Minimally invasive surgical practice: a survey of general surgeons in Ontario

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Introduction: With the rapidly evolving techniques for minimally invasive surgery (MIS), general surgeons are challenged to incorporate advanced procedures into their practices. We therefore carried out a study to assess the state of MIS practice in Ontario. **Methods:** A questionnaire was mailed to 390 general surgeons in Ontario. It addressed the surgeon's practice demographics, performance of both basic and advanced MIS procedures, the factors influencing this practice and the means of obtaining MIS training. **Results:** Of the 390 general surgeons surveyed, 309 (79%) responded. Thirty-six of these were retired and were excluded from the analysis, leaving 273 available for study. The average age in the study group was 49.7 years; 247 (90%) were men. Of 272 who responded to the question, 116 (43%) had subspecialty training. The average surgeon's operating room (OR) time was 1.5 d/wk and the average waiting time for elective procedures was 4 weeks. We found that 257 (94%) respondents performed basic laparoscopic procedures, and 164 (60%) performed appendectomy; 135 (49%) performed at least 1 advanced laparoscopic procedure in their practice, although only 30 (22%) of these performed inguinal hernia repair. Using a Likert scale, we found that the most important factors influencing the incorporation of advanced laparoscopic procedures into surgical practice were a lack of OR time (median 4), lack of OR financial resources (median 4) and lack of training opportunities (median 4). Of surgeons responding to questions, 161 (64%) of 251 felt that the present medical environment did not allow them to meet standard-of-care requirements; they felt that it was the responsibility of academic surgical departments (214 [80%] of 268), the Canadian Association of General Surgeons (177 [68%] of 262) and the Ontario Association of General Surgeons (141 [53%] of 264) to provide continuing medical education courses for MIS training. **Conclusion:** The ability of practising general surgeons to incorporate advanced MIS procedures into their surgical practice remains a complex issue.

Introduction : Avec l'évolution rapide des techniques de chirurgie à effraction minimale (CEM), les chirurgiens généraux doivent relever le défi consistant à intégrer à leur pratique des interventions de pointe. Nous avons donc réalisé une étude pour évaluer l'état de la pratique de CEM en Ontario. **Méthodes :** Nous avons envoyé un questionnaire à 390 chirurgiens généraux de l'Ontario. Les questions portaient sur les caractéristiques démographiques de la pratique du chirurgien, la réalisation d'interventions de base et avancées en CEM, les facteurs qui influent sur cette pratique et les moyens d'obtenir une formation en CEM. **Résultats :** Des 390 chirurgiens généraux sondés, 309 (79 %) ont répondu. Trente-six d'entre eux étaient à la retraite et ont été exclus de l'analyse, ce qui a laissé 273 chirurgiens disponibles pour l'étude. Les sujets du groupe d'étude avaient en moyenne 49,7 ans et le groupe comptait 247 hommes (90 %). Des 272 qui ont répondu à la question, 116 (43 %) possédaient une formation de sous-spécialité. Les chirurgiens passaient en moyenne 1,5 j/sem à la salle d'opération et la durée moyenne des périodes d'attente pour les interventions électives s'établissait à quatre semaines. Nous avons constaté que 257 (94 %) répondants procédaient à des laparoscopies de base et 164 (60 %) à des appendicectomies; 135 (49 %) pratiquaient au moins une laparoscopie avancée, même si 30 (22 %) seulement de ceux-ci réparaient des hernies inguinales. En utilisant l'échelle de Likert, nous avons constaté que les facteurs les plus importants qui jouent sur l'intégration des techniques laparoscopiques avancées dans la pratique de la chirurgie était le manque de temps en salle d'opération (médi-

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ane de 4), le manque de ressources financières en salle d'opération (médiane de 4) et le manque de possibilités de formation (médiane de 4). Parmi les chirurgiens qui ont répondu aux questions, 161 (64 %) sur 251 étaient d'avis que le contexte médical actuel ne leur permet pas de satisfaire aux exigences relatives à la norme de soin et qu'il incombe aux départements universitaires de chirurgie (214 [80 %] sur 268), à l'Association canadienne des chirurgiens généraux (177 [68 %] sur 262) et à l'Association des chirurgiens généraux de l'Ontario (141 [53 %] sur 264) d'offrir des cours d'éducation médicale continue en CEM. **Conclusion :** La capacité des chirurgiens généraux actifs d'intégrer les interventions avancées en CEM à leur pratique de la chirurgie demeure un enjeu complexe.

