

# Acute Generalized Peritonitis in a Peripheral Hospital Centre in Benin: Can It Be Managed by a Local General Practitioner?

**Semevo Romaric TOBOME**

Atacora Departmental Hospital Center

**Adrien Montcho HODONOU**

Universite de Parakou Faculte de Medecine

**Anifa WAHIDE**

Atacora Departmental Hospital Center

**Kadiri Alassan BOUKARI**

Atacora Departmental Hospital Center

**Moïse KPONOU**

Atacora Departmental Hospital Center

**Christelle Hermione Elvire BANKOLE'**

Centre de Sante Communal de Natitingou

**Roberto CARONNA** (✉ [roberto.caronna@uniroma1.it](mailto:roberto.caronna@uniroma1.it))

Universita degli Studi di Roma La Sapienza Facolta di Medicina e Odontoiatria <https://orcid.org/0000-0002-4683-2756>

---

## Research article

**Keywords:** peritonitis, typhic perforation, intestinal perforation, emergency laparotomy, developing countries

**Posted Date:** May 15th, 2020

**DOI:** <https://doi.org/10.21203/rs.3.rs-28536/v1>

**License:** © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

---

# Abstract

**Background:** Acute generalized peritonitis is a highly lethal and unfortunately common disease in developing countries. Moreover, lack of specialists and their concentration in main towns, expose the patients to a high but avoidable risk of complications or death. We report the experience of a peripheral hospital in Benin not equipped with specialized surgeons.

**Methods:** This is a descriptive study including patients operated for acute generalized peritonitis from March 1<sup>st</sup> 2018 to November 30<sup>th</sup> 2019 at the Atacora Departmental Hospital Centre, Benin. This hospital lacks a CT scan and an intensive care unit. Most of the surgical activity is performed by a General Practitioner with previous surgical training (but no surgical specialization). For the purpose of the study, we evaluated the following patients' data: age, gender, cause of peritonitis, surgical procedures, postoperative outcome and hospital stay.

**Results:** A total of 63 patients were selected, with a mean age of 23.2 yrs and a sex ratio of 1.5. The mean operative delay was 26 hours (range 6 - 92 hours). An ileal "typhic" perforation was found in 40 patients (63.5%) and 35 of them (87.5%) could benefit of primary repair without bowel resection. 73% of surgical procedures were performed by the general practitioner. Morbidity was 34.9%, mainly represented by surgical site infections. The overall mortality was 14.3%. The average postoperative hospital stay was 12 days (range 11 - 82 days). Patients operated by the General Practitioner were in line with the overall results (morbidity 32.6%, mortality 13.0% and average postoperative hospital stay 11 days, range 1 - 58 days).

**Conclusion:** Acute generalized peritonitis requires urgent management and can be effectively carried out, in a limited resources context, by a general practitioner with surgical skills. The respect of hygiene rules, the availability of qualified human and structural resources as well as the effectiveness of the care costs coverage by the Government are essential to reduce the peritonitis burden in Benin.

## Introduction

Due to etiological heterogeneity, acute generalized peritonitis remains a frequent abdominal emergency with high lethality. Its prognosis depends on several factors including patient's condition, onset, cause and treatment quality/promptness [1]. In sub-Saharan Africa, most patients look at modern medical care only after traditional treatment failure. Moreover, lack of financial resources entails patient's hospitalization delay, often in critical condition, and lack of specialized medical doctors makes the surgical management late or unfeasible. Most of reported etiologies in this African region are non-traumatic ileal perforations, often of typhic origin because of the unavailability of clean water and related high risk of salmonella infections.

We report the results of our experience in a peripheral Hospital Centre in Benin (sub-Saharan Africa), addressing etiological and therapeutic aspects.

## Materials And Methods

This study was carried out at the *Centre Hospitalier Départemental de l'Atacora* (CHD-A), Benin. This is the reference hospital of the northern part of Western Benin (891,528 inhabitants) [2] and it is located in Natitingou, the Department's main town. Since July 2019 this hospital has undergone a redefinition of its activities becoming a general hospital. Unfortunately, CHD-A does not have an intensive care unit, a CT scan or a microbiology laboratory for peritoneal fluid sampling examination after laparotomy.

