

# Laparoscopic Surgery of Incisional Hernia: Technique and Short-Term Results in Three Surgical Units in Cameroon

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## Abstract

**Introduction:** Incisional hernia is a common medical situation and its treatment has always been a challenge for general surgeons. If laparoscopic repair has become a gold standard elsewhere, it is increasingly done in our milieu, but no data has been found. The aim of this study was to review this surgery done in our country so far, to describe the operative technique and to evaluate the postoperative outcomes. **Patients and Methods:** We conducted an observational descriptive study with retrospective collection of data from the 1<sup>st</sup> of July 2018 to 30<sup>th</sup> of June 2022, in three hospitals in Cameroon. Data on socio-demographic and clinical characteristics, surgical technique and postoperative outcomes of patients who had a laparoscopic repair of their incisional hernia were collected. **Results:** We reviewed 20 files. There were 14 women with an average age of 54.6 years. The average BMI was 32.8 kg/m<sup>2</sup>. Thirteen patients had a moderate size hernia and the hernia was localized at the midline in 18 cases. Only composite biface meshes were used with dimensions chosen to obtain at least 5 cm overlap. Spiral tacks were the only fixation means used. We registered 3 complications. One case of generalized peritonitis secondary to missed digestive perforation, one case of seroma and one case of postoperative ileus. We registered no death. **Conclusion:** Laparoscopic repair of incisional hernias is feasible in a resource-limited setting like ours. Compliance with the operative technique and recommendations is important to obtain short-term results closed to that put forward by literature.

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## Keywords

Incisional Hernia, Laparoscopy Repair, Composite Biface Mesh, Postoperative Outcomes

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## 1. Introduction

Incisional hernia is defined as any defect of the abdominal wall with or without swelling in an area of acquired weakness, most often a postoperative scar. It is a frequent complication after abdominal surgery with an average incidence of 3.7% according to a meta-analysis by Nho *et al.* published in 2012 [1]. It is associated with significant morbidity, and as a result, it usually requires surgical repair, which is generally done electively. Elective surgery improves hernia-related quality of life and functional status, while emergency repair results in higher morbidity and mortality [2]. Despite the improvement in repair methods, the postoperative course remains dominated in the short term by significant morbidity and at a distance by the risk of recurrence [2] [3] [4] [5] [6]. Two techniques are available: open repair with or without prosthesis and laparoscopic prosthetic repair. Simple suture techniques are associated with a high rate of recurrence, up to 58% [3] [7]. The use of prostheses significantly reduced the recurrence rate [2] [3] [7] [8]. However, the placement of a prosthesis by an open approach often requires extensive tissue dissection, with the consequent increase in the risk of surgical site infections and other wound complications [4] [8]. Laparoscopic repair of incisional hernias is associated with a lower rate of surgical site infections and wound complications [2].

The place of incisional hernias remains unknown in our context, but parietal surgery by laparoscopic approach is increasingly practiced by certain specialized departments [9] [10] [11]. The aim of this study was to make an inventory of laparoscopic surgery for incisional hernias in our country, to describe the operative technique and the local adaptations used and to evaluate the postoperative morbidity and mortality.

## 2. Patients and Methods

We conducted an observational descriptive study with retrospective collection of data in three hospitals of Cameroon (a country in sub-Saharan African region): National Social Insurance Fund Health Centre Essos, Marie-Wyss Hospital (both in Yaoundé: the capital city of Cameroon) and Douala Gynaeco-Obstetric and Paediatric Hospital (Douala). These hospitals have each a team of digestive surgeons routinely performing laparoscopic surgical procedures.

We reviewed the operative and hospitalization's reports of these hospitals to identify all the patients operated for incisional hernia using the laparoscopic approach over a 4-year period from the 1<sup>st</sup> of July 2018 to 30<sup>th</sup> of June 2022. We retained the files of patients of both sexes over 18 years old. Unusable (incomplete

or not found) files were excluded. Socio-demographic, clinical, paraclinical, therapeutic (difficulties encountered and their solutions, local adaptations used) and evolutionary data of the patients were collected. The outcomes of the operation should be known within 30 days following surgery.

