

Adherence to Laparoscopic Colorectal Surgery in Argentina and its Relation with the World. Survey Results

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Abstract

Background: Despite having successfully passed different quality and safety controls and being considered a standard by some authors, laparoscopic colorectal surgery, after more than 20 years of experience since the first publication, seems to be relegated to minority groups, with an adoption not exceeding 20% of specialists worldwide. This study is become acquainted with the adherence to laparoscopic approach in colorectal surgery in Argentina and the rest of the world.

Methods: During March 2011, a national survey was conducted. The request was sent by e-mail to all the members of Argentine Societies of Coloproctology. In order to obtain parallel data from the rest of the world, three different search methods were used.

Results: National Survey: 187 (73% of them) colorectal surgeons specialists answer the survey. 43 out of 187 responses received, corresponded to specialists who perform laparoscopy. This represents a 23%. The percentage of surgeons increased 13% compared to the previous survey in 2007. The total number until March 2011 was of 9701 laparoscopic colectomies. This represents an increase of 214%. 62.3% of the procedures were performed by specialists in colorectal surgery.

72% of all surgeons were under 50, 21% were between 50 and 60 and 5% is between 60 and 70. Finally, 1% is over 70 years old. 78% (65/83) of those who perform laparoscopy, work in large cities.

14 responses (64%) were received out of 22 e-mails sent to different societies in the world. The overall percentage of this survey was 20.2%. 14 emails were sent to Latin America, the overall percentage of adherence in the region is 24.2%. The overall result of the global survey was 22.4%.

Conclusions: The level of offering of laparoscopic colorectal surgery in Argentina is low but it is growing. According to this the worldwide adherence would be below 30%.

Keywords: *National/Global Survey; Laparoscopic; Colorectal Surgery*

Introduction

Laparoscopic colon surgery has shown safety and benefits in the short and long term compared to conventional surgery. More than 10 years ago, prospective multicenter studies had been published with good level of evidence, which also show the advantages of this approach in neoplastic colonic disease [1-10].

Although there are research papers of good scientific level on rectal cancer [11-16], results from large collaborative groups are still expected. Recently, COLOR II showed similar oncologic results in laparoscopic and conventional surgery [17-19].

Despite having successfully passed different quality and safety controls and being considered a standard by some authors [20-22], laparoscopic colorectal surgery, after more than 20 years of experience since the first publication, seems to be relegated to minority groups, with an adoption not exceeding 20% among specialists from different parts of the world.

This percentage may still be lower if malignant pathology is exclusively analyzed [23,24].

This is a fact that concerns the surgical community, since a technique that has proven to be superior to the conventional approach is not affirmed as first option in most of the world [1,2,25,26].

There are no publications in the current literature that reflect the world reality regarding the level of adherence to this method.

Surveys are used as tools to get a close knowledge of the situation and to be able to work in the search of solutions that accelerate the incorporation of this technique on a larger scale.

Two previous surveys were carried out in Argentina by Salomon., *et al.* The first one in 1998 [27] showed that up to that time, 176 laparoscopic colectomies had been performed in the country. 9 years later in 2007, the same author reports an adherence of 10% of this approach, which corresponded to more than 3000 procedures [28].

The low figure or percentage of surgeons who carry out a technique, may be one of the important limitations when it comes to declaring the procedure as an standard.

However, it is not clear what the trend of national or global growth is in this regard.

Getting to know the data provided by a survey can signal a growth rate. There are not many publications where this data can be found and it is possible that many scientific societies do not have clear figures in this regard.

Aim

Become acquainted with the adherence to laparoscopic approach in colorectal surgery in Argentina and the rest of the world.

Methods

In March 2011, a national survey was conducted with 8 simple response points. This survey was distributed to all surgeons who were members of the Argentine Association of Surgery and to all specialists in coloproctology, who were members of the Argentine Society of Coloproctology. The request was sent by e-mail to all the members registered in the database of both scientific societies.

The questions were as follows: name and surname initials, age group by decade, geographical location of the hospital and type of institution: public or private hospital with or without university affiliation. Whether the surgeon performs laparoscopic colon surgery, when the surgeon performed the first intervention, how many surgeries he performs every year and how many surgeries he has performed so far (See figure 1). Our interest were to ask for any kind of procedure done by laparoscopy (colon, rectum, benign or malignant, schedule surgery or emergency), we look for a gross percentage and not for the expertise.