This study is observational, descriptive and analytical, with retrospective data collection from March 1st 2018 to November 30th 2019 (21 months). Patients admitted to CHD-A for abdominal pain underwent clinical examination, standard abdominal radiography and basic laboratory exams (blood count and grouping).

All patients received a perioperative "stabilization", essentially involving hydroelectrolytic imbalance and hemodynamic deficiencies correction, empirical broad-spectrum antibiotics infusion and analgesics.

All patients with confirmed acute generalized peritonitis at laparotomy were included, while patients who died before laparotomy were excluded from the study. Depending on patients' clinical conditions, a locoregional anesthesia (spinal anesthesia supplemented by general anesthesia with mask), or a general anesthesia with oro-tracheal intubation were performed before laparotomy.

The patients' variables considered in the study included: age, gender, surgery delay (time between admission to CHD-A and incision in the operating room), ASA Score (American Society of Anesthesiologists Score) [3], cause of peritonitis disclosed at laparotomy, type of operation, post-operative outcome and length of hospitalization.

The majority of laparotomies were carried out by a permanent Medical General Practitioner graduated since three years, with surgical skills acquired by attending African and European hospitals, but not yet admitted to any surgical specialization. Two General Surgeons were occasionally present and performed the others operations.

Each patient discharged was systematically reviewed 7–10 day later and all were monitored for 30 days after discharge. Post-operative complications were recorded according to the Clavien-Dindo classification [4].

Data collection technique was standardized: patient's list and inclusion criteria were obtained from the operative report register and from the anesthesiology chart. Therefore, patients' records were retrieved and the collection forms filled in.

Quantitative data were expressed as averages  $\pm$  standard deviation and qualitative data as frequency and percentage. Overall survival (OS) was defined as the interval between the date of surgery and the date of last follow-up or death.

# Results

Sixty-three patients were included and operated for acute generalized peritonitis (AGP).

In all cases, AGP preoperative suspicion was confirmed intraoperatively (no exploratory laparotomies).

The epidemiological variables are reported in Table 1.

Table 1  
Patient characteristics according to epidemiological variables

Variable	Numbers of patients	Percentage (%)
<b>Gender</b>		
Male	38	60,3
Female	25	39,7
<b>Age range (years)</b>		
2–10	17	27,0
10–20	16	25,4
20–30	11	17,4
30–40	8	12,7
40–50	4	6,4
50–60	3	4,7
≥ 60	4	6,4
<b>Operating time delay range (hours)</b>		
< 24	19	30,2
24–48	32	50,8
48–72	5	7,9
<b>Preoperative anemia*</b>		
Yes	22	34,9
Non	41	65,1
<b>Score ASA</b>		
3	47	74,6
4	16	25,4
*defined as Hemoglobin < 8 g/dL		

There were 38 males (60.3%) and 25 females (39.7%), sex ratio of 1.5. The mean age of the patients was  $23.2 \pm 17.7$  years (range 2–75 years). 75% of patients were less than 33 years old.

Surgery delay was 26 hours (range 6–92 hours). Nineteen patients (30.2%) were operated within 24 hours and 32 (50.8%) were operated between 24 and 48 hours after admission.

On admission, 22 patients (34.9%) had hemoglobin level less than 8 g/dL and all received pre- or intraoperative red cell transfusions. 16 patients (25.4%) had a severe clinical condition with an ASA Score of 4 (Table 1)

AGPs causes are presented in Table 2. There were 40 peritonitis (63.5%) by non-traumatic ileal perforation (on the anti-mesenteric rim with mesenteric nodes) presumably of typhic origin.

Table 2  
Peritonitis etiology

Variable	N. of patients	Percentage (%)
<b>Causes of peritonitis</b>		
Ileal perforation	40	63,5
Gastric - duodenal ulcer perforation	9	14,3
Appendicular	5	7,9
Cryptogenetic	5	7,9
Gynecological	1	1,6
Post-operative	1	1,6
Colonic necrosis by volvulus	1	1,6
Ileal necrosis by hernia strangulation	1	1,6

Anesthesiological and surgical procedures are in Table 3.

