

## Intraoperative Incidents and Postoperative Complications of Laparoscopy

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### Abstract

**Background:** Laparoscopy (or laparoscopy) is a modern surgical approach that has invaded and revolutionized all fields of surgery by introducing the concept of minimally invasive surgery. However, it can be interspersed with incidents and a source of complications of varying severity.

**Aim:** To describe the prognostic aspects, namely the morbidity and mortality of laparoscopy.

**Patients and Methods:** We carried out a retrospective study on the interventions carried out under laparoscopy from January 2006 to December 2015 at the general surgery department of the Aristide Le Dantec University Hospital in Dakar and having presented a per and/or postoperative complication. The parameters studied were epidemiological data, nature and classification of complications, management and prognostic aspects.

**Results:** We collected 842 laparoscopic procedures (84.2/year). Complications (per and postoperative) concerned 102 cases, i.e. 12.1%. We identified 59 intraoperative complications (7%). The sex ratio was 0.9 (28 men/31 women). The average age of the patients was 35 years old with extremes of 12 and 85 years old. The interventions concerned were carried out mainly in regulated programming (48 cases). Intraoperative complications occurred mainly after hepatobiliary surgery, especially cholecystectomy with 45 cases (76.2% of intraoperative complications). The biliary wound was the most frequent (n = 24 or 40.6%). We noted 9 cases (15.3%) of emergency intraoperative complications including 5 ileal wounds (8.9%), 1 cecal wound (1.6%), 2 bleeding from the appendicular artery (3.2%) 1 case (1.6%) of pneumoperitoneum intolerance). Management of intraoperative complications was done under laparoscopy in 44 cases (74.5%). The conversion rate to laparotomy was 25.4% (n = 15): intestinal breach in 8 cases; wound of the common bile duct in 3 cases, 3 cases of intolerance to pneumoperitoneum and 1 case of release of cystic clip. The suites were simple in 47 cases (79.7%). An operative morbidity related to intraoperative incidents of 20.3% was noted (n = 12). Of the 842 patients operated on by laparoscopy during this period, a morbidity of 5.1% was noted (n = 43). The majority was noted after emergency laparoscopy with 30 cases (69.7%). Acute appendicitis was the most frequent indication, in emergency, with 15 cases (34.8%) followed by acute generalized peritonitis with 10 cases (23.2%). Parietal suppuration was the most frequent postoperative complication with 15 cases (35.3%), followed by postoperative peritonitis with 7 cases (16.2%) and deep suppuration with 6 cases (13.9%). Our complications were classified as Dindo and Clavien grade I in 23 cases (53.4%), grade II in 1 case (2.3%), grade IIIb in 17 cases (39.5%), and grade V in 2 cases. (4.6%). The management of postoperative complications was surgical (by laparotomy) in 55.8% of cases (n = 24). The follow-up was simple for 41 patients (93%). Two deaths were noted (1.9%) following postoperative peritonitis.

**Conclusion:** Although it has many advantages, laparoscopic surgery can be a source of serious complications requiring careful management.

**Keywords:** Coelioscopy; Laparoscopy; Laparoscopic Per-operative Incident; Laparoscopic Post Opérative Complication; Laparoscopic Cholecystectomy

**Introduction**

The use of the laparoscopic approach at the CHU Aristide Dantec in Dakar (Senegal) since the 1990s, is faced with certain constraints specific to our conditions of daily surgical practice (equipment often obsolete or of poor quality, poorly trained staff, etc.) and difficult to overcome [1,2]. These constraints can cause laparoscopic complications. Although it has many advantages, this approach may lead to complications that are often non-fatal but require adequate management [3]. Our objectives were to describe intra operative incidents and postoperative complications related to this technique by studying their frequency, their epidemiological profiles, their nature, their management and their prognosis.

**Patients and Methods**

This was a retrospective study conducted over a period of 10 years (January 1, 2006 to December 31, 2016). It covered the patients' files, regardless of age and sex, operated under laparoscopy, whatever the indication, at the service of General Surgery of the Aristide Le Dantec University National Hospital Center in Dakar, and having had intraoperative incident and post operative complications. The parameters studied were: age, sex, diagnosis and actions performed. We also studied intartoperative inccidents and postoperatives complications by describing their nature, their time of onset, their grade according to the classification of Clavien and Dindo, their care and the consequences.

