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## Original Article

# Adoption rates of laparoscopic techniques for colorectal resections among Brazilian surgeons: limiting factors affecting incorporation into daily practice



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### ABSTRACT

Routine adoption of laparoscopy in clinical practice and Medical Residency has not been widely evaluated in Brazil so far.

**Aim:** To take an overview on the adoption and limitations concerning the use of laparoscopic techniques among Brazilian colorectal surgeons.

**Methods:** A questionnaire was sent to 1870 SBCP filiated members, containing personal and professional data such as sex, age, length and local of practice, SBCP filiation, number of procedures, treatment of cancer and laparoscopy limitations.

**Results:** 418 members (22.4%) sent their response (80% men and 20% women). 110 members (26.3%) affirmed they don't perform any laparoscopic procedure, while 308 (73.7%) have already adopted laparoscopy as a routine. An average number of 7.6 laparoscopic colorectal procedures were declared to be performed per month (1 to 40 procedures). Laparoscopic adoption rates were favourably influenced by young age members (46% vs. 28%) and affiliation to University hospitals ( $p=0.01$ ). Conversely, surgeons from private clinic showed a greater tendency of no adoption. Among the 308 responders, 106 (34.4%) have already surpassed more than 100 laparoscopic cases, and 167 (54.2%) reported an experience of more than 50 operated patients. The group of surgeons not using minimally invasive techniques incriminated lack of training (73.6%) and laparoscopic instruments availability (27.3%) as the main reasons for no adoption.

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*Conclusions:* Adoption rate of laparoscopic techniques to treat colorectal diseases is still low (at least 17%). Future efforts should focus on providing supervised training, proctorship during the initial experience and help instrumental acquisition in centers willing to change their routine and perspectives.

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## **Adoção de técnicas laparoscópicas em ressecções colorretais entre cirurgiões brasileiros. Fatores limitantes que afetam a incorporação na prática diária**

### **R E S U M O**

#### *Palavras-chave:*

Laparoscopia  
Cirurgia laparoscópica  
Adoção  
Cirurgia colorretal  
Treinamento

Durante as últimas décadas, a incorporação de técnicas minimamente invasivas no tratamento de doenças colorretais testemunhou um progresso lento e firme, principalmente após o reconhecimento da segurança oncológica e melhor evolução. A adoção rotineira na prática clínica e na Residência Médica no Brasil ainda não amplamente avaliada até agora. *Objetivos:* O presente estudo visou avaliar a adoção e as limitações relativas ao uso de técnicas laparoscópicas entre cirurgiões colorretais brasileiros.

*Métodos:* um questionário foi enviado a 1870 membros filiados à Sociedade Brasileira de Coloproctologia (SBCP) em 2006. As questões foram enviadas por email, incluindo dados pessoais (sexo, idade) e profissionais (tempo e local de prática, filiação à SBCP, número mensal de procedimentos laparoscópicos, tratamento de câncer e limitações para realizar laparoscopia na rotina.

*Resultados:* Entre os 1870 membros, 418 (22.4%) mandaram sua resposta, com uma maior participação de homens (80%) em comparação às mulheres (20%). A idade média foi de 43 (28–80) anos. A distribuição entre membros titulares e não titulares foi semelhantes (48% vs. 52%). As atividades profissionais foram desenvolvidas em clínica privada (84%), hospitais privados (73%), hospitais públicos (50%) e hospitais universitários (53%). Entre os que responderam (418), 110 (26.3%) não realizavam procedimentos laparoscópicos, enquanto 308 (73.7%) já haviam adotado o acesso laparoscópico rotineiramente na prática clínica. Um número médio de 7.6 procedimentos colorretais laparoscópicos são realizados por mês (1–40). Cerca de 13% dos cirurgiões iniciaram sua experiência laparoscópica diretamente com procedimentos colorretais, enquanto a maioria (87%) começaram por outros procedimentos no trato digestivo. A adoção da laparoscopia foi positivamente influenciada pela idade jovem dos membros (46% vs. 28%) e pela filiação a hospitais universitários ( $p=0,01$ ). Inversamente, cirurgiões trabalhando na prática privada demonstraram uma menor tendência em adotar o método. A maioria dos cirurgiões (93%) que adoraram a laparoscopia afirmou incluir pacientes com câncer colorretal em suas indicações operatórias. Entre os que responderam 106 (34,4%) já realizaram mais de 100 procedimentos laparoscópicos, e 167 (54,2%) reportaram experiência maior que 50 casos. Dentre aqueles que não adotaram técnicas minimamente invasivas, a falta de treinamento (73,6%) ou a indisponibilidade de instrumental laparoscópico (27,3%) foram incriminadas como os principais fatores limitantes.