Table 3  
Perioperative and postoperative data

Variable	N. of patients	Percentage (%)
<b>Type of anesthesia</b>		
General anesthesia + Oro-Tracheal Intubation	33	52,4
Spinal anesthesia + Sedation	30	47,6
<b>Main operating procedures</b>		
Simple ileal suture	35	55,6
Antro-pyloroplasty	9	14,3
Washing - Drainage	6	9,5
Appendectomy	5	7,9
Ileal resection - ileo-ileal anastomosis	4	6,3
Wedge ileal resection - Ileal suture	2	3,2
Right hemicolectomy – ileocolic anastomosis	1	1,6
Unilateral adnexectomy	1	1,6
<b>Post-operative complication</b>		
Yes	22	34,9
No	41	65,1
<b>Outcome</b>		
Discharge	54	85,7
Deaths	09	14,3

In 73.0% of cases the operation was performed by the General Practitioner (46 cases / 63) while the remaining 17 patients (27.0%) were operated by a skilled General Surgeon.

In patients with ileal perforation of presumed typhic origin, a primary repair without anastomosis was the main performed surgical procedure (55.6%) (Fig. 1). All patients received a peritoneal lavage and drainage of the peritoneal cavity: 3 drains in 34 patients (54.0%), 2 drains in 21 patients (33.3%) and 1 drain in 8 patients (12.7%). The mean duration of surgery was  $61 \pm 19$  minutes (range 45–130 minutes). Time of drain removal was  $6 \pm 2$  days (range 1–15 days).

Post-operative outcomes were unremarkable and uncomplicated in 41 patients (65.1%), while morbidity was 34.9%. Few patients presented several complications. Surgical complications according to Clavien-Dindo are described in Table 4.

Table 4  
Distribution of postoperative complications according to Clavien-Dindo

Type of complications		Percentage (%)
Grade I	Incisional surgical site infection	19 (30,1)
Grade II	Undernutrition requiring parenteral nutrition	7 (11,1)
Grade III	Fecaloid fistula	3 (4,8)
Grade IVa	Acute pulmonary edema	1 (1,6)
Grade IVb	Septic shock	4 (6,3)

The average post-operative hospital stay was 12 days (range 11 hours – 82 days) and the overall mortality was 14.3%.

In the subgroup of patients operated by the General Practitioner (46 cases / 63), morbidity was 32.6%, mortality 13.0% and the average postoperative hospital stay was 11 days with (range 1–58 days).

## Discussion

Diagnosis of AGPs in poor settings is mainly based on physical examination with few basic imaging and laboratory data. With remarkable frequency, AGPs are the most important abdominal surgical emergency at CHD-A, as confirmed in a study conducted in a district hospital in Northern Benin [5]. The same emerged other studies from Sub-Saharan Africa countries, notably Togo, Burkina Faso and Niger [6, 7, 8]. AGPs are often the consequence of unfavorable evolution of a disease not or badly managed. Primary and secondary prevention is therefore crucial to avoid the occurrence of AGP and community health policies need to pay more attention to this issue. Patients with AGP were frequently admitted to CHD-A in a serious clinical condition (ASA Score 3 or 4). This factor also affects prognosis of AGPs in our context.

All ages were affected, but the younger patients (range 2–40 years) were the most affected in our series (82.5%). The average age in our series (23 years) is similar to those reported by studies carried out in Burkina Faso [7], Togo [6] and the Central African Republic [9] (24, 25 and 23 years respectively). All these studies confirmed male predominance [7, 6, 9, 5].

The most common cause of AGP was non-traumatic ileal perforation of presumed typhic origin. Indeed, poor hygiene conditions and troubles of access to potable water, especially in rural areas, suggest typhic origin. Moreover, salmonellosis qualified as a disease of dirty hands, affects in this context children and adolescents who are the most represented population in our series (patients < 20 yrs account for 40% of all individuals with ileal perforation). This is a real public health problem in developing countries [10, 11]. Several studies carried out both in Benin sub-regions and in other sub-Saharan countries reported the same results (Table 5) [5, 6, 7].

Table 5  
Main etiologies of generalized acute peritonitis in the subregion.

Authors	Ileal perforation %	Gastric or duodenal perforation %	Appendicular %
Sambo. et al. (Bénin ; 2017) [5]	52,8	17,0	11,3
Kassegne et al. (Togo ; 2013) [6]	64,2	16,7	16
Ouangre et al. (Burkina Faso; 2013) [7]	42,5	06,8	33,0
Our series	63,5	14,3	7,9

Elsewhere, supposed typhic ileal perforation is not the primary cause of AGP. In Togo and Madagascar, gastric or duodenal ulcer perforation was the most frequent cause of non-traumatic AGP [12–13] while in Central African Republic, appendicular AGP was the most common [9]. Other causes, such as trauma, tuberculosis, Crohn's disease and tumors are mentioned as well [14, 15, 16]: probably causes of AGP are function of the context and environment of each country.