Since the introduction of laparoscopic cholecystectomy in the late 1980s, laparoscopic techniques have been successfully applied to an ever-expanding number of surgical procedures. The term minimally invasive surgery (MIS) has been applied to this evolving area of surgery, which generally has been associated with decreased morbidity and mortality and a number of patient-derived benefits. As a consequence, the standard of care for many abdominal procedures has shifted from a traditional open approach to a laparoscopic one.[1–3]

Canadian general surgeons were generally able to embrace laparoscopic cholecystectomy into their surgical practices.[4] However, new issues specific to MIS regarding the application of new technologies, credentialling, concern over the role of laparoscopy and cancer treatment, and, finally, controversy over apparent increased complication rates associated with the learning curve for MIS have resulted in a more conservative approach to the incorporation of advanced MIS procedures.[5–7] In the Canadian surgical environment the application of advanced MIS procedures has been variable and somewhat limited.[8] However, as public expectations grow and MIS is performed increasingly within the surgical community, general surgeons are facing pressure to incorporate advanced MIS procedures into their practices. The purpose of this study was to assess the current state of MIS practice in Ontario and the factors affecting it.

Methods

With the support of the Ontario Association of General Surgeons, a questionnaire was mailed to all 390 practising general surgeons in Ontario. The survey addressed the surgeon's personal and practice demographics, the performance of both basic and advanced MIS procedures, the factors influencing this practice, and the means of obtaining MIS training. Two mailings were sent so as to maximize the response rate. The information collected was collated and analyzed using the Epi 6.0 statistical program. A Likert scale was used to rank surgeons' opinions. This scale, introduced by Likert in 1952, is a method in which the rater expresses an opinion by rating his or her agreement with a series of statements. The only unique characteristic of the Likert scale is that responses are framed on an agree–disagree continuum.

Results

Most general surgeons (309 [79%]) responded to the survey. Of these, 36 were retired and were excluded from the analysis, leaving a study group of 273 respondents. The average age of the study group was 49.7 years and 247 (91.0%) were men. Of 272 who responded to the question, 116 (42.6%) had subspecialty training. The average surgeon's operating room (OR) time was 1.5 d/wk (Table 1), and the waiting time for elective procedures was 4 weeks. Of the study group respondents, 257 (94.1%) performed basic laparoscopic procedures, although only 164 (60.3%) performed appendectomy (Table 2). Of the 273 respondents, 135 (49%) performed at least 1 advanced laparoscopic proce-

Table 1

Demographics of the Study Group Surgeons

Characteristic	Perform advanced procedures	Do not perform advanced procedures	Mean	*p* value
Age, yr	47.0	52.3	49.7	< 0.05
Male sex, %	95.6	86.8	91.0	< 0.05
Subspecialty training, %	50.0	35.5	42.6	< 0.05
Operating room time, d	1.5	1.5	1.5	NS
Wait list time, wk	6.5	4.7	5.6	< 0.05

NS = not significant.

Table 2

Surgeons' Performance of Basic Minimally Invasive Procedures

Procedure	Perform advanced procedures, %	Do not perform advanced procedures, %	Total, %	*p* value
Diagnostic laparoscopy	94.1	80.4	87.1	< 0.05
Cholecystectomy	97.8	90.6	94.2	< 0.05
Appendectomy	81.5	39.1	60.3	< 0.05

dure in their practice (Table 3), of whom 30 (22.2%) performed only inguinal hernia repair. The methods of obtaining advanced training are listed in Table 4. The most important factors influencing the incorporation of advanced laparoscopic procedures into practice as measured on a Likert scale were a lack of OR time (median 4), OR financial resources (median 4) and training opportunities (median 4) (Table 5).