*Conclusões:* o índice de adoção de técnicas laparoscópicas no tratamento de doenças intestinais ainda é baixo (pelo menos 17%) entre cirurgiões colorretais brasileiros. Esforços futuros de nossa Sociedade Médica devem focar na provisão de treinamento supervisionado, na criação de oportunidades para preceptoria durante a experiência inicial e na obtenção de instrumental em centros que queiram mudar sua rotina e perspectivas.

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## Introduction

Soon after the pioneer adoption by gynecologists during the 80s, laparoscopic access was also rapidly employed to treat digestive diseases, including colorectal diseases in the next decade. Progressively, this approach took on an important role in clinical practice, turning to be a motive of intense practical, scientific and didactic activities. This initial period clearly demonstrated that laparoscopic surgery is technically demanding and the acquisition of special skills and training are necessary to optimize outcomes.

During the last two decades, advances in technology and the accumulated experience allowed the extrapolation of minimally invasive procedures to treat colorectal malignancies. Besides some initial controversies, huge scientific evidence extracted from clinical series, meta-analysis and randomized trials demonstrated the oncological safety associated with laparoscopic colorectal resections.<sup>1,2</sup>

All this progress led many surgeons to seek specific learning and training alternatives. Individually, part of this training may be developed outside the operating rooms, with the utilization of simulators, through experimental procedures in animals or even by watching and discussing operative videos. The exercise of all these activities may allow the surgeon to acquire basic laparoscopic skills such as hand-eye coordination, spatial perception and practice to perform knots and sutures.<sup>3</sup>

Gradually, laparoscopic teaching and training turned to be part of some Surgical Residency Programmes and medical events in Brazil. But besides all this evolution, the laparoscopic access to treat colorectal diseases has not been widely incorporated in Medical Residency or even adopted in clinical practice.

By perceiving the importance of laparoscopic advances in our specialty, the Brazilian Society of Coloproctology (SBCP) has dedicated an enormous effort to develop theoretical and practical courses during the last years. Furthermore, the SBCP have developed courses to help young and senior surgeons to naturally integrate conventional and laparoscopic experiences, by facilitating the access to different forms of basic and advanced training.

Within this context, we decided to develop a preliminary research to investigate the current panorama concerning the adoption of laparoscopic techniques among Brazilian colorectal surgeons filiated to the SBCP. More than that, we tried to discover the current limitations associated with choice.

## Methods

At the end of 2016, a questionnaire was sent to all 1870 SBCP members, in order to be answered via email.

Questions included personal (sex, age) and professional data (length and local of practice, filiations to SBCP, number of laparoscopic/open procedures in a month, treatment of colorectal malignancies and limitations to perform laparoscopy as a routine).

Comparison between the simple variables was performed with the Chi-square Test and *p*-value was considered significant when smaller than *p*=0.05.

## Results

From the total group of 1870 SBCP members, 418 (22.4%) sent their response, with a greater participation of men (80%) when compared to women (20%). Responder's age varied from 28 to 80 years, with an average of 43.0 years. Distribution among Titular and non-Titular Members was similar (48% and 52%). Filiations to the Society was established in periods varying from 1 to 50 years (average 13.9).

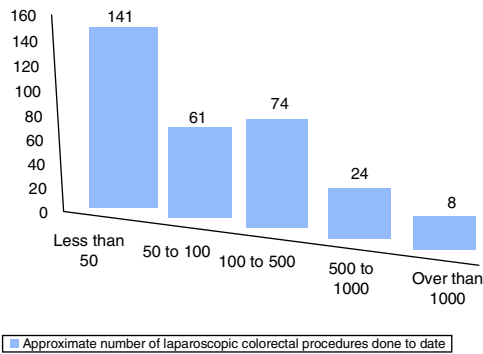
Professional activities were developed in private clinic (84%), private hospitals (73%), public hospitals (50%) and University hospitals (53%). This population reported that they perform an average of 7.6 laparoscopic colorectal procedures per month, varying from 0 to 40 procedures. Surprisingly, 13% of the surgeons initiated their laparoscopic experience directly with colorectal procedures, while most of them (87%) started performing digestive surgery before colectomies.

Among the 418 responders, 110 (26.3%) affirmed they don't perform any laparoscopic procedure, and 308 (73.7%) have already adopted laparoscopy as a routine in their clinical practice. [Table 1](#) shows some of the personal features and their relationship to laparoscopic adoption.