As to the repair of typhic ileal perforation, different surgical procedures have been reported, namely primary repair, excision and suture, ileostomy, resection and ileo-ileal anastomosis. The choice may probably depend on various factors including cause of peritonitis, location and perforations' number, patient's conditions and surgeon's experience.

Mehinto DK et al. (Cotonou) performed ileal resection followed by immediate terminal ileo-ileal anastomosis in 94.2% of cases with a morbidity of 21.2% [17]. Ouangre E. and Kambire JL (Burkina Faso) preferred ileostomy or excision followed by ileal suture, similarly to Sambo BT (Benin) and Kassegne I (Togo).

In our experience, the average number of ileal perforations was 3 and a single perforation occurred in 47.5%. Primary ileal repair was the most common procedure (87.5%) at CHD-A (Fig. 1). The attitude of the CHD-A operators towards ileal perforation (primary ileal repair) is based on the results of a study carried out in Benin peripheral hospital in 2013. The objective of this study was to compare primary ileal suture and ileal resection for typhic ileal perforations. The authors showed that primary ileal repair offered more advantages than ileal resection followed by anastomosis, especially in terms of morbidity [19].

It is, nonetheless, evident that AGP-related morbidity and mortality remains high. Reported rates are variable probably depending on several prognostic factors. Sambo BT (Benin), Ouangre E (Burkina Faso) and Kassegne I (Togo) report morbidity of 39.6%, 40.2% 59.3% respectively [5–7], higher than ours (34.9%).

Mortality is also variable. The rates reported by Doui Doumgba A (Central African Republic) (7.5%), Sambo BT (Benin) (11.3%), Kassegne I (Togo) (14.8%) and Ouangre E (Burkina Faso) (19%) were

respectively lower and higher than in our series (14.3%) [9, 5, 6, 7]. Probably patient's clinical conditions, management speed, quality of perioperative "resuscitation" and surgery were different and decisive for AGP prognosis.

Finally, we would like to comment the options for anesthesia. In AGP patients, anesthesia is frequently performed as general anesthesia with oro-tracheal intubation. However, almost half of our patients were operated under regional anesthesia (spinal anesthesia) with sedation and mask ventilation. Indeed, the clinical suspicion of ileal perforation and the serious condition of these patients (ASA 3 and ASA 4) motivated a limitation of invasive procedures and this choice. We initially performed a median limited peri-umbilical incision and, when the bowel perforation was confirmed, we eventually extended it as suprapubic laparotomy.

## Conclusion

AGP remains a common abdominal surgical emergency with different etiologies according to countries and people's habits. The outcome depends on several prognostic factors, including the time to hospital admission, patient conditions and management quality. For typhic ileal perforations, primary repair allows acceptable results. Prevention and proper medical management are fundamental actions in reducing the incidence of abdominal complications, which have high morbidity and mortality rate. Moreover, the availability of quality human resources, in this case surgeons in all hospitals, will ensure a rapid and effective management of such abdominal surgical emergencies. However, it appears that the presence of general practitioners with adequate surgical skills, even without a specialization, can help obtain acceptable results in a disadvantaged context.

## Abbreviations

CHD-A

Centre Hospitalier Départemental de l'Atacora

ASA Score

American Society of Anesthesiologists Score

OS

Overall survival

AGP

acute generalized peritonitis

## Declarations

## Ethics approval and consent to participate

Not applicable

## Consent for publication

Not applicable

## Availability of supporting data

The data that support the findings of this study are available from Atacora Departmental Hospital Center, Benin but restrictions apply to the availability of these data, which were used under license for the current study, and so are not publicly available. Data are however available from the authors upon reasonable request and with permission of Atacora Departmental Hospital Center, Benin.

## Competing interests

The authors declare that they have no conflicts of interest.

