), while on the other hand ASA is proved to be significant [27].

An important valuation is about the time past from diagnosis to surgery and between admission in our department and surgery. The time of surgery (</> 24 hours) is statistically significant in HP and PRA in both cases (Tables XXII, XXIII, XXIV).

Recovery in Intensive Care Unit (ICU) was necessary in twelve cases after surgery due to sepsis and respiratory complications. Our data shown a significant relation with type of surgery and post surgical recovery in ICU ($p<0.05$) considering the bias due to a small number of patients (Tables XXV). Relation between ASA score and recovery in ICU is not significant and the major number of cases (8 patients) was ASA 3 (Tables XXVI). Medium average stay is 5.5 days (range 1-27).

Post-operative complications were almost rare (Tables XXVII) with only one case of anastomotic stenosis in PRA (using a CEEA 31 Autosuture and building a L-T anastomosis) and ten cases of wound infections. Four patients experienced intra-abdominal infections, two of them were treated conservatively, while two made surgery (respectively in 13rd and 15th post-operative days). We also surgical treated one case of stoma dehiscence (2 days after the first operation). Unfortunately, three patients died, two of them were ASA 4 (and death occurred respectively in first and third post-operatory day), the third case was ASA 3 and died after 11 days for septic shock in ICU. All of them submitted HP.

TABLE XVIII - *Relation between diabetes and HP+PRA.*

DM	HP	PRA	Total
no	22	26	48
yes	3	3	6
Total	25	29	54

TABLE XVIII *bis* - *Relation between ASA score and different types of treatments.*

ASA	Conservative	HP	PRA	CC	LPL	Total
1	16	1	2	0	0	19
2	11	6	12	2	1	32
3	8	11	15	1	0	35
4	6	7	0	0	0	13
Total	41	25	29	3	1	99

TABLE XIX - *Relation between ASA score, Hinchey (x) and different types of treatments (y).*

ASA	Hynchey	Conservative	HP	PRA	CC	LPL	Total
1	1	11					11
	2A	3		1			4
	2B	1					1
	3	1	1	1			3
	4						0
1 Total		16	1	2			19
2	1	9		3	1		13
	2A	1	1	1			3
	2B	1				1	2
	3		4	6	1		11
	4		1	2			3
2 Total		11	6	12	2	1	32
3	1	7		6			13
	2A		1	2			3
	2B	1		2			3
	3		7	5	1		13
	4		3				3
3 Total		8	11	15	1		35
4	1	5	1				6
	2A	1	1				2
	2B		1				1
	3		2				2
	4		2				2
4 Total		6	7				13
Total		41	25	29	3	1	99

TABLE XX -*Relation between cardio-vascular (CV) diseases and HP+PRA.*

CV	HP	PRA	Total
No	11	15	26
Yes	14	15	29
Total	25	30	55

Table XXI - Relation between obesity and HP+PRA.

Obesity	HP	PRA	Total
no	22	27	49
yes	3	3	6
Total	25	30	55

In all cases of PRA we used a large caliber mechanical suture (from 28 to 31 mm). In any case of PRA, patients experienced anastomosis dehiscence.
The mean hospital stay was 12 days with a minimum of 2 and a maximum of 50.

TABLE XXII - *Relation between time past from diagnosis to surgery (in days) in different treatments. Conservative approach, as referred, had applied in 41 patients (N0).*

Time	Conservative	HP	PRA	CC	LPL	Total
N0	41					41
<1		20	13	3	1	37
1		1	3			4
2			4			4
3		1	2			3
4		1	1			2
5			1			1
7			1			1
9			1			1
10		1				1
11		1	1			2
13			2			2
Total	41	25	29	3	1	99

TABLE XXIII - *Relation between time past from diagnosis to surgery in HP+PRA. Timing is divided in <1 day or >1 day.*

Time	HP	PRA	Total
<1	20	13	33
>1	5	16	21
Total	25	29	54

TABLE XXIV - *Relation between time past from the admission in our department (in days) in different treatments. Conservative approach, as referred, had applied in 41 patients (N0).*

Time	Conservative	HP	PRA	CC	LPL	Total
N0	41					41
<1		20	13	3	1	37
1		3	3			6
2			5			5
3			1			1
4		1	1			2
5			1			1
7			1			1
9			1			1
11		1	1			2
13			1			1
14			1			1
Total	41	25	29	3	1	99

We followed our patients during time and we revealed that 12 of 25 cases which submitted HP were successively operated for stoma reversal. One patient which submitted PRA was recovered other twice in our department in the successively two years for diverticular exacerbation and now is asymptomatic. Another patient (recovered in our department with Hinchey 2B and conservatively treated)