Regarding age, the adoption rate among younger members is greater (46% vs. 28%, *p*=0.03). However, so far there was no difference in adoption among individuals older than 40 years of age (72% vs. 53%, *p*=0.10). When we compared data concerning local of professional work, the affiliation to University hospitals seemed to be a personal feature that favored adoption of laparoscopic techniques (*p*=0.01). On the other hand, doctors only working in private clinic demonstrated a greater tendency of having not adopted laparoscopy so far.

**Table 1 – Influence of some personal features on laparoscopic adoption of colorectal techniques.**

Personal features	308 LAP adoption, n (%)	110 No LAP adoption, n (%)	<i>p</i> (Chi square test)
<40 years	144 (46.7%)	31 (28.2%)	0.03
≥40 years	164 (53.2%)	79 (71.8%)	0.10
University hospital affiliation	156 (50.6%)	31 (28.2%)	0.01
Private clinic	71 (23%)	40 (36.4%)	0.05
Public hospital	6 (1.9%)	6 (5.5%)	0.09



**Fig. 1 – Number of surgeons and laparoscopic colorectal resections performed.**

According to the informed data, experience with laparoscopic colorectal procedures was initiated from 1989 until recently (2016). The great majority of surgeons (93%) uses the laparoscopic access to treat colorectal malignancies, but still exists a small proportion (7%) that doesn't agree with this indication.

Learning of laparoscopic techniques was planned with preceptor ship during surgery (49.4%), training during medical residency (51%), practical courses with animals (59.4%) and theoretical courses (65.6%). Again, participants could answer more than one way to learn.

In Fig. 1, it is possible to appreciate that SBCP Members have already developed a significant laparoscopic experience. Among the 308 surgeons, 106 (34.4%) surpassed more than 100 laparoscopic cases and 167 (54.2%) have already reached the number of 50 procedures, which is considered the point of learning curve for laparoscopic colorectal resections Kim et al. 2014. Despite this, most surgeons (64%) reclaimed they are not happy with their monthly surgical volume at the moment.

This is better appreciated when we note that among surgeons who have adopted laparoscopy and work in private hospitals as well, the number of monthly procedures is only 1 for 5/71 (7%) surgeons and less than 4 for 41/71 (57.8%) surgeons. However, when analyzing those who have not adopted laparoscopy, the number of monthly procedures is much

lower. Thus, 24 (62.5%) surgeons perform at most 1 procedure per month among those who haven't adopted laparoscopy yet.

Fig. 2 presents the alleged motives to justify non-adoption of laparoscopy. It is interesting to note that 73.6% referred they would like to, but haven't accomplished training yet. Another 27.3% report that they do not have access to the laparoscopic material and instruments.

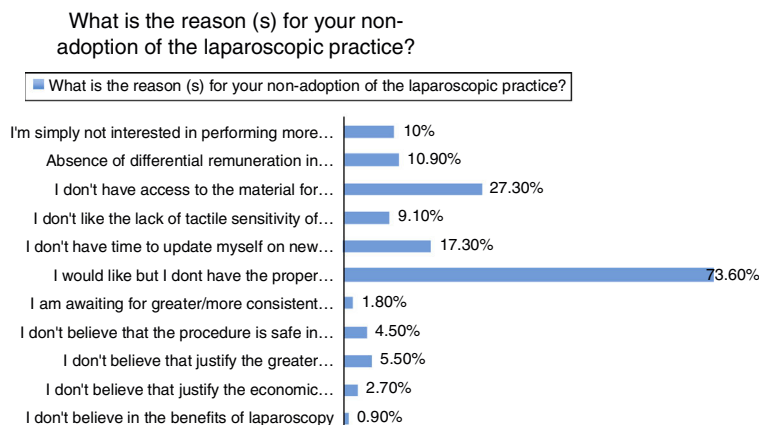
## Discussion

Adoption of laparoscopic techniques to treat colorectal diseases has gradually increased, despite issues concerning availability of specific instruments, technical complexity and oncological safety.<sup>4</sup> Demonstration of consistent data showing short and long-term benefits when compared with open colectomy was the basis for this shift.

However, movement towards minimally invasive techniques requires the acquisition of special skills concerning the understanding of the anatomy and handling operative instruments. More than that, the progressive development of colorectal laparoscopic techniques demonstrated lots of innovations that are far from its end. For example, numerous debates regarding controversies such as medial to lateral dissection, adequate vascular control, intracorporeal anastomosis, specimen transanal extraction, transanal total mesorectal excision and others issues certainly helped to improve outcomes along the way.

Certainly, variations in laparoscopy acceptance may depend on geography, surgeon's age, University-filiations, previous experience with laparoscopy and disease nature, among others. In this way, a slow adoption overtime is a natural consequence of different technical challenges and limitations, which demands a steep learning curve associated with surgical morbidity.<sup>5</sup> And this complex scenario may become even greater if the surgeon didn't have the opportunity to learn and practice the laparoscopic approach during one's medical residency in colorectal surgery.

