



MANAGEMENT OF POST-TRAUMATIC INTESTINAL PERFORATIONS: PRACTICE AND RECOMMENDATIONS

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ARTICLE INFO

Article History:

Received 12th October, 2020

Received in revised form 23rd

November, 2020

Accepted 7th December, 2020

Published online 28th January, 2021

Key words:

Intestinal perforation; Trauma;
Madagascar

ABSTRACT

Introduction: The management of post-traumatic intestinal perforations is sometimes limited in a low-income country such as Madagascar. Our objective is to evaluate the management of post-traumatic intestinal perforations.

Patients and method: Our case series was retrospective as part of a five-year observational, descriptive, monocentric study at the Joseph Ravoahangy Andrianavalona Antananarivo Hospital Center. The sampling was exhaustive and the parameters studied included the diagnostic and therapeutic means undertaken, as well as the characteristics of the lesions found and their evolution.

Results: Eighty-eight patients had bowel perforations due to abdominal contusion (29.54%) and a penetrating wound (70.45%). The presence of abdominal pain (100%), pneumoperitoneum (62.5%), and fluid effusion (68.18%) were diagnostic. Ileal lesions were found in 73.86%. Direct sutures were the most common surgical procedure performed for single punctures (76.92%) and hail punctures (73.84%). For colonic perforations, 56.52% had benefited from resection. The complication rate was 5.7% versus 7.9% for sutures versus resections ($p=0.0005$).

Conclusion: In the absence of diagnostic and therapeutic laparoscopy, the diagnosis of post-traumatic intestinal perforation is made by a careful clinical examination combined with an unprepared X-ray of the abdomen and ultrasound. Our therapeutic conduits followed the recommendations for obtaining good results.

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INTRODUCTION

Post-traumatic intestinal perforation is the cause of morbidity (47.82%) and significant post-operative mortality in digestive surgery (13.04%) [1,2]. Although diagnosis is easier following penetrating wounds, it is problematic in cases of abdominal contusions with a prevalence of 5 to 15% [3]. In developing countries, management is complicated because of the precarious diagnostic and therapeutic means. Our objective is to evaluate the management of post-traumatic intestinal perforations at the Joseph Ravoahangy Andrianavalona University Hospital Center of Antananarivo (CHU/JRA) in order to establish a protocol adapted to our situation taking into account the recommendations.

Patients and method

We had carried out a retrospective study on intestinal perforations. Patients aged 18 years and over, admitted to the visceral surgery services of the CHU JRA of Antananarivo over a period of five years for intestinal perforation in a traumatic context had been included in the study. Patients with intestinal perforation of typical origin or with Chronic Inflammatory Bowel Disease (IBD) were not included. Iatrogenic perforations following endoscopic or surgical

procedures were excluded. The following variables were studied: age, gender, type of trauma, delay between the trauma and the beginning of the treatment, clinical and radiographic signs, characteristics of the lesions, type of treatment, post operative period. The data were expressed as a percentage for qualitative variables and as a mean plus or minus standard deviation for quantitative variables. Comparisons were analyzed using the Chi-2 test. The difference was statistically significant when $p<0.05$.

RESULTS

In five years, 88 patients had bowel perforations with a prevalence of 19.6%. There was a clear male predominance, with 81 men versus 7 women, for a sex ratio of 11.5. Young adults were the most affected subjects with a mean age of 30.31 ± 9.72 years and extremities ranging from 15 to 59 years. Trauma was open in 70.45% ($n=62$) and closed in 26% ($n=26$). In our study, perforations were located in the ileum (47%), colon (27%), jejunum (23%), duodenum (3%). Intestinal perforation was single in 52 patients (59.1%) and multiple in 36 patients (40.9%). The presence of abdominal pain (100%), pneumoperitoneum (62.5%) and fluid effusion

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(68.18%) were diagnostic. Only fifteen patients had been able to benefit from abdominal-pelvic CT scans.

In our study, direct suturing was sufficient to treat intestinal perforation in 58 patients (65.9%). Direct sutures were not significantly the most performed regardless of the type of trauma ($p=0.25$) (Table I).

Table I Relationship between type of trauma and type of surgery

Type of trauma	Direct suturen (%)	Resectionn (%)
Penetrating wounds	39 (67,24%)	23 (76,67%)
Contusions	19 (32,76%)	7 (23,33%)
Total	58 (100%)	30 (100%)

p -value = 0,25

Direct suture is the most common surgery performed in case of hail perforation (Table II).

Table II Relationship between the type of surgery and the location of the perforations

	Small hail n (%)	Colon n (%)
Direct suture	48 (73,84%)	10 (43,47%)
Resection	17 (26,15%)	13 (56,52%)
Total	65 (100%)	23 (100%)

The influence of the number of intestinal perforations on the type of surgery was significant ($p=0.0005$) (Table III).

