Do North American colorectal surgeons use mesh to prevent parastomal hernia? A survey of current attitudes and practice

Jessica Holland, MD
Tyler Chesney, MSc, MD
Fahima Dossa, MD
Sergio Acuna, MD, PhD
Katherine Anne Fleshner, BSc
Nancy N. Baxter, MD, PhD

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Correspondence to:
N.N. Baxter
Department of Surgery
16-040 Cardinal Carter Wing
St. Michael's Hospital
30 Bond St
Toronto ON M5B 1W8
baxtern@smh.ca

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Background: The use of prophylactic mesh in end colostomy procedures has been shown to reduce the rate of parastomal hernia. However, the degree to which the practice has been adopted clinically remains unknown. We conducted a study to evaluate the current opinions and practice patterns of Canadian and US colorectal surgeons with regard to the use of prophylactic mesh in end colostomy.

Methods: Between May and July 2017, we conducted an internet-based survey of colorectal surgeons in Canada and the United States (selected at random). Using a questionnaire designed and tested for this study, we assessed the rate of mesh use, types of mesh and placement techniques, and perceived barriers and facilitators associated with the practice.

Results: Forty-eight (51.6%) of 93 invited Canadian surgeons and 253 (16.6%) of 1521 invited US surgeons responded (overall response rate 18.6%). Of the 301 respondents, 32 (10.6%) were currently using mesh, 32 (10.6%) had previously used mesh, and 237 (78.7%) had never used mesh. Of 29 respondents currently using mesh, 12 (41.4%) used it only in selected patients; the majority used a sublay technique (20 [69.0%]) and biologic mesh (17 [58.6%]). Most respondents agreed that parastomal hernias are common and negatively affect quality of life; however, there remained concerns about evidence quality and the perceived risk associated with mesh among those who had never or had previously used mesh.

Conclusion: Prophylactic mesh placement remains relatively uncommon; when used, biologic mesh was the most common type. Many surgeons were not convinced of the safety or efficacy of prophylactic mesh placement.

Contexte : Il a été démontré que la pose d'un treillis prophylactique durant une colostomie terminale réduit le risque de hernie parastomale. On ignore toutefois à quel point cette pratique a été adoptée en contexte clinique. Nous avons mené une étude pour connaître l'opinion et les habitudes des chirurgiens colorectaux canadiens et américains quant à cette intervention.

Méthodes : De mai à juillet 2017, nous avons mené un sondage en ligne auprès de chirurgiens colorectaux canadiens et américains sélectionnés aléatoirement. À l'aide d'un questionnaire conçu et validé pour cette étude, nous avons évalué le taux de pose de treillis, le type de treillis et la technique utilisé, ainsi que les facteurs facilitant ou limitant l'intervention.

Résultats : Au total, 48 des 93 chirurgiens canadiens (51,6 %) et 253 des 1521 chirurgiens américains (16,6 %) approchés ont répondu au sondage (taux de réponse global : 18,6 %). Sur les 301 répondants, 32 (10,6 %) ont dit qu'ils installent actuellement des treillis, 32 (10,6 %) ont dit en avoir installé, et 237 (78,7 %) ont dit n'en avoir jamais installé. Parmi 29 répondants posant actuellement des treillis, 12 (41,4 %) ont déclaré y avoir recours pour certains patients seulement; la majorité pose les treillis dans l'espace prépéritonéal (20 [69,0 %]) et se sert de treillis biologiques (17 [58,6 %]). La plupart des répondants s'entendaient pour dire que les hernies parastomales sont courantes et ont des répercussions négatives sur la qualité de vie des patients; cependant, les chirurgiens n'ayant jamais installé de treillis ou en ayant seulement installé par le passé se sont dits préoccupés par la qualité des données et les risques perçus associés aux treillis.

Conclusion : La pose d'un treillis à des fins prophylactiques demeure relativement rare. Les treillis biologiques étaient les plus fréquemment utilisés par les répondants. Bon nombre des chirurgiens questionnés n'étaient pas convaincus de l'innocuité ou de l'efficacité de l'intervention.