All the responses were sent to the same email address. Data were entered into a prospective base Excel Mac 2011, for further analysis.

Duplicate responses were identified by source mail and data matches and consequently they were discarded. In the case of surgeons who received both mails for being members of the two societies and replied twice, the considered response was that corresponding to the specialty and it was discarded from the list of general surgery.

National Survey on Laparoscopic Colorectal Surgery (LCS) in ArgentinaName and surname initials :

Choose the correct option

Age < under 30 between 30 and 40 between 40 and 50 between 50 and 60 between 60 and 70 ▪ Geographical location of the Hospital :

▪ Type of institution where you perform your medical practice

University Hospital General Hospital Private Institution

▪ Do you perform laparoscopic colorectal surgery?

Yes No ▪ When did you perform your first LCS? :

▪ How many LCS do you perform per year?

20 30 40 50 60 70 + de 70 ▪ How many LCS have you performed so far?

In order to reduce bias, the results were divided into 3 groups:

1. Gross value: It was considered as that given by the result of the total responses received.
2. Assumed value: It was taken as a result of considering that those surgeons who did not respond the survey, do not perform laparoscopic surgery.
3. Value of the specialists: They were analyzed in isolation for being considered the most representative group.

Note: since the latter is considered the most exact one, it will be used as a reference value. The other values are considered for their greater bias, only as isolated approximation data, therefore they will not be included in the discussion.

3,800 mails were sent to members of the Argentine Association of Surgery (AAC) and 256 mails were sent to members of the Argentine Society of Coloproctology (SACP).

This is the number of members registered by each society in the analyzed period of time (data obtained from the Secretary of the corresponding society). From the total amount (4056), 430 responses were obtained (10.6%), which were used for the analysis.

In order to obtain parallel data from the rest of the world, three different search methods were used. In this case, the desired information was only the overall percentage of adoption of each country, without any other details. It was sought to know independently, the percentages for Latin America as a region:

1. E-mails were sent to the presidents of the Scientific Societies of Coloproctology from abroad, which have a web page in English, Spanish, Italian or French. The mails were written in English, requesting the percentage of adoption to laparoscopic colorectal surgery registered in their society. The list of mails of the societies was obtained from the website of the International Society of University Colon and Rectal Surgeons.
2. For the Latin American countries, the mail list of the contacts of the Argentine Society of Coloproctology was requested. The author's contact list was also used to send information to referents of the country in a personal way, in case no response was obtained from the society.
3. PubMed search results of articles from 2009 up to the present with the following key words in English: laparoscopy and colorectal surgery. Language filter was used: English, Spanish, Italian or French. For different publications from the same country, the highest percentage found and the most recent publication were considered. Data of global use was applied and the publications that differentiated only the approach to malignant pathology were discarded.

The results were expressed as percentages and were compared to those of the national survey.

Adherence is defined, according to the dictionary of the Royal Spanish Academy, as the action of adding or expressing support for a doctrine, statement, opinion, etc. In this case it is used to make reference to the action of adhering or joining a surgical procedure.

Results

National Survey: 243 out of the 430 answers (6.4% of the total members), corresponded to members of the AAC, and 187 (73% of them) corresponded to specialists of the SACP.

1. Gross value: 83 out of 430 responses (19.3%), corresponded to surgeons who perform laparoscopic surgery of the colon and rectum.
2. Assumed value: 2% corresponds to 83 of the total of both standards. 40 members of AAC and 43 members of the SACP. This represents 1% and 17% for each society respectively.
3. Specialists: 43 out of 187 responses received, corresponded to specialists who perform laparoscopy. This represents a 23%.

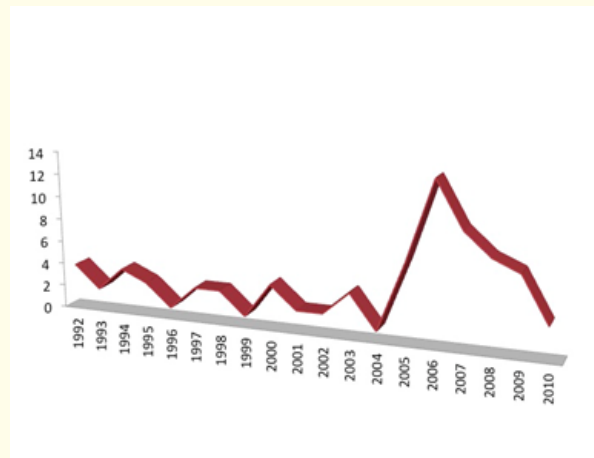
If we consider the best figure for specialists as the most real, we can see that the percentage of surgeons increased 13% compared to the previous survey of 2007 (23% and 10% respectively).