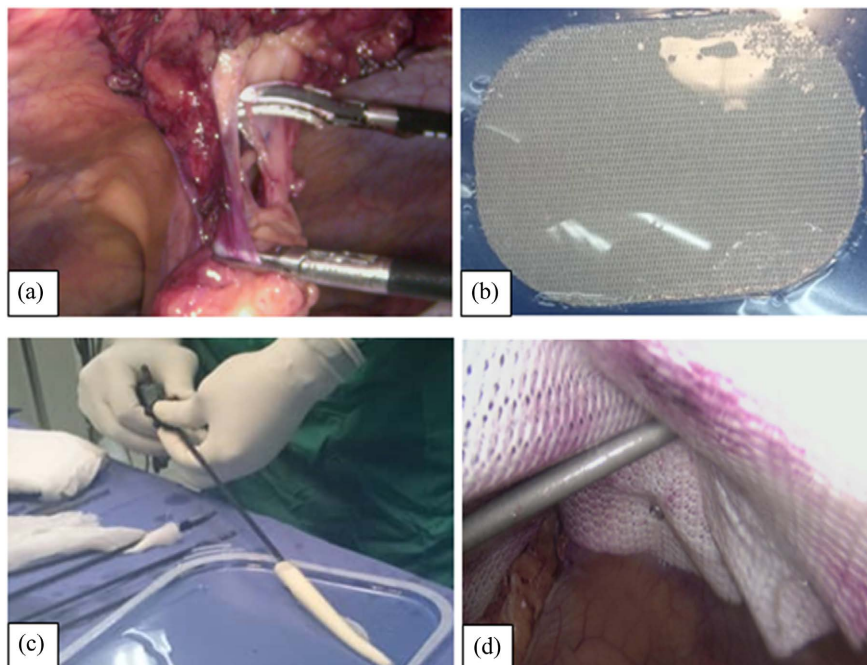
As for the surgical procedure, all patients had a routine pre-operative assessment and other tests based on their comorbidities or risk factors. A preoperative fasting of at least six hours was prescribed and general anaesthesia was performed for all the patients. A double antibiotic dose was administered 45 minutes before anaesthetic induction. Patients were installed in the supine position and draped after asepsis was done with povidone iodine 10%. The principal operator was standing on patient's left side, assistant to his right and instrument nurse to his left. Monitor was placed opposite to main operator to the right of the patient (**Figure 1**). Position of operator could vary during surgery according to needs. An optic 10- or 12-mm trocar was inserted on the left flank region using the open coelioscopy approach, then inflation done with carbon dioxide to a pressure of 12 - 14 mmHg. Two trocars of 5 mm were inserted at left hypochondrium and left iliac fossa regions under visual control. Position of optic trocar could vary according to patient's clinical presentation and operative difficulties. After abdominal cavity exploration in search of adhesions, parietal defect (s), content of hernia sac, a careful limited cleansing of adhesions and reduction of the hernia content was done. Kelotomy with good hemostasis was realized before insertion of the mesh. A biface mesh was moistened with warm sterile normal saline, rolled round on an atraumatic prehension forceps and introduced in



**Figure 1.** Patient's installation. Source: Mary Wyss hospital image bank.

the abdomen through the optic trocar with the non-adhesive surface lying directly on the viscera and the parietal side facing the anterior abdominal wall. The mesh was fixed to the anterior abdominal wall covering the defect (s) using spiral tacks (**Figure 2**). To ensure centered closure of the defect in some cases, the mesh was first fixed by 3 separate sutures on the same line superior, middle and inferior pole. The middle suture was first fixed using a passing by needle through the skin. The same procedure was repeated for the superior and inferior pole sutures. Intra-corporal sutures biting through part of the musculo-aponeurotic edges were used to reduce the size of the hernia in case of a large defect. The fixation of the mesh should be done straight with no folds throughout its rim close enough to each other to prevent sliding of bowel between the mesh and the abdominal wall. After fixation of mesh, exsufflation was done with progressive retraction of camera to appreciate how the mesh lies on the viscera. The aponeurosis was sutures with slow resorbable size 2 sutures over optic trocar entry zone and the skin was closed with 3/0 fast absorbable sutures. At 5-mm trocar entry points, only skin closure was done. All the patients receive antibioprophylaxis, analgesics and gastric protectors.

