

Study of Prognostic Risk Factors for Relaparotomy in University Hospitals of LUBUMBASHI: Analysis of Biological and Therapeutic Clinical Criteria

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Abstract

Early relaparotomy is a surgical emergency with a serious prognosis. They are daily practice all over the world. The objective of this research was to identify the widely accessible socio-demographic, clinical and therapeutic variables that are prognostic factors of the high risk of perioperative morbidity of laparotomy. From January 2012 to December 2013, we conducted a prospective cohort study at the university hospitals of Lubumbashi. This study enabled us to collect 304 patient records, of which 248 had progressed normally and 56 of them had become complicated and had been relaparotomized 68 times. There were 38 men and 18 women. The parameters analyzed were:

- Age less than 5 years which multiplied by 8 the risk of being reoperated. (OR: 7.5; CI: 2.5-26.13 and $p = 0.001$).
- Being a carrier of cancer multiplied by 24 the risk of complications. (OR: 23.5; CI: 4.04-136.69 and $p = 0.000$)
- Urgency multiplied the risk of relaparotomy by 4. (OR: 3.85; CI: 1.47-10.06 and $p = 0.003$)
- Being operated on by an unqualified person multiplied by 3 the risk of being operated on again. (OR: 2.91; CI: 1.60-5.28 and $p = 0.000$). It appears from this work that the frequency of reoperated postoperative complications was high in children under 5 years old, when cancer is associated as a comorbidity and also when the management of emergency laparotomy is done by an inexperienced surgeon.

Keywords: Prognostic factors, Risk of relaparotomy, Poor hospitals.

Introduction

Major abdominal surgery by laparotomy is a daily practice all over the world. In various general surgery centers, abdominal surgery covers more than 70% of activities. In Africa similar proportions are found [1-5]. In our environment (in the DRC,

particularly in Lubumbashi) laparotomy is still the only route used for abdominal interventions. It has multiple indications. Its site, its orientation and its length depend on the one hand on the organ to be reached and on the other hand on the operation to be carried out. Access to the peritoneal cavity to explore, repair or remove a diseased organ represents so-called major surgery,

likely to be marred by morbid post-operative consequences [6-9]. This is explained by the disturbances that a laparotomy is likely to cause in the physiology of this cavity and the organs that are there, particularly when said laparotomy is performed in an emergency and in a weakened and unprepared patient. Modern iconographic methods that complement the clinic in order to make the diagnosis in a reasonable time are still rare and not accessible in our community, particularly in an emergency. Prevention being the best treatment, we believe that it is necessary to predict the individual prognosis of an abdominal operation that becomes complicated, in order to really offer an early therapeutic alternative to the surgeon. To carry out our investigations well, we were interested in the clinical and therapeutic variables accessible to the community. The objective of this work is to identify the clinical and therapeutic sociodemographic parameters widely available and which can be considered as prognostic factors of the high risk of intraoperative morbidity of laparotomy.

Materials and Methods

Type of study and period

We had carried out from January 2012 to December 2013 at the university clinics of Lubumbashi and at the Jason Sendwe hospital a prospective cohort study on patients operated on the abdomen and re-operated early before leaving the hospital for surgery.

Study population

During the period of our study, 304 files of patients operated on by laparotomy were collected. 248 laparotomized had progressed normally and had left the hospital within the required time. 56 of them had become complicated and had been re-operated 68 times.

The parameters studied were

- Epidemiological aspects: They allowed us to review the age, gender, health institution managing the laparotomy and financial accessibility to medical care.
- Background these had focused on the comorbidity associated with the pathology and the general condition presented by the patient at the initial operation, namely: the circumstances of management of the laparotomy, the indications for the laparotomy and the qualification of the main operator.
- The clinical warning signs announcing the complication requiring reoperation. All data was encoded with Epi Info

7.1 software. Analyzes of associations with the dependent variable, which is relaparotomy, were generated by first applying the chi-square test. This enabled us to subsequently identify the variables to be retained as prognostic factors for the high risk of perioperative morbidity from laparotomies. The chi-square test was significant for a p-value less than 0.05 ($p < 0.05$) with a 95% confidence interval. Data analysis was performed with SPSS 24.0 software.

Ethical Considerations

Prior to data collection, the required authorizations were obtained. Our research protocol was presented and defended at the surgery department and also with the ethics committee of UNILU (University of Lubumbashi) and this authorization from the ethics committee bears the number: UNILU/CEM/032/2014. Informed verbal consent was obtained for the patient in our series. For minors, consent was given by the person in charge; patient information was kept secret.