The total number of surgical procedures registered by the survey until March 2011 was of 9701 laparoscopic colectomies. This represents an increase of 214% in the total number of surgeries compared to the figure portrayed in the previous survey (3088). 62.3% of the procedures were performed by specialists in colorectal surgery (6039 out of 9701).

The surgeons who responded that they offer laparoscopy to their patients are distributed in the following age groups: 42% is between 30 and 40 years old, 30% is between 40 and 50, 21% is between 50 and 60 and 5% is between 60 and 70. Finally, 1% is over 70.

The largest number of procedures (92%) was reported by surgeons aged between 30 and 60, with the following distribution: 3386 surgeries among surgeons aged between 40 and 50, followed by surgeons aged between 30 and 40 (2859 surgeries), surgeons aged between 50 and 60 (2718 surgeries), surgeons aged between 60 and 70 (687 surgeries) and surgeons of over 70, 50 procedures.

The average increase in the number of new surgeons per year who adhered to the laparoscopic approach in colorectal surgery in the analyzed period (obtained from the question: When did you perform your first CLC?), was of 4.4 per year. If it is divided into 2 periods from 1993 to 2004 the observed increase was on average 2.5 (1-4) surgeon per year. While from 2005 to 2010 this average rose to 8.2 per year, showing a clear increase (See Graph 1).



Graph 1: Number of surgeons and year when they started performing Laparoscopic Colorectal Surgery.

The 78% (65/83) of those who perform laparoscopy, work in large cities and the 57% (47/83) belong to private hospitals and hold a university affiliation.

Nine surgeons reported they perform 50 or more procedures per year. 18 surgeons perform 30 to 40 procedures a year. The largest number of surgeons perform less than 20 surgeries a year. One of the surgeons even reported having performed 1 procedure.

Global Survey results

14 responses (64%) were received out of 22 e-mails sent to different societies in the world. 8 out of the 14 responses reported to have no registers. 3 out of the 6 societies left responded with approximations and the other 3 (Malaysia, Belgium and the Mediterranean Society of Coloproctology) had registries in their database. The overall percentage of this survey was 20.2% (12 - 29%) (See table 1).

14 emails were sent to Latin America and 43% were answered (6), 4 of which responded with approximations and 2 countries responded they had no records. The overall percentage of adherence in the region is 24.2% (10 - 50%) (See table 2).

The overall result of the global survey was 22.4% (10 - 50) (See table 3). The overall result of the indexed publications was 36.6% (15.8 - 54) (See table 4). By adding the data obtained from the global survey and the publications identified, we get an average value of 26.5%. This can be taken as the worldwide adherence value that could be noticed through this work (10 - 54).

	Colorectal Society	President name	Response
1	Australia and New Zealand: www.cssanz.org (secretariat@cssanz.org)	Neilson, L	SR
2	Austria: www.chirurgie-ges.at/	Pfeifer, J	15% *
3	Canada: www.cscrs.ca		NR
4	Egypt: www.ess-eg.org (cobshahi@link.net)	Zeid, A.A	SR
5	Germany: www.koloproktologie.org (kontakt@koloproktologie.org)		NR
6	Great Britain and Ireland: www.acpgbi.org.uk (acpgbi@asgbi.org.uk)	Parker, M	20%*
7	India: www.acrsi.org		NR
8	Israel: www.iscrs.org		NR
9	Taiwan: www.crs.org.tw		NR
10	Spain: www.aecp.es.org (sepd@sepd.es)		NR
11	France: snfcp@snfcp.org		NR
12	Switzerland: www.ars-sgc.ch (stephan.vorburger@insel.ch)	Clavien, P	SR
13	Italy: www.siccr.org (segreteria@siucp.org)	Stuto, A	25%*
14	Malaysia: www.colorectalmly.org	Gul, Y	5%#-20%&
15	South Korea: www.colon.or.kr		NR
16	Singapore: www.scrs.org.sg		SR
17	South Africa: www.healthsoc.co.za		SR
18	Belgium: www.belsurg.org/index.php?art=20	Penninckx, F	29%
19	European Society of Coloproctology		SR
20	Asian Pacific Federation of Coloproctology	Sheikh, P	SR
21	Latin American Association of Coloproctology	Hequera, J	SR
22	Mediterranean Society of Coloproctology	Kanellos, I	12%
	Total		20,2%

Table 1: SR: no registers, NR: does not respond, * approximation, # general surgeons, and colorectal surgeons.