Parastomal hernias are a predictable consequence of the fascial defect created for an ostomy and represent a major source of morbidity for patients with stomas.[1,2] The incidence of parastomal hernia appears to be highest following end colostomy creation, and although reported rates vary, rates up to 57% are cited for clinically detectable hernias and up to 78% for radiologically detectable hernias.[1,3,4] Parastomal hernias can cause pain and reduced quality of life, affect body image and result in difficulties with application of the stoma appliance, which, in turn, results in leakage, skin excoriation and increased cost.[1,5] Parastomal hernia repair can be a difficult operation with a high rate of failure, even with newer mesh-based techniques.[6–9] Surgical repair of these hernias is often delayed until symptoms become debilitating or the patient presents with an acute indication such as obstruction, incarceration or strangulation necessitating urgent surgical intervention.

We identified 10 randomized controlled trials (RCTs) conducted between 2009 and 2015 investigating the efficacy of prophylactic mesh insertion at the time of the index stoma creation for prevention of parastomal hernias.[10–20] In the most comprehensive current meta-analysis (2017), Cross and colleagues[21] synthesized data from 649 patients across all 10 RCTs and found that prophylactic mesh insertion reduced the rate of parastomal hernia formation from 36.6% to 16.4% (odds ratio 0.24, 95% confidence interval 0.12–0.50). Since this meta-analysis, the STOMAMESH trial was published and did not show the previously seen efficacy of mesh prophylaxis.[22] High rates of parastomal hernia, detected both clinically and on computed tomography, were noted in both the intervention group and the control group, with 1-year rates of radiologically detected parastomal hernia of 34% without mesh placement and 32% with mesh placement. An analysis of follow-up data at 36 months is planned.

A small online study of 70 surgeons in Switzerland in 2012 cited fear of mesh-related infection as the most common reason that surgeons did not use mesh.[23] However, none of the RCTs showed an increased risk of complications with mesh insertion.[10–22] Rates of stoma-related complications were low across all RCTs, and there was no difference in rates of stoma-related complications, such as parastomal infection, stoma necrosis or stenosis, between mesh and control groups on meta-analysis.[21]

The present study aimed to evaluate the current opinions and practice patterns of Canadian and US colorectal surgeons with regard to the use of prophylactic mesh in end colostomy and to identify areas of clinical concerns with the current evidence base.

Methods

Study population

Between May and July 2017, we conducted a cross-sectional survey of North American colorectal surgeons. We identified Canadian colorectal surgeons through membership in the Canadian Society of Colon and Rectal Surgeons and the American Society of Colon and Rectal Surgeons, and a manual search of the faculty pages of all Canadian academic medical institutions. We excluded those without valid email addresses and those who were not practising surgery (non-surgeons, retired/deceased surgeons). For US colorectal surgeons, we surveyed a random selection of surgeons identified through membership in the American Society of Colon and Rectal Surgeons. We calculated our sample size based on the suggested sample size for a 5-point Likert scale, specifically with a coefficient of variation of population, C, of 0.5 and a pairwise correlation coefficient, p, of 0.5, and assumed a 40% response rate.[24] Surgeons with an invalid email address and those not actively practising were excluded after the individualized invitation was sent and were replaced with additional randomly selected American Society of Colon and Rectal Surgeons members. Because both the response rate and the use of prophylactic mesh were lower than expected, we conducted a second round of surveys with a further random selection of US surgeons to increase our sample size of completed responses.

Questionnaire development

Questionnaire development followed standard methods for survey-based research.[25–27] Two frameworks for barriers assessment and a previous survey guided initial item generation.[23,27–31] Items were generated within the domains of knowledge, attitudes, behaviours, patient characteristics, innovation characteristics, context characteristics and current evidence. We added items until sampling redundancy was achieved within each domain, and then reduced them to the smallest number possible without important omissions. Response formats included a 5-point Likert scale and an open-ended format. Pilot testing of the survey was conducted by the investigators and a small sample of physician reviewers (colorectal surgeons, senior residents interested in colorectal surgery and colorectal fellows at the University of Toronto) to assess clarity and comprehensibility. Limited sensibility testing was conducted by an expert in the colorectal field and an expert in knowledge translation to ensure the accuracy and pertinence of the questionnaire. The final questionnaire is presented in Appendix 1 (available at canjsurg.ca/019018-a1).

