Body mass index as a predictor of complications and conversion in patients undergoing laparoscopic colectomy

BRENO XAIA MARTINS DA COSTA¹, FÁBIO LOPES DE QUEIROZ², PAULO CÉSAR DE CARVALHO LAMOUNIER², ANTÔNIO LACERDA FILHO², RODRIGO DE ALMEIDA PAIVA², PAULO ROCHA FRANÇA², RODRIGO SOARES NAPOLEÃO DO REGO¹, FERNANDA ELIAS FERREIRA RABELO¹

¹Resident, Coloproctology at the Hospital Felício Rocho – Belo Horizonte (MG), Brazil. ²Coloproctologist at the Hospital Felício Rocho – Belo Horizonte (MG), Brazil.

ABSTRACT: Objective: Evaluate the predictive value of body mass index (BMI) for hospital length-of-stay, surgical conversion, and postoperative complications in laparoscopic colorectal surgeries. Methods: Retrospective analysis of 152 patients undergoing laparoscopic colorectal surgery. Patients were divided into two groups: group I (BMI ≤ 30) and group II (BMI > 30). The average hospital length-of-stay and the complication and conversion rates of the groups were compared. Results: Group II had a longer average hospital length-of-stay (9.852 versus 7.112 days) and higher conversion rate (33.3 versus 14.4%). BMI > 30 is a risk factor for conversion, with odds ratio (OR) of 2.972 (95% confidence interval - CI 1.157–7.633). No significant difference was observed between the groups regarding complications. Conclusions: Obesity (BMI > 30) significantly increases the conversion rate of laparoscopic colorectal surgery and increases the average hospital length-of-stay of patients.

Keywords: body mass index; laparotomy; laparoscopy; colorectal surgery; postoperative complications.

INTRODUCTION

Laparoscopic colon resection, described for the first time in 1991¹ for diverticular disease treatment, is today an alternative technique for the treatment of most benign or malignant diseases that affect this segment of intestine. Despite the initial difficulties, the experience acquired has allowed to extend indications to obese, elderly, intestinal inflammatory disease² patients and patients submitted to prior laparotomy.

Once the equivalence of oncologic radicality of laparoscopy in relation to conventional surgeries, the procedure was extended to the treatment of malignant tumors of colon and rectum, promoting the technique and its consolidation as a safe alternative for the treatment of colorectal diseases³⁻⁷. With the procedure safety, also from the oncologic perspective, as well as the laparoscopy advantages, such as reduced pain, morbidity, ileum, hospital length-of-stay and postoperative infection rates⁸⁻⁹, laparoscopic colectomy has become the method of choice for colon surgeries in large centers.

Today, laparoscopic colectomy is widely used in specialized centers, with 40% of elective colectomy procedures performed in the USA between 2005 and 2006⁹. The increasingly common use of this technique has enabled a detailed and individualized evaluation of the risk factor for the conversion to the laparotomy technique and postoperative complications¹⁰. The availability of proper material and the surgeon’s experience are examples of deeply studied factors. Other conditions, such as the influence of excessive weight, are still points to be discussed.

Study carried out at the Coloproctology Clinic at the Hospital Felício Rocho – Belo Horizonte (MG), Brazil.
Financing source: none.
Conflict of interest: nothing to declare.

Submitted on: 08/05/2011
Approved on: 09/06/2011
PATIENTS AND METHODS

This was a retrospective and observational study, based on the analysis of specific protocols of patients submitted to laparoscopic colorectal surgery at the Hospital Felício Rocho (MG), from October 2007 to June 2011.

In this period, 152 laparoscopic colorectal surgeries were performed and the corresponding protocols were analyzed. The patients were sorted into two groups. Group I had patients with BMI of 30 or less, totaling 125 (82.2%). Group II had patients with BMI over 30, totaling 27 (17.8%) (Table 1).

The rates of conversion to conventional surgery, in-hospital complications and the mean hospital length-of-stay were compared between the two groups. In-hospital complications considered in the analysis were as follows: hypovolemia, atelectasis, pneumonia, pulmonary thromboembolism, deep venous thrombosis, urinary infection, urinary retention, surgical site infection, intestinal fistula, pelvic abscess, intestinal ischemia, evisceration, acute myocardial infarction and subcutaneous emphysema.

Fisher’s exact test was used to evaluate the homogeneity of the groups in relation to age and presence or absence of malignity, in each of both associations.

Odds ratio (OR) was used as an association measurement to compare the conversion and complication rates during the hospital length-of-stay between the two groups. The t test was used to evaluate the mean hospital length-of-stay.

The study was evaluated and approved by the Research Ethics Committee of the Hospital Felício Rocho – protocol nº 364/11.

RESULTS

From the 125 patients in Group I, 57 were males (45.6%) and 68 females (54.4%). From the 27 patients in Group II, 16 were males (59.3%) and 11 females (40.7%) (Table 1).

When considering the age group distribution, Fisher’s exact test showed no significant difference between the groups (test result: 0.551). The test also showed homogeneous groups in terms of frequency of malignant and benign diseases in each group (test result: 0.291) (Table 1).

Statistically significant differences were observed in relation to hospital length-of-stay and rate of conversion to conventional surgery between the groups. In terms of in-hospital complications, no statistically significant differences were observed.