	Latin American Societies of Coloproctology	Name	Response
1	Argentina: www.sacp.org.ar	Present survey	23%
2	Bolivia: nricarpa@yahoo.com		SR
3	Brazil: www.sbcop.org.br	Regadas, S	20%
4	Chile: www.coloproctologia.cl	López Kostner, F	50%*
5	Cuba: www.sld.cu/sitios/coloproctologia/		NR
6	Ecuador: www.coloproctologiaecuador.com		NR
7	El Salvador: www.ascelsalvador.com		NR
8	Guatemala: www.acrg.net		NR
9	Mexico: www.smcrc.org.mx		NR
10	Paraguay: catedral@scavonehnos.com.py		NR
11	Dominican Republic: sdcop2009@hotmail.com		NR
12	Uruguay: www.cirugia-uy.com		SR
13	Venezuela: www.svcp.org.ve	Martínez, S	10%*
14	Colombia: www.coloproctologiacolombia.com		NR
	Total		24,2%

Table 2: SR: No Registers; NR: Does Not Respond; * approximation.

Global Survey	Response %
Argentina	23
Austria	15
Belgium	29
Brazil	20
Chile	50
Venezuela	10
Great Britain and Ireland	20
Italy	25
Malaysia	20
Mediterranean Society of Coloproctology	12
Total	22,4

Table 3: Global Survey.

Country	Author	Citation	Period	Global
Canada	Moloo, H	Can J Surg 2009	2009	54%
USA	Kang, C.	Arch Surg 2012	2007-2009	36,4%
Japan	Kuwabara, K	J Surg Res 2011	2006-2007	15,8%
Great Britain and Ireland	Coleman, M	www.lapco.nhs.uk	2012	40%
Total				36,6%

Table 4: PubMed database search.

Discussion

Even though it is impossible to know exactly what the value is worldwide, we were able to obtain an approximation of different countries which do not have their data published.

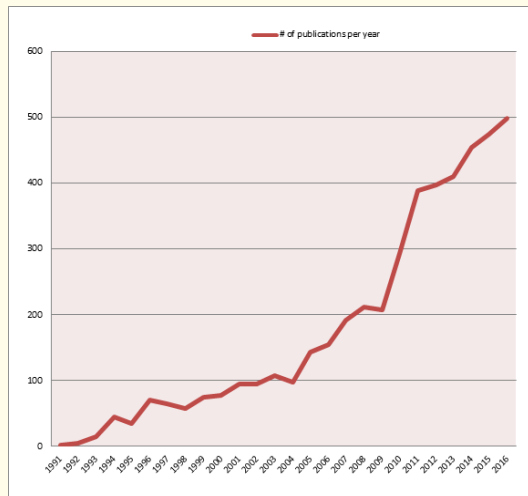
This difficulty in accessing information is given by different factors, as we portrayed in the survey, many countries do not have data recorded, most of them responded with approximations. There are few publications about this topic and possibly there are others that cannot be accessed because they have not been indexed or they might have been published in languages that are not understandable by the authors.

When 4 large societies that gather different societies of countries were surveyed, we obtained the response of only one of them. The other 3 informed to have no records. Their responses could have been considered to be more representative, since they are the Latin American Association of Coloproctology, the European Society of Coloproctology, the Asian Pacific Federation of Coloproctology and the Mediterranean Society of Coloproctology, each of them with a significant number of countries in every region.

This difficulty forced us to send e-mails to each country, without these large organizations as intermediaries.

Taking into account all of these limitations, this is the first study to carry out a global survey in order to try to find out the reality of the application of laparoscopic surgery worldwide in colorectal pathology and at the same time, to be able to compare the results with a national survey.

The increase in the number of publications in PubMed year by year regarding this subject, clearly shows the raise of interest of new work groups that turned to laparoscopic surgery (Graph 2).



Graph 2: PubMed search with "laparoscopy and colorectal surgery" as keywords.

This survey shows a slow growth in the implementation of the laparoscopic approach in Argentina and the rest of the world.