Results

Epidemiological aspects

Risk of relaparotomy and sociodemographic data

Table 1 relaparotomy risk distribution and sociodemographic data.

The age of the abdominal reoperations

The results reported in table 1 indicated that: Age less than 5 years would have multiplied by 8 the risk of reoperation after laparotomy (OR: 7.50; CI: 2.5-26.13 and $p: 0.001$) (Table 1A).

Sex for abdominal surgery

Although the male sex had predominated with a sex ratio of 2.11 in favor of the male sex, sex would not be a risk factor (Table 1B).

From the structure of origin of the complication to reoperate

33 recorded laparotomies were performed outside the CHU.

Being transferred from the Laparotomy Management Center to a specialized complication management center does not protect (OR: 0.48; CI: 0.27-0.87 and $p: 0.012$) (Table 1C).

Financial accessibility to care

More than half of the patients were cared for by the family.

Being supported by the family from a financial point of view multiplied the risk by 9 (OR: 8.55; CI: 2.86-6.09 and p: 0.000) (Table 1D).

Risk of relaparotomy related to medical story and characteristics of the initial operation.

It follows from table 2A that:

- Being a carrier of cancer as an associated comorbidity multiplied by 24 the risk of becoming complicated and requiring a relaparotomy (OR: 23.5; CI: 4.04-136.69 and p = 0.000).
- This risk is multiplied by 42 and 14 depending on whether the abdominal operation is classified as ASA III and II. (OR: 41.60; CI: 6.67-259.25 and p: 0.000) and (OR: 13.49; CI: 4.48-40.54 and p: 0.000). (IIB).

Risk of relaparotomy and technical characteristics of the initial operation

Table 3A shows that:

- Urgency quadrupled the risk of relaparotomy (OR: 3.85; CI: 1.47-10.06 and p: 0.0029). - For the present series, no indication of laparotomy was a risk factor while each of them was associated with a high percentage of reoperated complications and this in a statistically significant way (Table 3B).
- Being operated on by an unqualified person multiplied by 3 the risk of developing a reoperated abdominal complication (OR: 2.91; CI: 1.60-5.28 and p: 0.000) (Table 3C) Risk of relaparotomy and clinical warning signs.

Table indicates to us that all the clinical signs presented by the abdominal operated patient who becomes complicated have statistical significance at various powers ranging from 16 to 84 at acceptable confidence intervals not including 1 and at very high p values significant (p < 0.000). The signs listed were: The abdominal circumference which increases by 2 cm per day at the level of the umbilicus, the general malaise, the diffuse and induced or permanent abdominal pain, the urinary flow which decreases and the dressings which are constantly soiled at the central wound and at the level of the drains.

Variables	Case (%)	Controls (%)	OR	95% CI	p-value
Age (in year)					
<5	10(44.45)	12(54.55)	7.50	2,15 - 26,13	0,0013
5-14	05(10)	45(90)	1	-	-
15-25	15(12.61)	104(87.39)	1.29	0.44 - 3.78	0.4246
26-65	23(22.33)	80(77.67)	2.58	0.92 - 7.27	0.0480
>65	03(30)	07(70)	3.85	0.74 - 19.84	0.1203
Sex					
Male	38(21.23)	141(78.77)	1.60	0.86 - 2.96	0.0857
Female	18(18.40)	107(85.60)	1	-	-
Management structure					
Lubumbashi	23(13.61)	146(86.39)	1	-	-
Others	33(24.44)	102(75.56)	0.48	0.27 - 0,87	0,0116
Financial accessibility to care					
1/3 payant others state functions	09(10.98)	73(89.02)	1.78	0.52 - 6.09	0.2627
1/3 paying family	36(37.11)	61(62.89)	8.55	2.86 - 6.09	0.0000
1/3 paying company	04(06.45)	58(93.55)	1	-	-
1/3 paying UNILU	07(11.11)	56(88.89)	1.81	0.50 - 6.53	0.2741

Table 1: Relaparotomy risk distribution and sociodemographic data.