TABLE XXV - *% between numbers of patients recovered in ICU and type of treatment.*

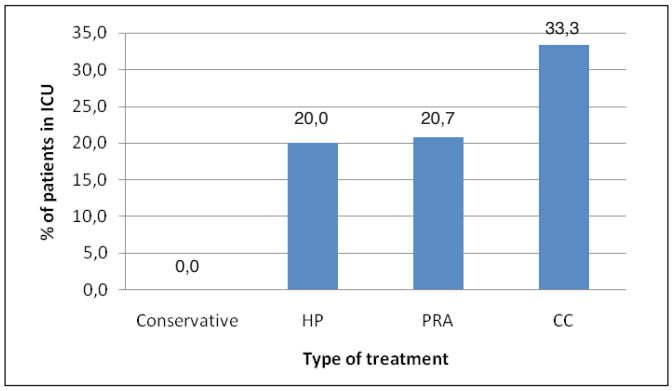


TABLE XXVI - *% between numbers of patients recovered in ICU and ASA score.*

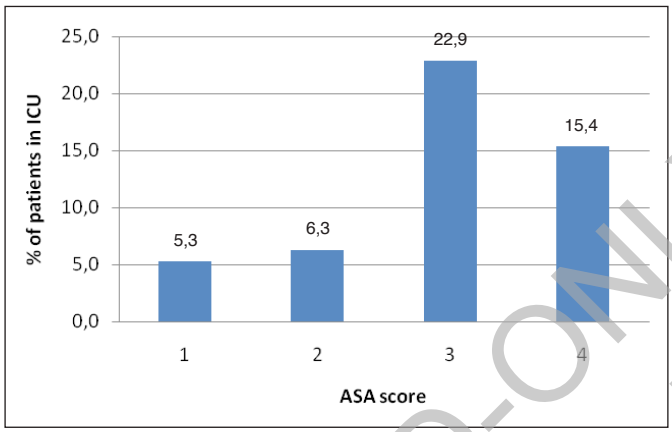
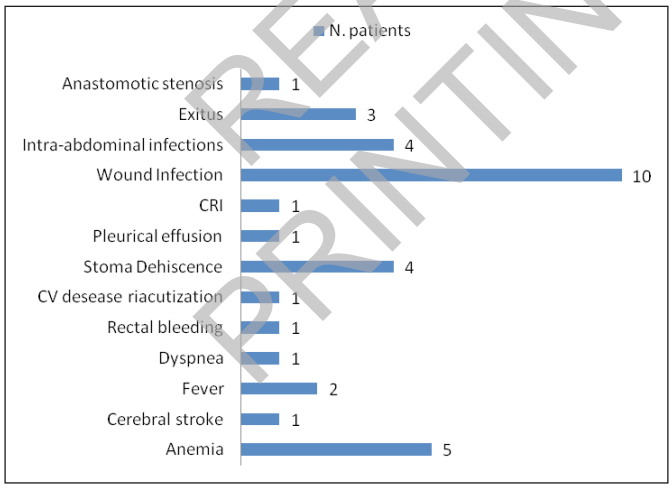


TABLE XXVII - *Post surgical complications.*



followed intervention of PRA in election and nowadays is asymptomatic. Other six patients (treated conservatively) had additional episodes of diverticulitis treated with antibiotic therapy.

Discussion

Acute perforated diverticular disease is one of the most common gastrointestinal diagnosis in patients recovered in emergency departments in the Western world. This problem is correlated with different factors, the majors are a lake of adequate fiber intake [5-13] and sedentary life [8]. Social costs amount at about 2.1 $ billion in USA [8-14] only for urgent treatments. About 30% of the population older than 45 years old and 60% older than 75 is affected by diverticulosis. It is estimated that 25% of them will envelope during their life at least one episode of acute diverticulitis and about half will be recovered [10-11]. The increasing use of CT scan and ultrasound in diagnosis of diverticular disease had recently completed the classical approach based on clinical evaluation, laboratory tests, conventional radiography and colonscopic findings [9]; attendance treatment is considered the best choice in low inflammatory situations even if nowadays literature refers that 15-30% of patients admitted in hospital require a laparoscopy or a laparotomy 1. Some authors, as Poletti et al. in 9 referred that CT scan is useful not only to establish a diagnosis of diverticulitis but rather to identify those patients who have the risk to develop complications or recurrences after the first episode. Abscesses formation and extra-intestinal free gas are the best criteria considered. In our evaluation CT scan was executed only for 76.7% of patients, generally avoiding it in patients with the lowest and the highest Hinchey; this because in our opinion clinic, laboratory findings, abdominal radiography and ultrasound were enough to make diagnosis. In our experience, supported by literature, CT scan is useful to decide for a conservative treatment (at the beginning) and eventually an elective/urgent surgery in patients with mild-moderate grade of inflammation [3-6-9]. The principal considerations must not exclude different groups of people, ASA score, anamnesis and co-morbidities. There is no doubt that free perforations, stenosis, occlusions, fistulae or bleeding are necessarily related to early intervention but, as Holmer et al. showed in [12], the problem remains whether the phlegmonous form of diverticulitis should also be regarded as a complicated stage and in these case knowing when CT-detected wall abscess or phlegmon is reflected in histological examination and changes related in conservative treatments [12] becomes helpful.