A deficit in our country is the lack of records of surgical procedures at national level, which would allow us to know, as it happens in developed countries, the number of surgeries performed via this approach.

As expected, this survey portrays that the greatest growth occurs in the group of young surgeons. Currently, these are the ones who often offer the laparoscopic approach and also, they are the ones who add up more procedures.

These results agree with the survey of Moloo, *et al.* published in 2009, regarding the adherence to laparoscopy in Canada [29]. In the survey mentioned, the authors found that surgeons offering laparoscopic surgery are younger than the ones performing conventional surgery. They also have shorter graduation time or surgery performance and belong to institutions with university affiliation.

In our survey, most surgeons also belong to hospitals with university affiliation, but this information was not a determinant condition since 42% of those who perform laparoscopic colectomies work in private or non-teaching institutions. Both surveys were similar in that most surgeons live and work in large cities [29].

The difference in the use of laparoscopy according to the type of city was also reported by other authors who mention that despite the universal availability of equipment in all US hospitals, there is a wide variation in the use for colorectal surgery among hospitals that are located in large cities and hospitals located in the rural areas of the same country [33-44].

In an Australian paper published in 2014, where the use of laparoscopy in colorectal cancer with data extracted from a national base was evaluated, it was observed that the institutions that most adhere to laparoscopy in colon cancer are the private ones over the public ones, but no differences were found when analyzing rectal cancer [36].

Another finding that emerges from the national survey is that the majority of surgeons in Argentina who perform laparoscopic colectomies (64%) are considered to be of low volume (20 or less per year) [30]. In a Japanese paper published in 2009, which assesses the difference between hospitals in that country according to the volume, they find that in hospitals considered to be of low volume, quality surgeries can be performed and with a rate of complications similar to those of high volume. They argue that this is possible in duly accredited centers and with well-trained surgeons in laparoscopic surgery [45].

A large difference with our country and more developed countries like Canada, is the percentage of surgeons in one country and another who offer laparoscopy. While in Argentina it is 23%, the Canadian survey finds a 54% of colorectal surgery specialists who perform the laparoscopic approach in a daily basis.

But if we compare the percentages by regions, Argentina is within an acceptable range for South America, since the overall region has 24% of application but only 4 countries responded.

The result of the global survey was 22%. In that survey, the high offer in Chile (50%) draws the attention, since it is comparable to the standards of developed countries such as Canada (54%) or the USA (36%) [29-31].

Even though in the developed countries the growth of laparoscopic surgery is greater or more accelerated than in the rest of the world, a slower but steady increase is observed in underdeveloped countries [40,41].

Baigrie, *et al.* make reference to the differences in the development of laparoscopic colorectal surgery in underdeveloped countries, compared to developed countries, and suggest the hypothesis that despite the economic difficulties and the lack of access to this training approach, it still grows in these countries [40].

In a small series of a Jamaican hospital that compares oncology safety in patients undergoing laparoscopy and also conventional surgery, it shows that it is possible to perform laparoscopic colon resections safely and without differences with open surgery. The authors suggest that the training of surgeons in underdeveloped countries should be encouraged [41].

In Moloo's Canadian paper, the group of surgeons who perform conventional surgery responded that the barriers that prevent them from offering laparoscopy were the lack of training in mini invasive surgery and longer surgical time. As we can see, the difficulties to access a training in advanced laparoscopic surgery are not only a problem of the underdeveloped countries [29].

One of the points under discussion are the different criteria used among countries to measure adherence to the laparoscopic approach.

In Canada and Argentina, the measurement was performed using a national survey, which generally reflects the number of surgeons. In the United States, Australia, and Japan, national databases were primarily used to assess the number of procedures performed in this way, but in most of the countries surveyed the approximation approach was used [27-31,33-37].

This may reflect that in most countries the rate of laparoscopic approach is not really known.

As observed in our study when we analyzed Great Britain for instance, there was a difference observed between the response of the Society of Coloproctology of the mentioned country, that informed to have a 20% of adherence while the publication in the webpage of the LAPCO national training program portrayed the official figure as being 40% [32].

It is not clear what the best method to measure is, since different issues are evaluated and this makes it difficult to draw conclusions.

It is also difficult to understand when comparing percentages of adherence in different publications of the same country, and we observe very different figures without a clear explanation but the mere interpretation of each author.

It can be seen in table 5 that in 2007 a survey in Canada reported that less than 5% of surgeons performed laparoscopic colon surgery. 2 years later, this percentage increased to 54% [30,31].