**Results**

Eight hundred and forty two (842) abdominal surgeries had been carried out by an approach laparoscopic during the study period. Fifty-nine (59) per laparoscopic complications were identified in 51 patients, i.e. a frequency of 7%. The interventions were mostly carried out in regulated programming (48 cases i.e. 83.4% of cases) and fell within almost exclusively surgery hepatobiliary. The main complications were recorded in the table 1. Biliary wounds consisting of wounds vesicular (19 cases) and those of the way main biliary disease (5 cases) had occurred following cholecystectomies for symptomatic lithiasis. Digestive wounds were dominated by

hail wounds (n = 10 or 16.9%) especially during bridle section under laparoscopy (n = 5 or 8.4%). Wounds ileum observed during cholecystectomies occurred during adhesiolysis. Vascular and hemorrhagic accidents accounted for 28.7% of complications per-coelioscopic and occurred mainly during cholecystectomy. We had 3 cases of intolerance to pneumoperitoneum with instability haemodynamic occurrences, respectively during a cholecystectomy, intervention for stenosing duodenal ulcer and a flange section. A conversion to laparotomy was essential in the remaining 15 cases (25.4%) whose causes and treatment are reported in tables 2 and 5. The main cause was the ileal wound (n = 8 i.e. 53.4%). Postoperative morbidity was 5.1% (n = 43). There were 20 men and 23 women (sex ratio = 0.9) with an average age of 31.5 years with extremes of 15 and 85 years. The average time to onset of these complications was 3 days with extremes of 2 to 10 days. The majority of complications were noted urgently with 30 cases (3.5%) especially after laparoscopic appendectomy (N = 14 or 1.8%) as shown in table 3. Parietal suppurations were the most common with 15 cases (35.3%) followed by postoperative peritonitis with 7 cases (16.2%) (Table 4). In settled program, we counted 13 cases (30.2%) distributed according to the gesture in table 5. In emergency, postoperative peritonitis was most often found (7 cases or 23.3%). They occurred in 6 cases (13.9%) after a flange section (Table 6). According to Dindo and Clavien's classification [4], 53.4% of complications were classified as grade I (Table 7). Medical management was the most common (n = 23 or 53.4%) as detailed in table 8. The followup was simple in the majority of cases (n = 41 ie 95.3%). Overall mortality was 3.4% (n = 2). The first patient was managed for flanged occlusion with an ileal perceleloscopic wound requiring conversion. The patient had benefited from an ileal suture which had become complicated by postoperative 3-day postoperative peritonitis by suture release. The death occurred 5 days later in a context of multi-visceral failure. The 2<sup>nd</sup> patient had laparoscopic perforation of duodenal ulcer in a context of septic shock. He presented on the 2<sup>nd</sup> postoperative day a recovery by laparotomy for postoperative peritonitis. The death was observed at the 5<sup>th</sup> post-operative day by multi-visceral failure following septic shock.

Incidents	Rate of incident	Rate in set program surgery	Rate in emergency surgery	Percentage
Biliary wound	24	24	00	40.6%
Digestiv wound	15	7	8	25.4%
Hemorrhage	17	15	2	28.7%
Pneumoperitoneum intolerance	3	2	1	5.3%
Total	59	48	11	100%

**Table 1:** Breakdown of the various intraoperative complications.

Reasons of conversion	First Surgery	Rate	Percentage
Hemorrhage	Cholecystectomy	1	6.6%
Digestiv wound	Appendicetomy Cholecystectomy Flange section	8	53.4%
Biliary wound	Cholecystectomy	3	20%
Pneumoperitoneum intolerance	Cholecystectomy Vagotomy Flange section	3	20%
Total		15	100%

**Table 2:** Rate et reasons of conversion to laparotomy.

Gestures	Effective gestures	Incidence of postoperative complications
Cholecystectomy	483 (57.3%)	7 (0.8%)
Vagotomy + gastric drainage	132 (15.6%)	7 (0.8%)
Heller seromyotomy	36 (4.2%)	1 (0.1%)
Perforated ulcer suture	36 (4.2%)	7 (0.8%)
Appendectomy	117 (13.9%)	14 (1.8%)
Section of postoperative flanges	38 (4.8%)	7 (0.8%)
TOTAL	842 (100%)	43 (5.1%)

**Table 3:** Incidence of Postoperative Complications.

Nature of complications	Effective	Percentage
Wall Suppuration	15	35.3
Postoperative Peritonitis	7	16.2
Deep Suppuration	6	13.9
Persistent Peritonitis	4	9.3
Digestive Fistula	3	6.9
Subcutaneous Emphysema	2	4.6
Ileus Reflex	2	4.6
Free Evisceration Septic	1	2.3
Persistence of Dysphagia	1	2.3
Eventration	1	2.3
TOTAL	43	100