During the admitting, in conditions of urgency or emergency, our Department works with surgeons of different teams but after 24 hours after recovery, we decide therapies solely; hence time occurred from diagnosis/admission to our Department and time of eventual surgical treatment is clinically significant. Conservative approach has been applied in many cases of Hinchey I and II, according to literature [13]. We considered ultrasound guided drainage as a conservative treatment applied just on 5 patients (4 with unique abscess lower than 5 cm and one case Hinchey III with abscess greater than 5 cm). In three cases, patients were discharged without surgical interven-

tion (and are now in good clinical conditions), while two submitted PRA. In literature CT or US guided placing of intra-abdominal drainage for abscesses is indicated in patients Hinchey II and some cases Hinchey III [15-16]. This treatment has some advantages like avoiding urgent intervention and the risk of a stoma. It was resolutive in 70-90% of patients [16]. Some authors have recently referred that elective surgery after a successful percutaneous drainage is not mandatory even though nowadays there are too few papers supporting this hypothesis [17].

Generalized peritonitis are treated by surgical intervention but currently the choice of the approach varies greatly around the world, related to the single surgeon's expertise about laparoscopy, the feasibility of different techniques during the night hours and the clinical history of patients [18]. During the last decades the gold standard in treatment has changed several times [19]. In many surgeons opinions, HP remains the favorite option, especially in III and IV Hinchey grades [20] but the advances in sepsis management have led to an increasing interest in PRA either with or without contemporary defunctioning stoma [21-23]. Outcomes remain suboptimal, with morbidity and mortality rates of 25% and 10% respectively for HP and 50-20% for PRA [21-24]. Actually the LADIES Trial, a multicentre randomised, parallel-group open label trial in Belgium, Netherlands and Italy, recently splitted and aborted in the LOLA branch, with its DIVA branch, is comparing the validity of HP versus PRA in Hinchey IV patients [25-26] in order to identify the best procedure choice.

Some authors proposed a new strategy in emergent treatment of perforated Hinchey III and IV patients: the damage control surgery [27-35]. It is performed in patients with septic shock defined as hemodynamically unstable with necessity of intensive care support (amine). It is even debated whether making colostomy [28], a limited colonic inflamed resection [29,30] with staplers or temporary abdominal VAC [31,32]. Despite we have never applied and tested this approach and the lack of papers supporting it, we think it could be a promising strategy.

In our experience we approached HP in 14 patients Hinchey III (48.3%) and 6 patients (75%) Hinchey IV. Twelve patients Hinchey III (41.4%) and two Hinchey IV (25%) submitted PRA. CC was detected in only three cases. Protective stoma was not done in any case of PRA because resection and anastomosis were intra-peritoneal and considered at low-risk of dehiscence.

LPL was done only twice: in one case patient was discharged after 5 days in good clinical conditions, in the other one submitted PRA after 24 hours. Literature is debated about this new argument and surgical approach. LOLA-split, the laparoscopic versus sigmoidectomy approach of the LADIES Trial [25-26], was prematurely closed for an increased event rate in the lavage group. This section of the study was applied on Hinchey III patients only. Actually another Scandinavian randomized trial, called DILALA, is comparing LPL and HP in Hinchey III patients and preliminary results appears encouraging [33-34]. Independently from the two ongoing trials, many authors are debating the feasibility, the grade and the possibility of this approach, whether it could be transitory or effective and the possible interested Hinchey [4,24,36-38,45].

In our opinions, the results are partial and conflicting with each others. The two patients treated with this approach had a complication rate of 50% but, of course, the number is too small for thinking to mature an opinion. Currently we feel we can not apply LPL, as a result, on Hinchey III patients reserving it, when appropriate, on Hinchey IIA and IIB, for which, however, the US or CT guided percutaneous drainage appears a cleaner solution. Therefore we expect the conclusion of the ongoing clinical trials.