Survey administration

We administered the questionnaire using SurveyMonkey, a secure internet-based commercial service. An invitation to participate preceded the survey and was distributed by email with an individualized link. If there was no response, this was followed by 2 further requests for participation, sent a week apart. Entry into a prize draw was offered to all participants as an incentive.

Data analysis

Responses were anonymized through SurveyMonkey. We calculated the response rate as the number of completed questionnaires divided by the number of invited participants in each respondent group, including incomplete questionnaires. We categorized respondents into 3 groups based on self-reported use of mesh: 1) those who had never used mesh, 2) those who were currently using mesh and 3) those who had previously used mesh but no longer did so. We compared the response distribution of the Likert score for each item between the 3 groups using the Kruskal–Wallis test adjusted by the Benjamini–Hochberg method for multiple comparisons. We used the Dunn test to determine which of the groups were significantly different. We compacted Dunn analysis results into letter display format (a, b and c); groups sharing the same letter were not significantly different. We analyzed the quantitative data using R, version 3.3.3 (R Foundation for Statistical Computing). We collapsed the Likert responses into 3 categories; strongly agree/agree, neutral and disagree/strongly disagree. Answers to open-ended questions were reviewed and recurring factors identified. These factors were grouped and are presented in 4 domains: evidence, risk–benefit ratio, technical factors and professional factors. Respondents were also asked to identify any tools or information that have helped or would be helpful in deciding whether to use mesh.

Results

Of the 93 Canadian surgeons contacted, 79 could be verified to have received and opened the email, of whom 48 (60.8%) responded. A total of 1521 US surgeons were contacted, 585 in the first round and 936 in the second round. Of the 1521, 760 could be verified to have opened the email, of whom 253 (33.3%) responded. The overall response rate for all North American surgeons was 18.6% (301/1614). The overall response rate was higher for Canadian surgeons (48/93 [51.6%]) than for US surgeons (253/1521 [16.6%]).

Current surgical practices

Of the 301 respondents, 32 (10.6%) reported that they currently used prophylactic mesh, 237 (78.7%) had never used mesh, and 32 (10.6%) had used mesh in the past but no longer did so (Fig. 1). Of the respondents who had never used mesh, 178 (75.1%) were considering its use; 21 (8.9%) had actively taken steps to implement the practice in the previous year. Among Canadian respondents, only 1 surgeon (2.1%) was using prophylactic mesh, and 2 surgeons (4.2%) had used it in the past. The practice was more common among US respondents: 31 (12.2%) reported they were currently using mesh, and 30 (11.9%) reported that they had used it in the past. Similar proportions of Canadian (26 [54.2%]) and US (131 [51.8%]) surgeons were considering the use of mesh.

The clinical practice characteristics of the 301 respondents by mesh use are presented in Table 1. The respondents performed a median of 13 (interquartile range 9–20) colostomy procedures a year. More than half (169 [56.1%]) estimated that parastomal hernias will develop in 40% or more of patients undergoing end colostomy within 5 years of surgery. Most surgeons who reported currently