All data were analysed with IBM SPSS® (SPSS Inc., version 23, Chicago, IL, USA) and Microsoft Excel 2016. Counts and percentages were determined for categorical variables and means and standard deviations (mean  $\pm$  SD) calculated for the continuous variables.



**Figure 2.** Surgical procedure. (a) Dissection and reduction using an atraumatic forceps and a thermofusion forceps. (b) Composite biface mesh. (c) Moistening in warm normal saline and roll round on atraumatic forceps of composite biface mesh before introduction in the abdominal cavity. (d) Fixation of the mesh covering the defect using spiral tacks. Source: National Social Insurance Fund Health Centre Essos image Bank.

### 3. Results

During the study period, 27 patients were operated for an incisional hernia using a laparoscopic approach. Seven (7) files (25.9%) were excluded. We therefore included 20 patients' files in our study. There were 6 men (30%) and 14 women (70%) with a sex ratio of 0.42. They were aged from 30 to 81 years with a mean age of  $54.6 \pm 13.9$  years. Obesity was the only associated comorbidity, found in 14 patients (70%), with a mean body mass index of  $32.8 \pm 7$  kg/m<sup>2</sup>. Only one case of recurrence was registered and the technique used to treat the primary incisional hernia was an open mesh repair, which evolved to a mesh infection leading to its removal. Symptoms of incisional hernia appeared within a median duration of 6 months after the previous surgery with the extremes of 1 and 24 months. Nineteen (19) patients (95%) had only one surgery before and one patient (5%) underwent four previous laparotomies. The pre-hernia surgeries were done through a median incision in 18 cases (90%) and in 2 cases (10%), it was a transverse hypogastric (Pfannenstiel) incision. These surgeries were carried out in an emergency context in 11 cases (55%) opposed to 9 cases (45%) where they were done in an elective context. Seven (7) patients (35%) had simple postoperative outcomes after their pre-hernia surgery. Six (6) patients (30%) had wound dehiscence and 4 patients (20%) developed a surgical site infection. At the admission, all the patients presented with abdominal swelling with 2 patients (10%) complaining of altered bowel habits and 2 others (10%) having frequent vomiting. Thirteen (13) patients (65%) had a moderate size hernia and the hernia was localized at the midline in 18 cases (90%). Clinical epidemiology of our study population is summarized in **Table 1**.

All the patients were operated under general anaesthesia. In 18 patients (90%), optic trocar was inserted at the left flank and at the left hypochondrium in 2 patients (10%). The small bowel and the greater omentum made up the only content of the hernial sac in different proportions. Only composite biface meshes were used with dimensions chosen with respect to sizes of the defects, to obtain at least 5 cm overlap. Per-operative difficulties were encountered once and was a difficulty to reduce a tight sac containing the small bowel. It was managed by addition of 2 trocars of 10 mm at the right hypochondrium and the right lumbar regions for camera to improve exposure and gesture to reduce the small bowel from the sac. The fixation of mesh by 3 separate sutures on the same line superior pole, center and inferior pole, to ensure centered closure of the defect, was used in 6 cases (30%). Intracorporal sutures biting through part of the abdominal wall were used to reduce de size of the defect in 3 cases (15%). No peroperative incidents were encountered. No conversion was undertaken. The mean duration of surgeries was  $120.4 \pm 57$  minutes; with the extremes of 63 minutes and 252 minutes. The amount of blood lost was minimal in all the cases. **Table 2** resumes the surgical technique in the study population.

We registered 3 complications in 3 different patients (**Table 3**). One of which was a generalized peritonitis secondary to unnoticed digestive perforation for which the patient was re-operated under general anesthesia with removal of

mesh. We also had one case of seroma and one case of postoperative ileus all managed conservatively. We registered no death in our series. The mean hospital stay was 3 days for 19 patients. The patient reoperated had a 14-day hospital stay.