## Funding

Not applicable

## Authors' contributions

All authors participated in the study. TSR came up with the idea for the study. TSR and WA collected the data. TSR performed most of the surgery and data analysis. TSR and BCHE wrote the manuscript. CR finalized the writing of the manuscript. All authors have read and accepted the contents of the manuscript.

This study was carried out within the framework of cooperation between the Sapienza University of Rome (Italy) and the University of Parakou (Republic of Benin).

## Acknowledgements

The authors would like to thank Sapienza University of Rome and the University of Parakou for their didactic support.

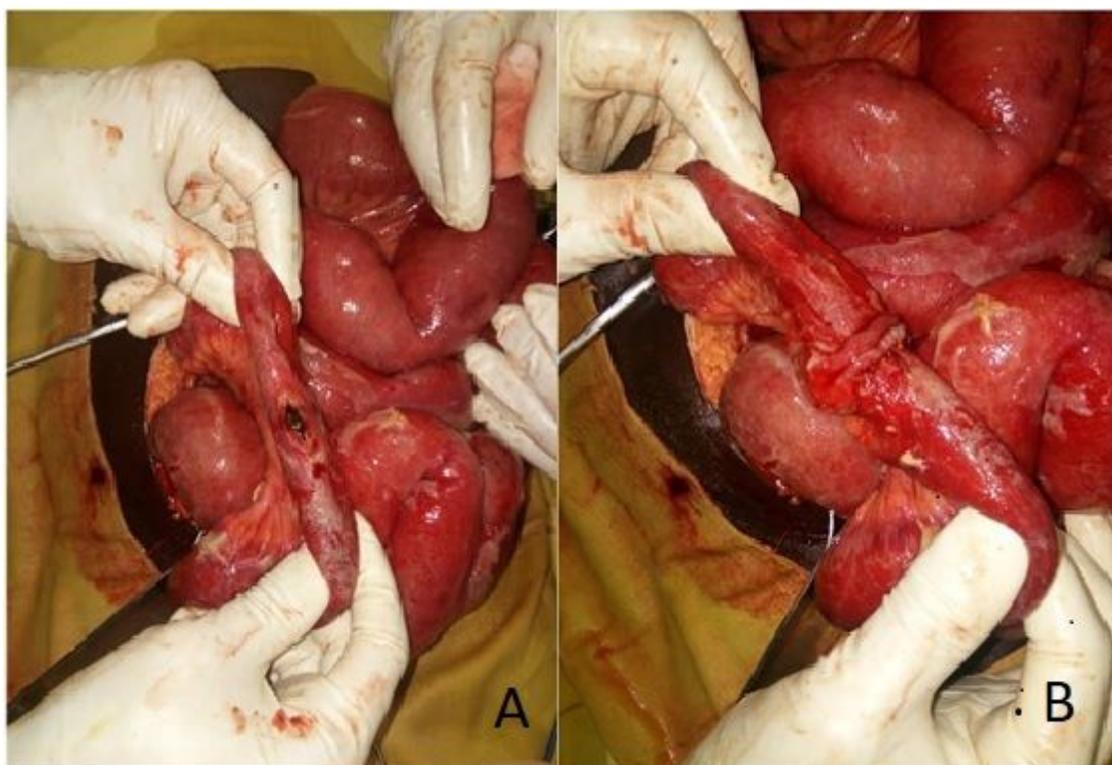
## References

1. Malik AA, Wani KA, Dar LA, Wani MA, Wani RA, Parray FQ. Mannheim Peritonitis Index and APACHE II - Prediction of outcome in patients with peritonitis. Turkish Journal of Trauma Emergency Surgery.