Group I had mean hospital length-of-stay lower than Group II (7.112 versus 9.852 days), with p=0.048 (Table 2).

Group I presented the conversion rate of 14.4 versus 33.3% from Group II (p=0.020). The OR of this association was 2.972 (95% confidence interval - CI 1.157–7.633). Therefore, the patients in Group II have a conversion chance 2.972 higher than the patients in Group I (Table 3).

Table 1. Table showing the comparisons between the groups.

<table>
<thead>
<tr>
<th>BMI</th>
<th>Number</th>
<th>Male</th>
<th>Female</th>
<th>&lt;60 years</th>
<th>61–80 years</th>
<th>&gt;80 years</th>
<th>Benign</th>
<th>Malign</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 30</td>
<td>125</td>
<td>57</td>
<td>68</td>
<td>73</td>
<td>47</td>
<td>5</td>
<td>27</td>
<td>97</td>
</tr>
<tr>
<td>(&lt;82.2%)</td>
<td>(82.2%)</td>
<td></td>
<td>(54.4%)</td>
<td>(58.4%)</td>
<td>(37.6%)</td>
<td>(4.0%)</td>
<td>(21.8%)</td>
<td>(78.2%)</td>
</tr>
<tr>
<td>&gt;30</td>
<td>27</td>
<td>16</td>
<td>11</td>
<td>13</td>
<td>13</td>
<td>1</td>
<td>3</td>
<td>23</td>
</tr>
<tr>
<td>(&gt;17.8%)</td>
<td>(59.3%)</td>
<td>(40.7%)</td>
<td></td>
<td>(48.1%)</td>
<td>(48.1%)</td>
<td>(3.7%)</td>
<td>(11.5%)</td>
<td>(88.5%)</td>
</tr>
<tr>
<td>Total</td>
<td>152</td>
<td>73</td>
<td>79</td>
<td>86</td>
<td>60</td>
<td>6</td>
<td>30</td>
<td>120</td>
</tr>
<tr>
<td>(100.0%)</td>
<td>(48.0%)</td>
<td>(52.0%)</td>
<td></td>
<td>(56.6%)</td>
<td>(39.4%)</td>
<td>(3.9%)</td>
<td>(20.0%)</td>
<td>(80.0%)</td>
</tr>
</tbody>
</table>
Group I had 11.2% of in-hospital complications and Group II, 11.1% (OR: 1.009, 95%CI 0.260–3.787). Therefore, as data were collected, there are no evidences of difference in the chances of in-hospital complications between the two groups (Table 4).

**DISCUSSION**

Obesity increases hospital length-of-stay of patients submitted to laparoscopic colorectal surgery. According to Kurmann et al., BMI over 27 increases the risk of surgical site infection, a fact that considerably enhances hospital length-of-stay (15 versus 8 days)\(^{12}\). In a retrospective study that evaluated laparoscopic colectomy exams from 2002 to 2007, Kim C. Lu et al. concluded that obesity is a predictive factor for conversion and that, when compared to fully laparoscopic surgery, the converted surgery leads to longer hospital length-of-stay\(^ {13}\). Chew et al., when analyzing 418 patients, concluded that, the greater the BMI, the longer that mean hospital length-of-stay\(^ {14}\). The results of our study confirm the literature mentioned and show that the BMI over 30, in the studied group, increased the mean hospital length-of-stay (9.85 versus 7.11 days). On the other hand, a study conducted by Delaney et al. did not show any difference in hospital length-of-stay when comparing obese and non-obese patients\(^ {15}\).

The surgical conversion rate is greater in obese patients. According to a study developed by Chew et al., higher BMI increases the conversion rate (OR: 1.15)\(^ {14}\). The conversion risk due to obesity was confirmed by other authors, such as Kim C. Lu et al.\(^ {13}\) (OR: 1.9). The results of this study also indicate obesity as a predictive factor for conversion, showing that patients with BMI over 30 have a conversion chance 2.972 higher than the patients with BMI under 30.

The comparative analysis of post-laparoscopic colectomy between obese and non-obese patients shows divergent results in the literature. It occurs probably due to the absence of standardization of which complications are considered and computed. Just as Tuech et al.\(^ {16}\), our study did not show any significant difference in complication rates when comparing obese and non-obese patients.

This study was a retrospective analysis, in which 152 patients submitted to laparoscopic colorectal surgery has their results analyzed. The study results agree with most available reports in the literature, showing longer hospital length-of-stay (9.85 versus 7.11 days) and greater conversion rate (OR: 2.972) in patients with BMI over 30. Regarding postoperative complications, the studied population did not show any statistically significant difference when comparing the groups with BMI over or under 30.

**Table 4. Complication rate versus grouped body mass index.**

<table>
<thead>
<tr>
<th></th>
<th>Up to 30</th>
<th>&gt;30</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without complications</td>
<td>11.2%</td>
<td>11.1%</td>
<td>11.2%</td>
</tr>
<tr>
<td>With complications</td>
<td>88.8%</td>
<td>88.9%</td>
<td>88.8%</td>
</tr>
<tr>
<td>Responders</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>
REFERENCES


Correspondence to:
Breno Xaia Martins da Costa
Avenida do Contorno, 9530, Barro Preto
CEP 30110-934 – Belo Horizonte (MG), Brazil
E-mail: brenoxmc@yahoo.com.br