Historically, data from the beginning of the century showed adoption rates varying from 10-27% in studies using administrative databases (such as National Inpatient Sample). In an assessment made over the years, Lacy et al.<sup>6</sup> demonstrated increasing rates of laparoscopic colectomy of 2.2% for



**Fig. 2 – Reasons to justify non-adoption of laparoscopic colorectal techniques.**

1996, 2.7% for 2000, 5% for 2004, 15% for 2008 and 31.4% for 2009. More recently, Davis et al.<sup>7</sup> reported that the use of laparoscopy gradually increased from 22.7% in 2005 to 49.8% in 2014 by analyzing 277,000 colorectal patients. They also reported that laparoscopic procedures were most commonly performed in young, obese and ASA 1–2 class patients (American Society of Anesthesiologists classification), and that emergent cases also doubled from 5.5% to 11.5% over a 10 year period.

Progressively, reported numbers started to grow. In a more recent review of 9075 patients, Fox et al.<sup>8</sup> identified more than 50% treated via the laparoscopic approach. Even the indications of proctectomy for rectal cancer reached a 30% grade of acceptance,<sup>9</sup> even though the learning curve for rectal resections is considered greater than that for the colon.<sup>10</sup>

Over the years, the Brazilian Society of Coloproctology (SBCP) has documented its Members' experience with the laparoscopic technique in many publications.<sup>11–14</sup> But the present study is the first to collect information and to assess factors that could limit the adoption of laparoscopic colorectal procedures in our country. Although it does not represent the whole surgical community, it represents a group of experts.

From the 418 Brazilian responders, 110 (26.3%) reported they do not perform any laparoscopic procedure, while 308 (73.7%) do. In a radical scenario supposing that the remaining Members of our Society didn't send their response cause they did not use the laparoscopic approach so far (which could be a bias in our current presented data), we would still have 308 in a universe of 1870 members (16.5%) that have already adopted laparoscopy for colorectal resections.

Probably, there exist many reasons to justify why a greater number of surgeons have not taken this opportunity so far. Our research revealed reasons such as absence of adequate training (74%), of specific payment (18%), and unavailability of laparoscopic instruments (27%). We all recognize that lack of resources, proper training and specialization is a justifiable scenario in a country like ours. Thus, we may hypothesize several reasons to explain the low adoption of laparoscopy for surgeons working in public hospitals not linked to Medical Schools. For example, the unavailability of proper equipment and training, the absence of specific reimbursement and the longer operative time associated with laparoscopic procedures.

In an interesting survey among general surgeons from Canada, Moloo et al.<sup>15</sup> found that recent graduation, male sex, practice location, university-hospital affiliation and training were independent predictors for offering the laparoscopic approach. Within this group, they agreed that the main adoption barriers were represented by lack of operative time (43%), formal training (51%) and absence of laparoscopic facilities (35%). Also, other potential barriers included inadequate financial reimbursement (33%) and absence of enough scientific evidence to operate cancer for another 30%. Those findings were very similar to our current data, such as lack of time to learn or training; inadequate payment and unavailability of adequate material were also appointed.

One important predictor was that younger surgeons were more likely to offer laparoscopy. Probably, this information

reflects not only the fact that these surgeons have been exposed to laparoscopy during residency, but also a greater acceptance of the young to everything that is "new" or the "future". In our survey, the adoption rate among younger members is greater (46% vs. 28%,  $p=0.03$ ) and similar within the older group.

Medical residents participation in laparoscopic procedures is credited to increase operative times and complications, but this subject is extremely controversial.<sup>16–19</sup> However, experience has demonstrated that a gradual participation in laparoscopic procedures, the assumption of progressive responsibilities' and the constant presence of a preceptor is fundamental. A preceptor ship could shorten the learning curve, overcome challenges and improve outcomes.<sup>20</sup>

When facing the whole picture, a Medical Society like ours should help its Members to become technically proficient. Thus, identification of hospitals and areas lacking proper material and trained staff would be ideal targets to install a preceptor ship programmed. Simultaneously, the organization of laparoscopic colectomy courses and the establishment of post course mentorship would definitively improve laparoscopy incorporation into clinical practice. A costly, difficult but not impossible strategy would also include remote mentoring for surgeons in specific and distant areas.<sup>21</sup>

Currently, SBCP Board Members are discussing and analyzing economical and practical limitations regarding the definition of continuous education strategies and tutorship in different areas where the colorectal surgeon may develop personal skills and expand specialization. Future generations will certainly take profits from this decision.

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## Conflicts of interest

The authors declare no conflicts of interest.

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