**Table 4:** Nature of postoperative complications.

Gestures	Complications	Effective	Percentage (%)
Cholecystectomy	Parietal suppuration Ileus	3	6.9
	reflex	1	2.3
	Septic free evisceration	1	2.3
Heller's Seromyotomy	Persistent dysphagia	1	2.3
Vagotomy and Pyloroplasty	Persistence of stenosis	1	2.3
Vagotomy and Gastroentero-Anastomosis	Digestive fistula	3	6.9
	Subcutaneous mphysema	2	4.9
	Parietal suppuration	1	2.3
TOTAL		13	30,2

**Table 5:** Nature of post-operatives Complications according the gesture.

Gestures	Nature of complications	Effectives	Percentage (%)
Appendectomy	Deep Suppuration	4	9.3
	Persistent Peritonitis Iléus reflexe	2	4.6
	Iléus reflexe	1	2.3
	Deep suppuration	8	18.6
Flange section	Postoperative peritonitis eventration	6	13.9
		1	2.3
Perforated ulcer suture	Persistent peritonitis	2	4.6
	Postoperative peritonitis Wall	1	2.3
	Suppuration	3	9.6

**Table 6:** Postoperative complications in emergency.

Grade	Effectives	Percentage (%)
Grade I	23	53.4%
Grade II	1	2.3
Grade IIIa	17	39.7
Grade V	2	4.6
TOTAL	43	100

**Table 7:** Distribution of complications according to the classification of Dindo and Clavien.

Postoperative complications	Management
<b>Wall Suppuration</b>	Local care + antibiotics (n = 15)
Deep suppuration	Laparotomy (toilet and drainage: n = 2) Antibiotherapy (n = 4)
Ileus reflex	Medical treatment (= 2)
Septic free evisceration	Toilet + local point closure (n = 1)
Persistence of dysphagia after Heller seromyotomy	Complementary seromyotomy (n = 1)
Persistence of pyloric stenosis after pyloroplasty	Gastroenteroanastomosis (GEA) (n = 1)
Post-GEA digestive fistulas	Rehabilitation of GEA (n = 3)
Subcutaneous emphysema	Surveillance (n = 2)
Postoperative peritonitis by relapse of bulbar suture	Resumption of suture + epiplooplasty/laparotomy (n = 3)
Persistent peritonitis after appendectomy	Toilet + laparotomy drainage (n = 2)
Postoperative peritonitis by anastomosis of intestinal anastomosis	Toilet + laparotomy drainage (n = 2)
Medial sub-umbilical eventration	Cure by prosthesis (n = 1)

**Table 8:** Management of postoperative complications of laparoscopy.

**Discussion**

The incidence of complications is generally low in the literature [1]. They are generally dominated by intraoperative incidents. A study conducted in French relating to 1091 cases of complications of laparoscopy had objectified 7.7% of intraoperative incidents. For the main series, accidents digestive are the most frequent since they account for half of the causes of laparotomies [1]. Unlike our study, in which we find a majority of biliary wounds (40.6%). This rate high is explained by the fact that the breach accidental vesicular, during Cholecystectomies, has been considered excess biliary wound. She is not, moreover, not specific to laparoscopy. Bile duct wounds principal (VBP) represent 6.7% of our incidents while this rate is often greater than 10% in series [3,4]. They are the result of local conditions particular (inflammation, vesicle sclero-atrophic...) and the difficulty is to their intraoperative recognition. The treatment can be done under laparoscopy by suture but is often delayed [1]. The conversion is due to a major leak of bile or adhesions as for 3 of the 5 of wound to principal duct biliary we have encountered. Digestive wounds, usually more frequent, occur in 1/3 of cases during the first laparoscopic phase [5,6]. Ileal lesions predominate in the most series like ours [6-10]. The main risk factor is represented by the antecedents of laparotomy favoring the formation of flanges and strong adhesions [1]. This guy incident is described by several authors as a common cause of conversion [11,12]. This was the case for all ileal wounds encountered in our study. Other works also incriminate the defect learning in the feasibility of laparoscopic repair sutures [13]. These wounds have the particularity of not being recognized only 1 in 2 times during the initial procedure what is responsible for secondary peritonitis