The results reported in table indicated that:

- Age less than 5 years multiplied by 8 the risk of being reoperated after laparotomy (OR: 7.50; CI: 2.5-26.13 and p: 0.0013);
- Gender would not be a risk factor;
- Being transferred from the laparotomy management center to a specialized complication management center does not protect (OR: 0.48; CI: 0.27-0.87 and p: 0.0116);
- Being supported by the family from a financial point of view had multiplied this risk by 09 because (OR: 8.55; CI: 2.86-6.09 and p: 0.0000).

Medical Story	Case(%)	Controls (%)	OR	95% CI	p-value
Associated Co-morbidity					
High blood pressure	09(8.26)	100(91.74)	2.11	0.43 - 10.17	0.2785
Diabetes	06(16.67)	30(83.33)	4.70	0.88 - 24.83	0.05670
Hemorrhagic Diathesis	02(22.22)	07(77.48)	6.74	0.81 - 55.64	0.1097
HIV/AIDS	02(04.08)	47(95.92)	1	-	-
Cancer	07(50)	07(50)	23.5	4.04 - 136.69	0.0001
ASA Classification					
I	05(1.60)	208(98.40)	1	-	-
II	12(24.49)	37(75.51)	13.49	4.48 - 40.54	0.0000
III	03(50)	03(50)	41.60	6.67 - 259.25	0.0006
IV	09(100)	00(00)	Ind	Ind -Ind	0.0000

Table 2: Distribution of the risk of relaparotomy and medical story.

It follows from table that:

- Having cancer increased the risk of complications and requiring relaparotomy by 24 (OR: 23.5; CI: 4.04-136.69 and p: 0.0001);
- This risk is multiplied by 42 and 14 respectively depending on whether the abdominal operation is classified as ASA III and II. - this risk is multiplied by 42 and 14 respectively depending on whether the abdominal operation is classified as ASA III and II.

It appears from table that:

- Emergency had multiplied the risk of relaparotomy by 04 (OR: 3.85; CI: 1.47-10.06 and p: 0.0029);
- No indication of laparotomy was a risk factor for this series, although each of them was associated with a high percentage of complications that were re-operated and this was statistically significant;
- Being operated on by an unqualified person multiplied by 03 the risk of developing a reoperated abdominal complication (OR: 2.91; CI: 1.60-5.28 and p: 0.0003).

Discussion

Sociodemographic data

Risk of relaparotomy and age of abdominal surgery

In our series, the mean age was 34.6 years ± 19. The median was 35 years and the mode 33. The youngest patient was 07 days old and the oldest was 83 years old for the study group presented as CASE. For the comparison group called CONTROLS, this average age was 25 ± 14 years. The median of 16 and the mode of 21. Post laparotomy abdominal reoperations were frequently observed in the age groups of 26-65 years and 15-25 years with respectively 21 and 20 reoperations out of 56, i.e. 37.50% and 35, 71% of cases. These relaparotomies rare at the extreme ages of life, exposure being low. The age groups most in demand and which had evolved normally are those of 26-65 and 15-25 years with respectively 77.67% and 87.39% of cases. This distribution gives us a difference which is statistically significant because p = 0.006 for age less than 5 years, (OR = 4.27 and p = 0.0022. Speaking of risk factors for postoperative peritonitis, Pettigrew, *et al.* [10] had retained the advanced age for their series. What must be recognized is that their series had been interested in the reoperations carried out

following the colorectal tumor pathologies which are frequent at advanced ages. The age below 05 years had multiplied by 8 the risk of being reoperated after a laparotomy (OR: 7.50; CI: 2.5-26.13 and p: 0.0013). We also estimate that early childhood could run this great risk following the maternal-transmitted immunity which must be reinforced by vaccination and the maturation with age of the immune system which would very probably play a major role in this fragility.

It should be noted that the surgery itself leads to a decrease in immune defences. This immune deficiency caused by laparotomy only aggravates pre-existing situations of acute or chronic anemia which, in our environment, is caused by the endemicity of malaria, tuberculosis and verminoses such as giardiasis, ascariasis, hookworm and many others that occur in malnourished or fragile subjects (children) and are intertwined with other deficiency or constitutional diseases [11-13]. In this series, age less than 5 years is statistically significant for the appearance of a postoperative complication leading to relaparotomy. Less specific statistically but real is the risk of very old subjects and it can be said that abdominal reoperations after laparotomies have been frequently observed at the extreme ages of life. They represented 45.45% for those under 05 years old and 30% for those over 65 years old. Belonging to the age group below 05 years or that of 26 to 65 years multiplies the risk of developing a post laparotomy complication reoperated respectively by 08 and 03. We can thus confirm that extreme ages constitute a risk factor for relaparotomy after abdominal surgery with opening of the peritoneum. We did not find in the literature the predictability of age on reoperations. Some data confirm that the terrain seems to play a considerable role in the prognosis: advanced age, associated pathologies, immunosuppression, organ failure, malnutrition, without much precision.