Table III Relationship between type of surgery and number of intestinal perforations

	One perforation	More than two perforations
Direct suture	40 (76,92%)	18 (50%)
Resection	12 (23,08%)	18 (50%)
Total	52 (100%)	36 (100%)

p -value = 0,0005

In our study, we did not find any fistula or revision surgery. The time to management was in the majority of cases less than six hours, but this was not statistically significant in relation to progression ($p=0.49$). Complications were Clavien-Dindo type II in eight patients and type I in five patients. Direct sutures had a complication rate of 5.7% versus 7.9% for resections.

DISCUSSION

In the literature, penetrating wounds were the most frequent cause of post-traumatic intestinal perforations. In fact, Nadir A *et al* found 131 cases of intestinal perforation, including 77 cases (58.78%) due to penetrating wounds of the abdomen and 54 cases (41.22%) due to abdominal contusions [2,4]. We compared the clinical symptomatology of intestinal perforations during penetrating wounds and abdominal contusions. We found that signs of peritoneal irritation were present in eighty patients. According to Robbs A *et al*, there is a delay in the presentation and diagnosis of bowel perforation after closed abdominal trauma [5]. Hyang *et al*. stated that the clinical manifestations of traumatic GI tract injuries are poor in the initial stage, particularly in the small intestine, due to the low pH and lower bacterial content of the digestive tract, conditions that explain less peritoneal irritation [6]. Our results did not agree with those in the literature, probably due to delayed management of intestinal perforations secondary to abdominal contusions. Unprepared abdominal radiography and abdominal ultrasound were routinely requested; CT scan was not available to everyone. David J *et al* reported that the main interest of CT scanning lies in its ability to reveal damage to the peritoneal barrier and to accurately diagnose intra-abdominal lesions, especially hail. Its sensitivity is 97% and its

specificity is 98% [7]. According to Germain M *et al.*, CT is a reliable, sensitive and high-performance examination for the diagnosis of traumatic perforation in hail [8]. According to Hoffmann C *et al.*, FAST ultrasound (Focus Assessment with Sonography for Trauma) is widely used if the patient's condition is unstable [9,10]. It is highly sensitive for the detection of liquid or even gaseous effusions and can be used as early as the pre-hospital phase. None of our patients had undergone laparoscopy. Laparoscopy performed without delay in a patient with a stable hemodynamic state often confirms the diagnosis of traumatic hail rupture. However, it was less than 50% sensitive in the diagnosis of hollow organ damage [6, 11, 12]. When intestinal perforation is suspected, exploratory laparotomy, in the absence of laparoscopy, is necessary. Nevertheless, we found a high white laparotomy rate of 25.29% in our study among traumatized patients of the abdomen with suspected hollow organ perforation. The small intestine was the preferred site of post-traumatic intestinal perforation in our study and in particular the ileum, as there were 47 (47%) cases of ileal perforation. Several studies on post-traumatic intestinal perforations had already shown that the small intestine was the most frequent site of perforation [4, 7, 8]. We found that intestinal perforations were more frequent in penetrating wounds of the abdomen than in abdominal contusions. However, the influence of the type of trauma on the site of perforation was statistically significant ($p=0.03$). Wade T *et al* confirmed that digestive wounds occur more often during penetrating abdominal wounds [8]. In our study, direct suturing was the most common type of treatment used to treat intestinal perforation. Penetrative abdominal wounds predispose to a risk of resection and the influence of the type of trauma on the type of treatment was not statistically significant ($p=0.25$). This frequency could be explained by the fact that there are more multiple perforations but also colic lesions were more numerous than in abdominal contusions. Indeed, some studies on abdominal contusions had found single perforations in the majority of cases, unlike ballistic trauma [2, 3]. According to the literature and proven by our study, a direct suture is generally sufficient to repair a single small intestinal perforation. However, multiple perforations and gangrene of mesenteric injuries usually require resection-anastomosis. In our study, the influence of the type of treatment on the number of perforations was statistically significant with $p=0.0005$. Colonic lesions, especially those of the left colon, may require ostomy construction [3]. Ileostomy is performed on lesions seen late or during peritoneal contamination [2]. We identified twelve complications (13.64%) during our study. Infectious complications were the most frequent and we had one case of death. Sule A *et al* had identified 3 complications (13.04%) out of 23 patients included in their study [2] and Chirdan L *et al* had recovered a complication rate of 21.05% [4]. Thus, we obtained a good result compared to what is observed in other studies. However, the complication rate remains high both in our study and those carried out by the other authors.

CONCLUSION

Insufficient diagnostic means lead either to a delay in diagnosis or to white laparotomies. In the absence of diagnostic and therapeutic laparoscopy, the diagnosis of post-traumatic intestinal perforation is made by a careful clinical examination combined with an unprepared X-ray of the abdomen and ultrasound. Our therapeutic conduits followed the recommendations, allowing us to obtain good results.

Acknowledgments

We also thanks the personal assistance.

Funding

This study has no grants or financial support.

Conflict of interest

The authors contributed equally to the study.

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How to cite this article:

Rajaonarivony T *et al* (2021) 'Management of Post-Traumatic Intestinal Perforations: Practice and Recommendations', *International Journal of Current Medical and Pharmaceutical Research*, 07(01), pp 5482-5484.