Most surgeons felt that academic surgical departments were not providing adequate continuing medical education (CME) opportunities (median 2) and that the presence of a dedicated minimally invasive surgeon working within the academic setting would provide valuable educational opportunities for practising community surgeons (median 4). Despite this perspective, surgeons still felt that it was the responsibility of academic surgical departments (214 [80%] of 268 responding) to provide CME courses for MIS training. In addition, they felt there was an important role for the Canadian Association of General Surgeons (177 [68%] of 262 respondents) and the Ontario Association of General Surgeons (141 [53%] of 264 respondents) in this regard. Finally, 161 (64%) of 251 of surgeons who responded to the question felt that the present medical environment did not allow them to meet standard-of-care requirements.

Discussion

The ability of practising general surgeons to successfully learn and integrate advanced laparoscopic procedures into surgical practice is a major hurdle in the evolution and dissemination of MIS. The excellent response to this survey suggests that this issue is very important to surgeons practising in Ontario. Surgeons who perform advanced laparoscopic procedures tend to be young, male and have subspecialty surgical training beyond their general surgery fellowship. Our findings are consistent with the fact that younger surgeons would more likely have had some laparoscopic training during their residency. Also, one might assume that younger surgeons, early in their career, would have more incentive to learn and incorporate advanced laparoscopic procedures into their practices. The relationship between subspecialty training and the performance of advanced laparoscopic procedures was anticipated. Subspecialty-trained surgeons tend to be academically based and see a greater proportion of patients in their practices who would be considered candidates for advanced laparoscopic procedures. Thus, there may be more incentive to learn "cutting edge" procedures and an opportunity to more rapidly transcend the learning curve. Finally, the gender bias toward men performing advanced laparoscopic procedures is likely owing to the fact that many women who responded to the survey maintained limited surgical practices that focused pri-

Table 3

Advanced Minimally Invasive Procedures Performed by Study Group Respondents

	Performance, no. (and %)		
Procedure	Perform now	Would like to perform	No interest
Nissen fundoplication	49 (18)	68 (25)	156 (57)
Heller myotomy	16 (6)	29 (11)	228 (83)
Gastric resection	15 (6)	50 (18)	208 (76)
Gastrojejunostomy	17 (6)	86 (32)	170 (62)
Cyst-gastrostomy	11 (4)	71 (26)	191 (70)
Bariatric surgery	2 (1)	14 (5)	257 (94)
Hepatic resection	7 (3)	17 (6)	249 (91)
CBD exploration	21 (8)	98 (36)	154 (56)
Choledochojejunostomy	8 (3)	62 (23)	203 (74)
Distal pancreatectomy	8 (3)	36 (13)	229 (84)
Splenectomy	61 (22)	76 (28)	136 (50)
Adrenalectomy	33 (12)	42 (15)	198 (73)
Right hemicolectomy	55 (20)	106 (39)	112 (41)
Sigmoid resection	43 (16)	108 (39)	122 (45)
Rectal surgery	26 (9)	89 (33)	158 (58)
Inguinal hernia repair	77 (28)	28 (10)	168 (62)
Ventral hernia repair	23 (8)	77 (28)	173 (64)

CBD = common bile duct.

Table 4

Method of Obtaining Advanced Minimally Invasive Surgery Training

Method of training	No./no. responding (and %)
Residency training	13/130 (10)
Surgical apprenticeship	58/112 (52)
Weekend CME courses	62/112 (55)

CME = continuing medical education.

Table 5

Factors Affecting Incorporation of Minimally Invasive Surgery into Surgical Practice

Factor	Median Likert scale measurement
Lack of OR time	4.0
Lack of OR financial resources	4.0
Lack of training opportunities	4.0
Lack of hospital support	3.0
Poor remuneration	3.0
Lack of scientific validation	3.0
Inhospitable medicolegal climate	3.0

OR = operating room.

marily upon diseases of the breast.