**Table 1.** Clinical epidemiology of the study population.

Variables	Number	Percentage
<b>Sex</b>		
Male	6	30
Female	14	70
<b>Age</b>		
≤40	2	10
]40 - 60]	9	45
>60	9	45
<b>Clinical presentation at admission</b>		
Abdominal swelling	20	100
Altered bowel habits	2	10
Vomiting	2	10
<b>Previous surgeries and postoperative outcomes</b>		
Simple postoperative outcomes	7	35
Surgical site infections	4	20
Wound dehiscence	6	30
Parietal Hematoma	1	5
Peritoneal abscess	1	5
Early resume to work	1	5
<b>Duration before appearance of symptoms</b>		
≤6 months	10	50
6 - 12 months	7	35
>12 months	3	15
<b>Site of incisional hernia</b>		
Median supra umbilical	9	45
Median infra umbilical	1	4
Median supra and infra umbilical	8	40
Hypogastric (Transverse)	2	10
<b>Size of defect</b>		
<4 cm (Mild)	0	0
5 - 10 cm (Moderate)	13	65
>10 cm (Large)	7	35

**Table 2.** Operative findings and surgical technique.

Variables	Frequency (n)	Percentage (%)
<b>Region of Insertion of optic trocar</b>		
Left Hypochondrium	2	10
Left flank	18	90
<b>Content of sac</b>		
Small intestine only	2	10
Small intestine and omentum	7	35
Omentum only	11	55
<b>Local adaptation modalities</b>		
Sutures at superior pole, center and inferior poles of mesh	6	30
Intracorporal sutures	3	15
<b>Dimensions of prosthesis used</b>		
20 × 15 cm	4	20
25 × 20 cm	7	35
30 × 30 cm	9	55

**Table 3.** Clavien Dindo classification of post-operative complications and treatment modalities.

Complication	Grade	Treatment modality used
Seroma Formation	Grade I	Aspiration of collection and local dressing
Post-operative Intestinal obstruction (Ileus)	Grade II	Non operative management within hospital premises
Postoperative Peritonitis	Grade IIIb	Removal of mesh under general anaesthesia

#### 4. Discussion

This study shows that laparoscopic repair of incisional hernia is feasible and safe in a resource-limited settings like ours. It nevertheless presents a certain number of limitations. Its retrospective nature with the shortcomings associated with this type of data collection. In addition, the small sample size and the short follow up period do not allow us to overgeneralize these results. However, this is a preliminary study which aimed to make an inventory of laparoscopic surgery for incisional hernias in Cameroon and described the operative technique and the local adaptations used. Future studies on larger samples with longer follow-up are therefore necessary to validate these preliminary results.

The treatment of incisional hernias has always been a challenge for general surgeons. The repair can be done with or without prosthesis. Simple suture tech-



niques are associated with a high rate of recurrence [3] [7]. This recurrence rate was significantly reduced by the use of prostheses [2] [3] [7] [8]. Traditionally, the prosthesis can be implanted intraperitoneally, preperitoneally, in prefascial retromuscular space or in premusculo-aponeurotic space. These last two implantation sites require extensive tissue dissection with the consequent increase in wound complications [4] [8]. Laparoscopic repair of incisional hernias was first described by Leblanc and Booth [12]. It combines both the safety of prosthetic repair and the reduction of wound complications due to the minimally invasive approach. Indeed, several studies have shown that it has similar results in terms of morbidity and mortality as open prosthetic repair, with fewer surgical site complications. In a 2011 Cochrane review [13] based on 10 randomized control trials with a population of 880 patients, comparable recurrence rates were reported between the open route and the laparoscopic route. The duration of hospitalization was shorter and the incidence of surgical site infections was significantly lower in the laparoscopic group, while there was no difference for other complications [13]. In a study published by Asti *et al.* in 2016, it appears that laparoscopic and open approaches were comparable in terms of safety and there was no significant difference in the recurrence rate at one year [5]. A 2021 Danish national review [14] showed that patients operated by the traditional laparoscopic route had a shorter hospital stay and a lower rate of early complications compared to those operated by the open route. However, postoperative complications were more severe after laparoscopic repair [14]. The 2015 consensus conference showed that laparoscopy is safe, effective and superior to the open route in terms of hospital stay, pain and postoperative morbidity [15]. Laparoscopic prosthetic repair should therefore be preferred whenever the patient's condition allows it and the necessary technical skills are available [2] [8].

