

Umbilical Port Site in Laparoscopic Cholecystectomy: A Possible Strategy to Avoid Complications

Mario Pacilli¹, Nicola Tartaglia², Giovanna Pavone³, Antonio Ambrosi⁴

ABSTRACT

Laparoscopic cholecystectomy is the gold standard for the surgical treatment of symptomatic cholecystolithiasis. A skin incision is made above the umbilicus, an area that is infrequently exposed to UV light, soaps, and contains a large amount of bacteria. The purpose of this study is to examine the effect of the use of topical prophylactic antibiotic to prevent post-videlaparo-cholecystectomy infection at the umbilical port site. Our outcomes display that in patients treated with topical antibiotics, umbilical port site infections occurred less often than in the patients not treated. Further studies are required to determine what other procedures should be engaged to decrease the high rate of infections.

Keywords: Laparoscopic cholecystectomy, Topical antibiotic therapy, Umbilical port site infection.

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INTRODUCTION

Elective laparoscopic cholecystectomy, also known as minimally invasive cholecystectomy, has become the treatment of choice for the surgical treatment of symptomatic cholecystolithiasis.^{1,2}

It is performed through four small incisions, two ports of 10 mm and two additional 5 mm entrees each in the standard position with the legs opened.³

The skin should be cut for about 10–12 mm approximately in length just above the umbilicus. The subcutaneous fat is dissected with the help of forceps and scissors. The abdominal fascia is elevated with the Kocher hemostatic forceps, and a little incision is made through the fascia. The peritoneum is exposed and opened carefully by a scalpel. Sutures through abdominal fascia are positioned to lock the Hasson port.

The umbilicus is a zone of the body that is not set out to UV light, rarely cleansed, and contains a large amount of bacteria.⁴

The minimal skin injury during laparoscopic cholecystectomy guarantees a lower risk of wound infection, but umbilical port site infection in laparoscopic cholecystectomy procedure is reported to be 9%^{5,6} especially for a difficult operation.

The aim of this study was to investigate how the use of topical prophylactic antibiotic can improve post-VLC infection rate at the umbilical port site, because there is no scientific agreement on the practice of it.

MATERIALS AND METHODS

Study Design and Participants

From September 2013 to December 2019, more than 1,200 patients with cholecystolithiasis underwent VLC, in the Division of General Surgery, Department of Surgical and Medical Sciences of the University of Foggia, School of Medicine, Polyclinic of Foggia, Italy. Nine-hundred and sixty patients were analyzed in the study, affected by the same clinical scenario.

Exclusion criteria were patients who used antibiotics during the previous 7 days (for causes unrelated to the surgery), finding of unpredicted acute cholecystitis, unintentional gallbladder rupture, and change to an open procedure.

^{1–4}Department of Surgical and Medical Sciences, University of Foggia, Foggia, Apulia, Italy

Corresponding Author: Nicola Tartaglia, Department of Surgical and Medical Sciences, University of Foggia, Foggia, Apulia, Italy, Phone: +39 3204394640, e-mail: nicola.tartaglia@unifg.it

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The selected patients were randomized into three groups: Rifamycin group (RG): 320 patients treated by application of rifamycin on the site; Gentamicin group (GG), 320 patients was treated with gentamicin; and control group (CG) was not treated (320 patients).

Rifamycin and gentamicin are often utilized on the skin for the treatment of contaminations caused by germs, founded on the specific evidences about the drug. Skin plagues, pyodermitis, dermatitis, abscesses, infected wounds, and exposed trauma are some examples.

Surgical Technique and Administration of Antibiotic Therapy

Systemic antibiotic prophylaxis was applied, to all patients, with prophylactic intravenous administration of 2 g of cefazolin. Immediately before of the operation, surgical field was prepared by washing all the abdomen, disinfection by iodopovidone (focus on umbilical and periumbilical skin), and final step with 0.9% saline solution.

A 12-mm Hasson trocar was inserted through the umbilicus incision and three supplementary trocars (5 mm at the right quadrant for the left surgeon's hand, 10 mm at the upper left quadrant for the right hand, finally to divaricate the liver 5 mm, at the epigastrium) were introduced. An anterograde cholecystectomy is performed, and the gallbladder is pulled out through the umbilical incision always with a protection container.