Most surgeons incorporate some basic laparoscopic procedures into their surgical armamentarium; however, this is not the case for advanced laparoscopic procedures. The performance of laparoscopic appendectomy in surgical practice appears to be a predictor for the performance of advanced laparoscopic procedures. Although the surgical literature supports the performance of laparoscopic appendectomy, its relative merits are not as apparent in relation to other laparoscopic procedures (e.g., splenectomy, Nissen fundoplication). Thus, it might be argued that those surgeons who choose to perform laparoscopic appendectomy do so for other considerations. On a practical level, the performance of laparoscopic appendectomy serves as a good training model. It is a commonly performed procedure that requires the surgeon to work with 2 hands and frequently incorporates advanced techniques (e.g., endostapling, mobilizing bowel). Thus, it can serve as an important first step for surgeons who might consider incorporating laparoscopic colorectal procedures into their practice. This is an important consideration in view of recently published evidence that laparoscopic colon resection for cancer offers patients a cancer-related survival advantage.[9] With respect to the performance of advanced MIS procedures, it seems that surgeons already performing advanced MIS procedures or those who would like to perform them are focused primarily on the common procedures one sees in a general surgical practice.

The survey suggests that surgeons use various strategies to obtain training on advanced MIS procedures. To date, the focus has been to base the management of training issues on the experience gained from the development of laparoscopic cholecystectomy. Short procedure-based courses taught by surgeons experienced in minimally invasive surgical techniques have been the norm for teaching specific advanced laparoscopic procedures. However, there is considerable controversy regarding their usefulness,[10] and recent evidence suggests that surgeons participating in these courses are often not able to integrate the newly learned procedures into their respective practices. Rather, short-term apprenticeships appear to be a better option for teaching specific procedures.[11] This approach has its own limitations. There are issues surrounding the length of the learning curve for the specific procedure being taught, the presumed long-term availability of the mentoring surgeon and the feasibility of expanding on the skills learned performing one procedure. Thus, although this approach may be feasible on a local level, on a broad scale this approach seems cumbersome. Finally, some surgeons have advocated 2–3 months' advanced MIS mini-fellowship courses at centres of excellence. A short course such as this would enable the surgeon to participate in a significant number of procedures over a short period. This model is based on the understanding that the various advanced laparoscopic procedures require a common advanced laparoscopic skill set. Therefore, the focus of this training is to obtain a reasonable comfort level to be able to adopt an advanced MIS approach to all areas of one's practice. Although this approach might seem an ideal means of obtaining advanced laparoscopic skills, there are practical limitations. Most surgeons are not in a position to leave their practices for such a period of time, and there are few opportunities available to surgeons who would consider this type of approach.

Given these considerations, there is at present no "magic bullet" for solving these training issues. Rather, it is prudent to improve on the resources that currently exist. It is evident, from this survey, that surgeons believe that academic centres are not providing adequate CME training opportunities. Moreover, most felt that academic surgeons dedicated to minimally invasive surgery would have a valuable role in this regard. This is an important consideration as, at present, only 8 of 16 Canadian academic training programs have a dedicated minimally invasive surgeon on staff.[12] In Canada, there are now 4 MIS fellowship programs with a primary purpose to train general surgeons who, ideally, will return to the academic setting for their respective practices. In theory, these minimally invasive surgeons would establish programs for the purpose of training other academic faculty, residents and practising surgeons. This concept is not without controversy, but Fowler and Hogle[13] demonstrated that the presence of a minimally invasive surgeon within an academic department had a significantly positive impact. As well, most surgeons felt that their organizational bodies have a role in providing CME opportunities for learning advanced laparoscopic skills.

Finally, surgeons, both locally and through their representational organizations, need to continue to press for additional OR time, financial resources and training opportunities to support their respective MIS practices. Our survey suggests that most surgeons feel that the present medical environment does not enable them to meet standard-of-care requirements. However, with its increasing profile, the negative factors that have previously limited the incorporation of MIS into the surgical workplace will be modified as governments and administrators begin to appreciate the positive impact of MIS on hospital costs and patient care.[14]

Conclusion

The ability of practising general surgeons in Ontario to incorporate advanced laparoscopic procedures into their respective surgical practices remains a vexing problem.

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