The female predominance, an average age of around 50 - 60 years and the high prevalence of obesity in our study population are found by many authors [5] [14] [16] [17] [18] [19]. Indeed, female sex, advanced age and a BMI greater than 25 kg/m<sup>2</sup> are risk factors for incisional hernia identified by Itatsu *et al.* [20].

Laparoscopic repair of incisional hernia responds to a certain number of technical principles. The realization of the pneumoperitoneum by open coelioscopy or Veress needle and the introduction of the first trocar should, according to certain recommendations, be done at a distance from the defect and any potential adhesions [2] [21]. We performed our open coelioscopy with introduction of the first trocar to the left flank or to the left hypochondrium. Adhesiolysis, when necessary, was limited to the area needed for prosthesis placement to reduce the risk of seroma formation and visceral injury. Indeed, enterotomy is a common intraoperative complication during adhesiolysis [22] [23] [24]. It has also been shown that extensive adhesiolysis increases the risk of seroma formation and does not reduce chronic pain [25] [26]. The placement of a non-absorbable material permanently intraperitoneally could eventually lead to intestinal lesions [27]. The appearance of such a lesion is mainly associated with the characteristics of the prostheses, in particular the material and the surface, and not with its



location [28]. The composite prostheses used in our patients seem to offer the advantage of combining both the resistance of a permanent intraperitoneal structure and an anti-adherent barrier to protect the viscera [17]. Closure of the fascial defect was not systematic before prosthesis placement. However, it would lead to fewer recurrences, fewer wound complications and the formation of seroma in certain studies [29] [30] [31] [32]. We had only performed it in three patients. Henriksen *et al.* had preceded closure of the defect in only 28% of their cases [14]. The size of the prosthesis is very important to reduce the risk of recurrence. Indeed, several authors recommend an overlap of the aponeurotic edges of at least 5 cm [19] [33] [34]. The Italian Laparoscopic Ventral Incisional Hernia Guidelines recommends an overlap of at least 3 cm [35]. In their study published in 2021, Olmi *et al.* found a recurrence rate of 25% for an overlap of less than 4 cm. This rate fell to 3% in case of an overlap equal or greater than 4 cm [17]. We chose a prosthesis size that ensured overlapping of the aponeurotic edges by at least 5 cm. However, the guidelines of the International Endohernia Society [2] recommend abandoning this rule of 5 cm overlap. The overlap should increase with the size of the defect. Thus, the radius of the prosthesis used must be at least four times the radius of the defect. Several means can be used for fixing the prosthesis. Like many authors [14], we systematically used tackers. These were absorbable or not according to the surgeons. In an Italian study [17], a slight increase in early postoperative pain related to non-absorbable fixation devices was found, while a significant difference in recurrence rates was reported in favour of non-absorbable devices (11% versus 3%,  $P < 0.001$ ). The authors thus encourage the use of non-absorbable devices [17]. Although tackers facilitate the fixation of the prosthesis, they have not shown any advantage in terms of pain, quality of life and recurrences compared to the suture [2]. However, their use increases the cost of procedures and adverse events should be considered. Indeed, non-absorbable tackers could lead to long-term visceral damage [27]. Other means of fixation such as glue would lead to more recurrence [2].

We recorded a morbidity of 15%. These were two cases of minor complications: a seroma and a postoperative ileus, all treated conservatively. Laparoscopic prosthetic repair of incisional hernias significantly reduces local and surgical site complications as reported by many authors [5] [14] [16] [17] [19]. The third patient presented with postoperative peritonitis due to unnoticed intestinal perforation during adhesiolysis; he was successfully reoperated. It is the most frequent intraoperative complication during adhesiolysis in intra-abdominal procedures [22] [23] [24], with local and general consequences and a longer duration of hospitalization [24]. This patient was hospitalized for 14 days compared to an average of three days for the other patients. We did not record any deaths. This procedure is associated with a low death rate [14] [16] [19].

## 5. Conclusion

Laparoscopic repair of incisional hernias is feasible in a resource-limited setting like ours. Compliance with the operating technique and the recommendations is

important to obtain short-term results closed to that of the literature. However, a larger sample and a longer follow-up period would be necessary to validate these preliminary results.

### Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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