Only the umbilical fascia is closed, with a hand-sewn interrupted suture using 0 polyglactin 910 (Vicryl, Ethicon). The skin is closed applying staples, in all cases.

The same surgical tools were adopted to perform the VLC operative technique in all 960 cases.

Postoperative dressings were performed routinely at 1, 5, and 10 postoperative days (POD), and in the last dressing, the stitches were removed.

Protocol for the control group, no topical antibiotic application was expected. The dressing was performed only with disinfection of the wounds using iodopovidone and replacement of the patch.

The procedure for the patients belong to rifamycin and gentamicin group had the identical stages as the aforementioned protocol, but rifamycin and gentamicin was applied according to following scheme:

- Preoperative phase: Twelve hours before VLC, application on the umbilical and periumbilical skin of iodopovidone, affixing a sterile patch with 3 mL of rifamycin (RG) or gentamicin (GG) on the umbilicus.
- Intraoperative phase: After suturing the umbilical access, the area is disinfected and then was affixed a sterile patch with 3 mL of rifamycin (RG) or gentamicin (GG) on the umbilical wound.
- Postoperative phase: At each dressing, application of sterile patch with 3 mL of rifamycin (RG) or gentamicin (GG) on the umbilical wound (1, 5, 10 POD).

The assessed features were the following: (1) pain insisted on umbilical region (pain scale from 0 to 10); (2) analgesic drugs to treat umbilical region pain; (3) signs of phlogosis of the umbilical wound defined according to the Southampton score⁷ as follow: grade 0: normal healing, grade I: erythema, grade II: erythema plus additional signs, grade III: haemoserous release, grade IV: pus discharge, grade V: severe wound infection.

On the 90th post-VLC day, the incidence of incisional hernia in the umbilical region was recorded.

Statistical Analysis

Collected data were examined using statistical package for social sciences software (SPSS version 11.0) by means of the analysis of variance (ANOVA) test to compare the means of independent samples, and Chi-square test used for categorical variables.

RESULTS

During the last dressing, all patients were asked for the value of pain during the postoperative period and the possible use of painkillers (administration for more than 2 days).

The first graph shows (Fig. 1) the mean values of the postoperative notes of pain localized on the umbilical area in patients in each groups.

The means of this three independent samples (treatments) have been analyzed using ANOVA test. There is a statistically significant differences, between the pain values reported among these three groups with a lower values in the RG and GG groups ($p < 0.001$).

The second graph (Fig. 2) shows the percentages of patients in each group, who reported taking pain relievers for more than 2 days in the postoperative period.

In the CG, 250 patients revealed that they had taken pain-relieving drugs (for a period longer than 2 days), 198 patients in the RG, and 203 in the GG. The data obtained were analyzed

statistically, using the Chi-square test, showing a not statistically significant results ($p > 0.05$)

Southampton scoring system was applied to all the umbilical wounds. The values are reported in Figure 3.

- In the control group, Southampton scoring system reveals in 144 cases scored a grade 0—normal healing (45%); 38 cases scored grade I—normal healing with mild bruising or erythema (12%); 86 cases scored grade II—erythema plus other signs of inflammation (27%); 24 cases scored grade III—clear or haemoserous discharge (7%); 19 cases scored grade IV—pus/purulent discharge (6%); and 9 cases scored grade V—deep or severe wound infection (3%).
- In the Rifamycin group, Southampton scoring system reveals in 152 cases scored a grade 0 (48%), 85 cases scored grade I (27%), 66 cases scored grade II (21%), 7 cases scored grade III (2%), 5 cases scored grade IV (1%), and 5 cases scored grade V (1%).
- In the Gentamicin group, Southampton scoring system reveals in 159 cases scored a grade 0 (49%), 80 cases scored grade I (25%), 60 cases scored grade II (19%), 10 cases scored grade III (3%), 6 cases scored grade IV (2%), and 5 cases scored grade V (2%).