The same happens with the United States. There were two papers published in 2012. One of them portrayed a global use of laparoscopic surgery of 36% and the other one, carried out during the same study period, reported that 50% of the malignant pathology in the US was operated by laparoscopy [32-34]. Another example is a current publication which portrays the experience of 8 hospitals within

the NCCN (National Cancer Center Network) where it is shown that in 2010, these centers performed minimally invasive procedures in 51% of the patients with colon and rectal cancer [35] (Table 5).

Country	Author	Citation	Period	Cancer (%)	Global (%)
Canada	Birch DW	Can J Surg 2007 (31)	2007	-	< 5
Canada	Moloo, H	Can J Surg 2009 (30)	2009	-	54
USA	Rea, J.D.	Ann Surg 2011 (24)	2001-2003/2005-2007	8,9	-
USA	Kang, C.	Arch Surg 2012 (32)	2007-2009	-	36,4
USA	Fox J., <i>et al.</i>	DCR 2012 (34)	2008-2009	50	-
USA	Yeo, H	JNCI 2015 (35)	2005-2010	51	-
Japan	Kuwabara K	J Surg Res 2011 (36)	2006-2007	-	15,8
Australia	Dubbins T.A	DCR 2014 (37)	2008	19,5	-
UK	Coleman, M	www.lapco.nhs.uk (33)	2012	-	40

Table 5: Differences in publications by country

A different case was the growth shown by Great Britain, which through the national LAPCO program could train surgeons of different ages and incorporate them into laparoscopic surgery. This program monitors learning in a tutorial course which lasts 2 years. After that period of time, the surgeon acquires the necessary skills to perform advanced surgery [32].

One of the barriers that delayed the development of laparoscopic colon and rectal surgery were the initial investigation papers on laparoscopy and cancer, which put a shadow of suspicion on the oncological safety of this technique [37-39].

This is reflected in a paper published in 2008 that portrayed a little use of the laparoscopic approach for colorectal cancer in the United States with a growth of 3.8% in 1998 and 5.2% in 2002. The data used by the authors came from the National Cancer Data Base [23].

In a medical specialty where approximately 60% of the surgical pathology is malignant, this was a determining factor which prevented the massive development of the technique on the one hand, but on the other, it led to the formation of collaborative working groups around the world which generated papers of great scientific level.

One of these examples was the COST publication (Clinical Outcomes of Surgical Therapy study group) in 2004. This was studied by Rea, *et al.* in a paper published in 2011, when evaluating the impact on the percentage of laparoscopic surgeries performed in the USA before and after the publication of COST [4-24].

The two periods studied were from 2001 to 2003 and from 2005 to 2007, observing that in cancer that percentage increased from 2.3% to 9% in the second period. The difference observed in benign pathology was lower in the same period (6,2% to 12%), so the authors take this fact as relevant in the development of laparoscopic colon surgery [24].

Something similar is observed with the scientific production when we searched in Pub-Med the line graph of publications (Graph 1). It increased significantly after 2004 and the Rea publication can be an explanation for this phenomenon [23].

In our survey we were not able to establish the difference between benign and malignant pathology, but we could observe that the percentage of surgeons who adhered to this technique per year went from 2.5 before 2004 to 8.2 new surgeons per year who adhered to the offering of the laparoscopic approach after this period.

Because of the aforementioned, we can consider 2004 as a hinge year in the development of this technique, because of the high impact publications and the good level of evidence. But there is also a possibility that other factors which are more complex to measure also in-

fluenced directly or indirectly, such as the technological development and the fulfillment of the learning curve of the pioneer groups that by that time already had more than 10 years of experience.

Conclusions

1. The level of offering of laparoscopic colorectal surgery in Argentina is low but it is growing, with acceptable figures for the region (23%).
2. According to the research carried out in this paper, taking into account surveys and publications, the worldwide adherence would be below 30%.
3. In our country, there are a few centers concentrating the largest volume of cases.
4. The evidence of scientific papers on colorectal cancer generated a growth in the offering of this approach since 2004.
5. This growth, although uneven around the world, is firm and has solid bases with good level of evidence.

Disclosures

No disclosures.

Statement: This is possibly one of the earliest work that attempts to gather information from the world literature to explain the possible causes of the low rate of adoption of colorectal laparoscopic surgery in the world. This article also seeks to know what the local situation is.

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