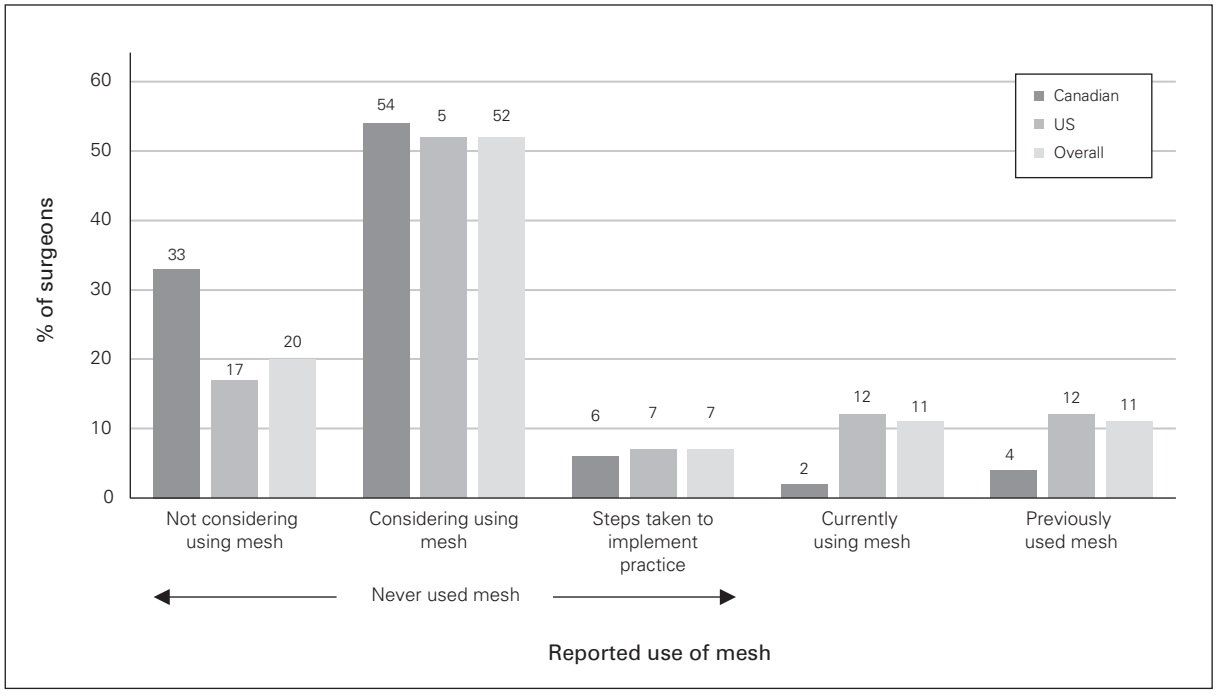

Fig. 1. Use of prophylactic mesh in end colostomy by North American surgeons.

using mesh (24 [75.0%]) indicated that they knew at least 1 other surgeon who also did so, whereas few surgeons who had never used mesh (22 [9.3%]) did. Most surgeons currently using mesh (22/29 [75.9%]) did not use it in all patients (Table 2). More than half (17/29 [58.6%]) used a biologic product, and most (20/29 [69.0%]) used a sublay technique, with the remaining 9 (31.0%) using an underlay or intraperitoneal approach (Table 2).

Surgeons who had previously used prophylactic mesh in end colostomy but no longer did so were asked to comment on why they had stopped. The most common factors identified were insufficient benefit (12 [37.5%]) and lack of appropriate resources (7 [21.9%]). Four respondents (12.5%) had personal experience with bad outcomes.

Factors affecting adoption of prophylactic mesh into clinical practice

Table 3 displays the results of Likert scale questions and Table 4 the results of open-ended questions regarding factors affecting the adoption of prophylactic mesh into practice. Regarding the evidence base for prophylactic mesh, most surgeons reported awareness of current literature on the use of prophylactic mesh; however, opinions differed with respect to the quality of the evidence. Most (20/29 [69.0%]) of those currently using mesh agreed there was high-quality evidence to support the efficacy of prophylactic mesh, compared to 101/223 (45.3%) of those who had never used mesh and 5/28 (17.8%) of those who previously had used mesh ($p < 0.01$) (Table 3). On open-ended questioning, surgeons not currently using mesh (both those who had never used mesh and those who had previously used it) cited concern with the quality and nature of the current evidence as a major barrier to the use of prophylactic mesh in end colostomy. Further evidence was the factor most commonly identified by both groups as potentially helpful in implementing the use of prophylactic mesh during end colostomy creation in the future (Table 4). Almost half (117/251 [46.6%]) of surgeons not currently using prophylactic mesh had reservations about the available research as it may have been unduly influenced by industry factors (Table 3).