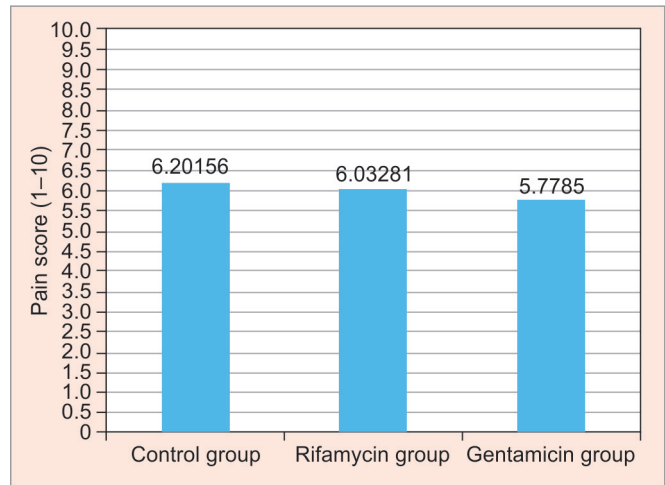


Fig. 1: Mean value pain score

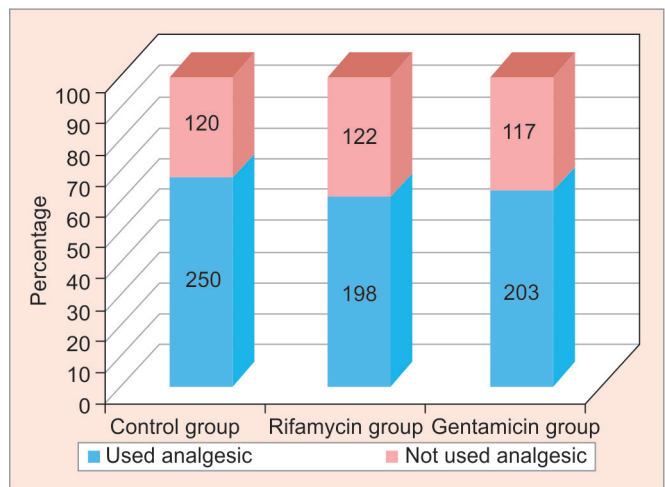
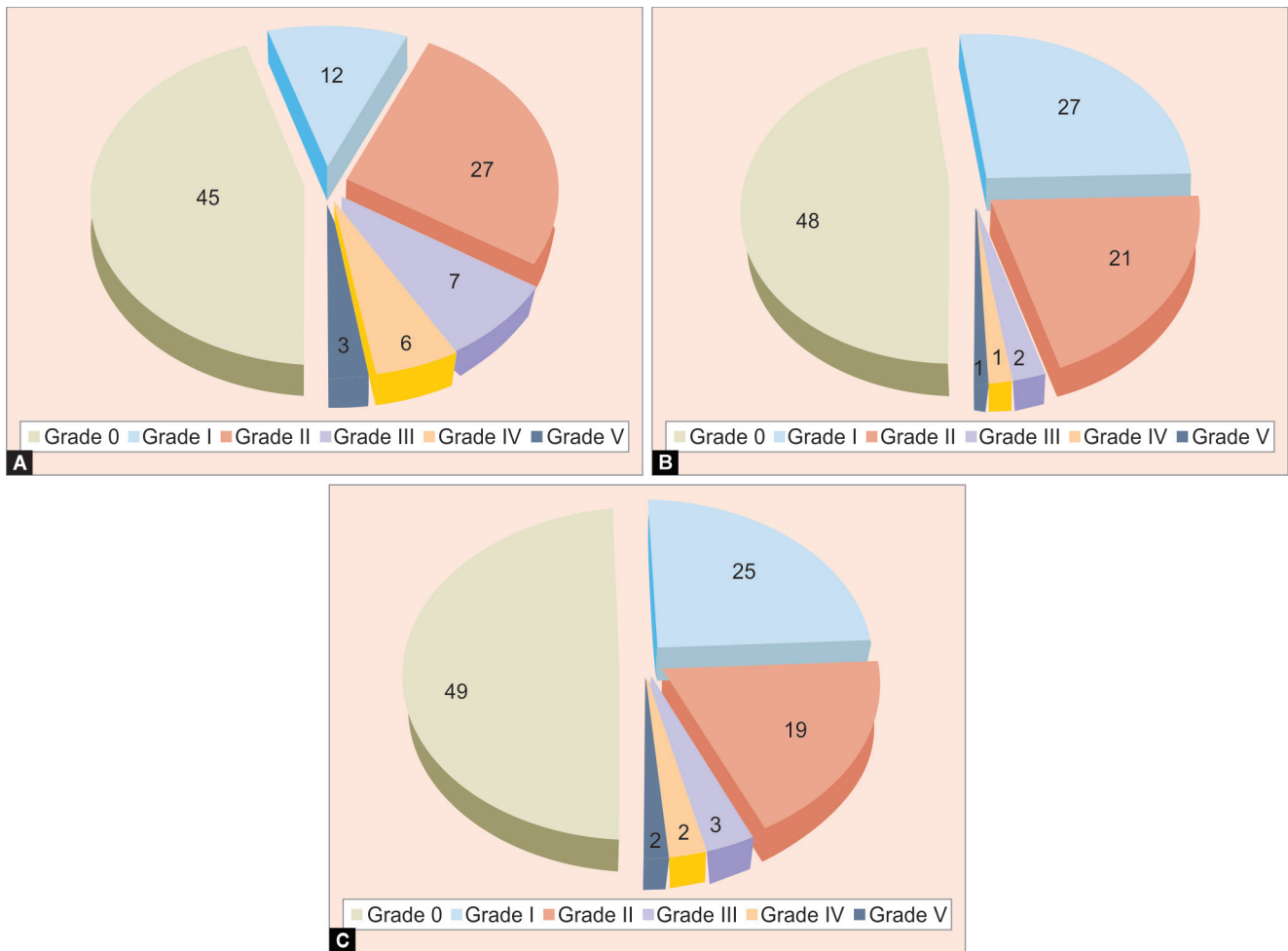