We only noted that speaking of risk factors for postoperative peritonitis, Pettigrew, *et al.* [10] and Jung, *et al.* [14] had retained advanced age for their series. What must be recognized is that their series were interested in reoperations carried out following colorectal tumor pathologies. Postoperative peritonitis can also be grafted onto sites other than cancer and be associated with visceral failures, malnutrition or undernutrition [15-18].

The antecedents found at the initial operation

The comparative analysis of CASES and CONTROLS according to comorbidities and ASA classifications showed a distribution which

is statistically significant especially for the cancerous disease (OR: 4.91; 1.65-14.65; p: 0.0001). Patients operated on for cancer had given reoperated complications in 50%, followed by those who had a hemorrhagic diathesis as a comorbidity (22.22% of cases). The operated cancer multiplies by 5 the risk of occurrence of a reoperated complication of the abdomen. The same applies to the comparison of the ASA classification. The poor general condition of the patient before the laparotomy had a negative impact on the evolution of the laparotomized patient. In this series, it resulted respectively in 50% and 100% of reoperated complications depending on whether the patient is ASA III and IV. This distribution gives us a difference which is statistically significant in both situations for ASA greater than 1 (OR: 53.04; CI: 19.92-141.16 and p: 0.0000).

This confirms the literature data according to which patients with comorbidity and with poor anesthetic conditions pose many problems during and after surgery and in particular cancer patients. In low-resource settings, even ASA grades II already pose problems due to the low weight of anesthetic means for resuscitation. However, the paraclinical explorations were 100% financed by the patients who could take care of themselves. The facilitation that could be done thanks to the funding of this study did not allow us to effectively include the paraclinical data that would eventually be of great benefit. We thus observed that the majority of laparotomized patients were unaware of their medical status in relation to the elements used in the associated comorbidity study. As many authors point out, the terrain seems to play a considerable role in the prognosis: advanced age, associated pathologies, immunosuppression, organ failure, malnutrition [19-21]. The surgical act itself induces immunosuppression because a laparotomy is a major surgical act [22]. The two elements that dominate the discussion in relation to the necessity (should we re-intervene?) and the time (when should we do it?) of reoperation are the existence or not of one or more visceral failures and the localized or generalized character of the peritonitis. These two elements led to the surgical revision of the laparotomized patients who had presented a sudden decompensation with a state of shock and multi-visceral hemodynamic, renal and respiratory failures in particular and generalized peritonitis.

This is a caricatural case which does not pose any decisional problem, there are beside this one a multitude of intermediate situations for which the strategy to be followed is less obvious.

In these cases, the initial pathology that led to the surgical procedure as well as the intraoperative circumstances must be taken into consideration.

Good knowledge of the patient's file, which is not always easy to reconstitute in the event of transfer between centers, as well as multidisciplinary consultation between intensive care physicians and surgeons are necessary [23,24].

Conclusion

At the end of this study, which allowed us to establish the relationship between socio-demographic factors, medical story and the characteristics of the previous surgical technique on the one hand and on the other hand the risks of relaparotomy. We can confirm that extreme ages constitute a risk factor for relaparotomy after abdominal surgery with opening of the peritoneum. The same goes for the comparison of the ASA classification, the poor general condition of the patient and the comorbidities before the laparotomy had a negative impact on the evolution of the laparotomized patient. the emergency had multiplied the risk of relaparotomy by 04 being operated by an unqualified person had multiplied by 03 the risk of developing a reoperated abdominal complication. Infection would be a risk factor for reoperation, with a degree of significance in some studies.

Competing Interests

The authors declare no competing interests.

Author Contributions

Catherine Saleh Ugumba wrote the article, Marc Kasha Kasong and Vincent de Paul Kaoma Cabala participated in the data collection, Dimitri Kanyanda Nafatalewa, Augustin Kibonge Mukakala and Trésor Kibangula Kasanga read, translated into English and corrected according to Acta's recommendations scientific, Gabriel Wakunga Warach and Etienne Odimba BF Koshe initiated the article.

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