Table 1. General characteristics of respondents' clinical practice

Characteristic	No. (%) of respondents*			
	Never used mesh *n* = 237	Currently using mesh *n* = 32	Previously used mesh *n* = 32	Overall *n* = 301
Years in practice as surgeon				
≤ 5	56 (23.6)	7 (21.9)	3 (9.4)	66 (21.9)
6–10	42 (17.7)	9 (28.1)	7 (21.9)	58 (19.3)
11–15	30 (12.6)	3 (9.4)	4 (12.5)	37 (12.3)
16–20	35 (14.8)	2 (6.2)	2 (6.2)	39 (13.0)
> 20	74 (312)	11 (34.4)	16 (50.0)	101 (33.6)
Primary location of practice				
Community	103 (43.4)	17 (53.1)	19 (59.4)	139 (46.2)
Academic	128 (54.0)	14 (43.8)	10 (31.2)	152 (50.5)
Other	6 (2.5)	1 (3.1)	3 (9.4)	10 (3.3)
General surgery subspecialty				
Colorectal	218 (92.0)	29 (90.6)	31 (96.9)	278 (92.4)
General practice	6 (2.5)	3 (9.4)	0 (0.0)	9 (3.0)
Surgical oncology	8 (3.4)	0 (0.0)	1 (3.1)	9 (3.0)
Other (e.g., breast, endocrinology)	5 (2.1)	0 (0.)	0 (0.0)	5 (1.7)
Estimation of rate of parastomal hernia 5 yr after end colostomy, %				
< 10	8 (3.4)	3 (9.4)	0 (0.0)	11 (3.6)
10–20	33 (13.9)	2 (6.2)	3 (9.4)	38 (12.6)
20–30	68 (28.7)	7 (21.9)	8 (25.0)	83 (27.6)
40–50	73 (30.8)	11 (34.4)	11 (34.4)	95 (31.6)
> 50	55 (23.2)	9 (28.1)	10 (31.2)	74 (24.6)
Aware of use of prophylactic mesh by other surgeons at same institution				
Yes, 1–2	22 (9.3)	21 (65.6)	9 (28.1)	52 (17.3)
Common practice	0 (0.0)	3 (9.4)	2 (6.2)	5 (1.7)
No	215 (90.7)	8 (25.0)	21 (65.6)	244 (81.1)
Estimated no. of operations with end colostomy performed per year, median (interquartile range)	14 (10–20)	10 (6–23)	15 (10–25)	13 (9–20)

*Except where noted otherwise.

Table 2. Clinical practice patterns regarding the use of prophylactic mesh

Variable	No. (%) of respondents
In your current practice, how frequently do you include mesh when creating an end colostomy? (*n* = 29)	
In all patients	7 (24)
In most patients	10 (34)
In specific patients	12 (41)
Type of mesh (*n* = 29)	
Lightweight polypropylene	8 (28)
Composite polypropylene	1 (3)
Biologic mesh	17 (59)
Other	3 (10)
Technique of placement (*n* = 29)	
Sublay (i.e., retromuscular or preperitoneal)	20 (69)
Underlay/intraperitoneal	9 (31)
Steps taken by surgeons intending to introduce mesh in their practice (*n* = 23)	
Discussion	9 (39
Literature review	4 (17)
Trial use	4 (17)
Factors cited for no longer using mesh (*n* = 32)	
Insufficient benefits	12 (38)
Lack of appropriate resources	7 (22)
Theoretical risk	4 (12)
Negative outcomes	4 (12)
Cost	4 (12)
Alternative techniques	2 (6)

When considering the risk–benefit ratio of prophylactic mesh, most respondents agreed that parastomal hernias have a negative effect on a patient's quality of life, and almost all believed that they are problematic enough to justify a prophylactic measure. However, there was disagreement on the risk associated with prophylactic mesh: more surgeons not currently using mesh than those currently using mesh agreed that prophylactic mesh increases the risk of short-term (96/251 [38.2%] v. 4/29 [13.8%]) and long-term (84/251 [33.5%] v. 1/29 [3.4%]) complications ($p < 0.01$ for both) (Table 3). On open-ended questioning, concern regarding the risk of mesh placement was the most common barrier to the use of mesh in end colostomy identified by surgeons who had never used mesh (57/164 [34.8%]) and those who had previously used mesh (5/25 [20.0%]).