- 2010;16(1):27–32.
2. Service de la. Planification de l'Informatique et de la Recherche en Santé Annuaire des statistiques sanitaires du Département 2018. Rapport: 187p.
  3. Dripps RD, Lamont A, Eckenhoff JE. The role of anesthesia in surgical mortality. *JAMA*. 1961; 1978:261-6.
  4. Dindo D, Demartines N, Clavien PA. Classification of surgical complications: a new proposal with evaluation in a cohort of 6336 patients and results of a survey. *Ann Surg*. 2004;240(2):205–13.
  5. Sambo BT, Allodé SA, Wekpon DS, Séto DM, Hodonou AM, Dossou B. Prise en charge des péritonites aiguës généralisées dans un hôpital de district en Afrique sub-saharienne: cas du Bénin. *European Scientific Journal*. 2017;13(36):388–95.
  6. Kassegne I, Kanassoua KK, Sewa EV, Tchangai B, Sambiani DM, Ayite AE, Dosseh ED. Prise en charge des péritonites aiguës généralisées au Centre Hospitalier Universitaire de Kara. *Saranf*. 2013;18(2):115–21.
  7. Ouangre E, Zida M, Bonkougou PG, Sanou A, Traoré SS. Les péritonites aiguës généralisées en milieu rural au Burkina Faso: à propos de 221 cas. *Rev CAMES SANTE*. 2013;2:75–9.
  8. Harissou A, Ibrahim AMM, Oumarou H, Mansour A, Amadou M, Ousseni EA, et al. Retard diagnostique et implication pronostique en milieu africain. Cas des Urgences en chirurgie digestive à l'Hôpital National de Zinder, Niger. *European Scientific Journal*. 2015;11(12):251–62.
  9. Doui A, Doumgba L, Nghario VN, Ngaoutchougbo OA, Peguele, Ndemanga J, Kamoun A, Gaudeuille, Nali N, Mamadou. Aspects diagnostiques et thérapeutiques des péritonites aiguës généralisées à propos de 214 cas à Bangui. *Revue Africaine de Chirurgie et Spécialités*. 2015;9(3):18–24.
  10. Crum NF. Current trends in typhoid fever. *Current Gastroenterol Rep*. 2003;5(4):279–86.
  11. Ukwenya AY, Ahmed A, Garba ES. Progress in management of typhoid perforation. *Ann Afr Med*. 2011;10:259–65.
  12. Alassani F, Tchangai B, Amavi AK, Adabra K, Kassegne I, Amouzou K, et al. Aspects étiologiques et thérapeutiques des péritonites aiguës diffuses non traumatiques au CHU Sylvanus Olympio. *Journal de la Recherche Scientifique de l'Université de Lomé*. 2017;19(3):395–402.
  13. Rakotomavo FA, Riel AM, Rakotoarison RCN, Randrianambinina H, Randrianambinina T, Randriamiarana MJ. Péritonite aiguë: aspects épidémiologique et étiologique dans un service des urgences chirurgicales malgache. A propos de 60 cas. *Journal Africain d'Hépatogastroentérologie* 2012; 6:33 – 7.
  14. Allodé AS, Dossou FM, Hodonou AM, Séto M, Gbessi GD, Sambo BT, et al. Non-traumatic intestinal perforation in the regional hospital Borgou of Benin: epidemiological and therapeutic characteristics. *Int Surg J*. 2017 Apr;4(4):1376–9.
  15. Sharma MP, Bhatia V. Abdominal tuberculosis. *Indian J Med Res*. 2004;120:305–15.
  16. Hu JP. Difficulties in diagnosis and treatment of Crohn disease. *Zhonghua Wei Chang Wai Ke Za Zhi*. 2013;16(4):301–3.

17. Mehinto DK, Gandaho I, Adoukonou O, Bagnan OK, Padonou N. Aspects épidémiologiques, diagnostiques et thérapeutiques des perforations du grêle d'origine typhique en chirurgie viscérale du Centre National Hospitalier et Universitaire-Hubert Koutoucou Maga de Cotonou. *Médecine d'Afrique Noire*. 2010;57(11):535–40.
18. Kambire JL, Ouedraogo S, Ouangre E, Traore SS. Résultats de la prise en charge des perforations iléales typhiques: à propos de 29 cas à Ouahigouya (Burkina Faso). *Bulletin de la Société de pathologie exotique*. 2017;110(5):298–9.
19. Caronna R, Boukari AK, Zaongo D, Hessou T, Gayito R, Ahononga C, et al. Comparative analysis of primary repair vs resection and anastomosis, with laparostomy, in management of typhoid intestinal perforation: results of a rural hospital in northwestern Benin. *BMC Gastroenterology*. 2013;13:102.

## Figures



**Figure 1**

ileal perforation, probably typhoid (1A) and primary repair (1B). Regarding primary repair a particular technique was often adopted, consisting of a single-layer suture with 2 to 4 large vicryl 2/0 “U” stitches passed through the seromuscular intestinal layer at some distance from the perforation, where there was less inflammatory involvement, achieving a good introflexion of the perforation itself and without edge excision.