Complications in emergent-urgent surgery are quite common and we approached Clavien-Dindo Classification [39] evaluating minor and major complications in our Department. We never experienced dehiscence and just three patients dead. Many scores and the lack of consensus in defining grade and time of adverse events often create problems in classification. We think the new AAST (American Association for the Surgery of Trauma) Grading System for Emergent General Surgery [40], actually ahead of print, could be useful in future. It is a multicenter (13 centers) retrospective study on 1105 patients (one death) valuating the relationships between AAST grade, clinical events, age comorbidities and physiological status at the time of admission. Surely, identification of patients who are at risk to develop complicated diverticulitis becomes of foremost importance and must be taken in consideration during management of diverticular disease [5,42,43].

Follow up at 6 moths and at one year shown that stoma reversal was done in 12 of 25 patients as referred in literature without complications [19,41,45]. All 96 considered patients are now in good clinical conditions.

Conclusion

The treatment of colonic complicated diverticulosis is nowadays debated. Some clinical trials are ongoing and there are more different options than in the past. Hinchey I and II can be treated conservatively and US-CT scan drainage is now a good (but probably only just a bridge to elective surgery) treatment. We believe in PRA in Hinchey III and IV patients, but HP's procedure remains safer in co-morbidities and higher ASA. LPL is not an actually applicable choice for us. In the coming years many promising research in progress will serve to reduce the doubts that now surgeons are facing with this disease.

The purpose of this article is to demonstrate the results from our experience as an inspiration to improve, starting from the mortality rate up to the number of intervention of closure of the stoma.

Riassunto

Obiettivo: La patologia diverticolare acuta è attualmente molto frequente nei paesi occidentalizzati. L'aumento costante del numero dei pazienti ricoverati nelle Unità operative di Chirurgia per il trattamento d'Urgenza sta portando alla necessità di individuare nuove Classificazioni e Scores per il corretto e razionale trattamento medico e chirurgico, anche in relazione all'assenza di linee guida ufficiali.

Metodi: Si tratta di uno studio retrospettivo che prende in considerazione tutti i pazienti ricoverati presso il nostro Dipartimento, con diagnosi di diverticolite acuta perforata, nel periodo di tempo compreso tra giugno 2010 e marzo 2015.

Risultati: Nel nostro studio 41 pazienti sono stati trattati conservativamente. I restanti 58 pazienti sono stati sottoposti ad intervento chirurgico: 25 con procedura di Hartmann, 29 con intervento di resezione e consensuale confezionamento di anastomosi senza ileostomia di protezione, 3 pazienti sono stati sottoposti a riparazione diretta della lesione diverticolare (rafia) e 2 a lavaggio peritoneale laparoscopico con posizionamento di drenaggio. Di questi ultimi due pazienti, uno è stato dimesso dopo 7 giorni in buone condizioni cliniche generali ed uno è stato poi sottoposto a resezione e confezionamento di anastomosi. Abbiamo correlato i pazienti suddividendoli nei vari gruppi Hinchey modificati e sovragruppi, associandoli ai diversi trattamenti, identificandone i fattori di rischio, l'ASA score e le complicanze.

Discussione: L'utilizzo di nuove tecnologie, come la TC, si sta rivelando molto utile per la diagnosi delle diverticoliti perforate. Il loro trattamento è invece ancora piuttosto dibattuto: per i pazienti Hinchey I e II è, tendenzialmente conservativo, a meno di fattori concomitanti che ne pregiudichino l'andamento clinico. I pazienti Hinchey III e IV sono di competenza chirurgica. Il trattamento preferenziale è la procedura di Hartmann ma negli ultimi anni la resezione con consensuale anastomosi sta diventando una valida alternativa, specie in pazienti selezionati. Per quanto concerne il lavaggio peritoneale laparoscopico, i Trials sono ancora in corso ed i risultati preliminari attualmente contrastanti.

Conclusioni: A nostro giudizio la resezione e consensuale anastomosi è il trattamento d'elezione in pazienti selezionati e con ASA score bassi, mentre riserviamo l'intervento secondo Hartmann per i casi associati a maggiori fattori di rischio, anche se il problema del successivo reintervento per ricanalizzazione e chiusura di colostomia rimane dibattuto. Per quanto concerne il lavagio peritoneale laparoscopico, attendiamo i risultati dei Trials clinici ma al momento non ci sembra una procedura applicabile su larga scala.

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