Fig. 2: Analgesic drugs





Figs 3A to C: Southampton score (A) Control group; (B) Rifamycin group; (C) Gentamicin group. grade 0: normal healing; grade I: erythema; grade II: erythema plus other signs; grade III: haemoserous discharge; grade IV: pus discharge; grade V: severe wound infection

In the immediate postoperative phase (12, 24 hours after surgery), clinical data were recorded at and also on the fifth and tenth post-VLC day. All the patients were evaluated to surgical ambulatory up to the complete healing. Ninety days after VLC, seven cases of incisional umbilical hernias were reported in the control group, one in rifamycin group, and two in the gentamicin group.

Data have been analyzed using Chi-square test ($p < 0.001$) showing a statistically significant differences between the three groups.

DISCUSSION

In the interpretation of our results, the use of topical antibiotic therapy about wound infection in elective laparoscopic cholecystectomy has proven to be a good method in preventing wound complications. Our results show that in patients treated, umbilical port site infections occurred less often than in the control group. Even pain score between the study groups and the control group is statistically different. Analgesic usage was found to be lower in the two groups treated, but the results are not statistically significant, and the difference between the groups was small.

All laparoscopic operations are characterized by smaller surgical wounds and less exposed to infections,⁸⁻¹⁰ but precisely because there are small incisions and the intervention is a routine operation

very practiced, a less serious complication like this does not deserve to be underestimated.

The possibility of wound infection is caused mainly by the interaction of the microbial burden, local wound settings, and the host's immune status.¹¹ The role of systemic prophylactic antimicrobial therapy is still not well defined^{12,13} and can only be useful when these other factors are under control.

Surgeons' diagnosis of infection can have a main influence on surgical wound infection rates; therefore, an accurate, specific, and homogeneous definition of infection is important to improving patient recovery.^{14,15}

CONCLUSION

We performed this study for evaluate whether the application of topical antibiotic therapy can significantly improve the postoperative period, reducing the rate of an annoying complication such as umbilical wound infection.

According to the results of this study, umbilical port site infections happened less often in patients treated with rifamycin and gentamicin than in not treated patients.

More studies are needed to assess what other measures should be adopted to decrease the high rate of infection, and whether the application of local antibiotic therapy plus careful disinfection of the

surgical site can replace the administration of systemic antibiotic therapy in laparoscopic surgery.

ORCID

Mario Pacilli  <https://orcid.org/0000-0002-1473-6962>

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