or even death [14,15]. The wound of the mucosa esophageal, encountered in 4 cases of our study, is rare in series Western (<2%) [14,16]. She is in part, linked to poor exposure of the abdominal esophagus (in particular by a large left lobe of the liver) but also to the use of the coagulator hook monopolar. The repair was done by suture under laparoscopy in all our cases. Conversions are rarely necessary [1,16]. Bladder bed bleeding make up the majority of accidents bleeding that we have encountered. They are frequent but minimal and often hemostasis is spontaneous. The use of conversion is observed especially during cholecystendesis [1]. The dissection and hemostasis of the cystic pedicle can also cause hemorrhage as in our study due to particular anatomical conditions and possible adhesions [1]. Thus taking into mass of pedicle and fat surrounding explains the cases of release of cystic clip. Bleeding cases appendicular artery are rarely found in most series dealing with laparoscopic appendectomies. The availability of clips and hemostasis bipolar, which we lack, facilitate the control of bleeding [17]. Pneumoperitoneum intolerance has been encountered in 0.3% of cases of laparoscopic surgery (n = 3) as in most literature series [13,18-21]. It often manifests as a bradycardia. Insufflation stop and a conversion are usually the rule [13,18-21]. Even though some authors consider that placing the patient in Trendelenburg improves the return venous and, therefore, the venous pressure center and cardiac output.

Our morbidity was 5.1% (n = 43 cases). In a study carried out in France on 1091 cases of complications of laparoscopy, post-operative complications represent 33% [21-23]. Other Western studies have shown a low prevalence of laparoscopic complications compared to our contexts [25]. Experience, good perioperative

resuscitation can be incriminated as factors influencing the occurrence of these complications [23]. In the Cissé, *et al.* study, postoperative morbidity was 1.4% [26]. In our series, the morbidity follows in most cases (N = 30) to emergency procedures, as reported by Cissé, *et al.* [27]. These complications may be specific to the intervention (digestive fistula, postoperative peritonitis) as in our study. Sometimes the complications are related to laparoscopy and may be minimal in subcutaneous emphysema, found in 2 cases, or more severe (air embolism, pneumothorax...) as revealed elsewhere [28,29]. Eviscerations and dislocations on 10 mm orifice exist and may require re-intervention, particularly in the case of strangulation [30]. Postoperative flanges and adhesions appear to be more rare after laparoscopy [29,31]. The parietal suppurations represent 35.3% (N = 15) of our postoperative complications. It is essentially suppuration on the trocar site (N = 11) following cholecystectomy (N = 3) and appendectomy (N = 8). In western series, these infections are very rare (less than 1%) and often follow an appendectomy [32-34]. Inoculation of the trocar orifice during extraction of the parts (appendix or gallbladder) is the main mechanism of occurrence of these suppurations [3]. They can cause parietal cellulitis or eventration [32-34]. Peritonitis (postoperative and persistent) and digestive fistulas account for 25.5% (N = 11) of our postoperative morbidity. The majority of cases follow a suture release or ileal anastomosis (N = 5). These complications are therefore rather related to gestures than to the laparoscopic approach [35,36]. In our study, the overall mortality of 1.9% is comparable to that found in the series of literature which vary between 0% and 4.4% [27,29,38-40]. This mortality is related, in our case, with post-operative complications related to the pathology, to the quality of surgery, rather than to laparoscopy (duodenal suture release of an ulcer perforation and ileal suture release resection anastomosis for ileal wound after a flange section under laparoscopy). On the other hand, in the literature, laparoscopy is rarely the cause of death outside of a particular pre-existing site. This terrain, usually detected pre-operatively, may contraindicate the use of laparoscopy [23,30]. Recently, several authors claim the involvement of the surgeon's experience in the occurrence of intraoperative incidents and postoperative complications in laparoscopic surgery [22]. They argue that the reduction of intraoperative incidents could neglect the morbidity and mortality rate of laparoscopy [22]. This prevention requires high-performance instrumentation, careful and graduated training of surgeons, identification of risk phases during laparoscopic procedures (especially during trocar installation, manipulation of dilated loops, dissection in adherent zones), perfect control of the physiopathological consequences of insufflation, the humility of the surgeon who has to learn how to convert and the constant monitoring post-operatively to detect.

## Conclusion

The increasing technical possibilities make it possible to consider more laparoscopic video interventions. Technical innovation increases the feasibility of this surgery. The question is whether innovation and progress are synonymous in this area. Numerous benefits such as reduced wall trauma and risk of sepsis, reduction of postoperative pain and ileus, and improved esthetic outcomes have contributed to a rapid expansion of laparoscopy. The prevention of intraoperative incidents requires instrumentation performance, careful learning and graduated from surgeons, and an identification risky phases during the procedure such as the installation of trocars, the manipulation of the digestive tract and dissections in the inflammatory zone. In addition, the respect of the anatomy, the efficient vision and the reduction of the postoperative flanges contributed to make the laparoscopy a first line of choice for the abdominopelvic surgery. But these positive aspects in no way exclude the risk of occurrence of intraoperative incidents that may cause significant nonnegligible postoperative morbidity

## Conflicts of Interest

None.

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