Technical factors were not identified as a major barrier in most respondents' decision-making (Table 3). Some respondents who had previously used prophylactic mesh (4/25 [16.0%]) noted that lack of appropriate resources, specifically difficulty obtaining an appropriate mesh or discontinuation of previously used mesh product, was a factor in their decision to stop using mesh (Table 4). Some surgeons who had never used mesh reported that educational tools (16/109 [14.7%]) and technical experience (15/109 [13.8%]) in how to place the mesh would be helpful in implementing the practice (Table 4).

Most respondents disagreed that professional factors played a major role in their decision-making. Most disagreed that there were substantial institutional barriers, and only a minority were concerned with professional consequences if there was a complication. The perceived need for clinical guidelines varied. Surgeons who had never used mesh were most strongly in favour of guidelines as a prerequisite to implementation (131/223 [58.7%]), while those currently using mesh disagreed that guidelines are necessary (24/29 [82.8%]) ($p < 0.01$) (Table 3). The lack of clinical guidelines supporting the use of prophylactic mesh was the second most commonly cited barrier on open-ended questioning among surgeons who had never used mesh (35/164 [21.3%]) (Table 4).

Discussion

The use of prophylactic mesh to prevent parastomal hernia was uncommon among the North American colorectal surgeons surveyed, and in Canada only a single surgeon was using prophylactic mesh. However, there was a high level of interest among those surveyed, with the majority considering adopting the practice in the future. This high level of interest and low level of adoption, along with a marked difference in interpretation of the current evidence, suggest that the reluctance of clinicians to adopt the practice may reflect not a failure of dissemination of current research but, rather, ongoing concern among clinicians regarding the safety, efficacy and technical details of the practice. Of the surgeons currently using mesh, just over half reported using biologic mesh. Notably, neither of the 2 RCTs in which biologic mesh was used showed a statistically significant reduction in parastomal hernia rates with mesh use.[10,17] Our results do not identify any general characteristic of a current clinical practice that appears to be related to a surgeon's decision to use prophylactic mesh, apart from potential use by colleagues at his or her institution.

Although most of our respondents agreed that parastomal hernias have a negative impact on a patient's quality of life, there was disagreement as to whether that impact justified the theoretical risk of mesh. Surgeons who were not currently using mesh or who previously used mesh remained concerned with the risk of mesh placement, both in the short and the long term, despite a lack of evidence of increased risk in current clinical studies. Among surgeons not using mesh and those who had used it previously, the risk of mesh use was the most common factor cited when asked about the major barrier to prophylactic mesh use. Given that these surgeons were also less likely to strongly agree with the negative impact of parastomal hernias on patients' quality of life and more likely to disagree with the efficacy of mesh placement, their risk–benefit analysis would likely be weighted away from mesh.

To our knowledge, there have been 11 RCTs investigating the efficacy of prophylactic mesh for parastomal hernia prevention,[10–20,22] representing a larger body of evidence than

Table 3 (part 1 of 2). Factors identified by respondents as affecting the adoption of prophylactic mesh into practice, by mesh use

Factor; mesh use	Response; no. (%) of respondents*			*p* value	Dunn test†
	Agree	Neutral	Disagree		
Evidence					
I am aware of the current literature investigating the use of prophylactic mesh for parastomal hernia prevention					
Never	174 (78.0)	38 (17.0)	11 (4.9)	0.002	a
Current	29 (100.0)	0 (0.0)	0 (0.0)		b
Previous	25 (89.3)	2 (7.1)	1 (3.6)		ab
There is high-quality evidence that prophylactic mesh reduces the rate of parastomal hernia occurrence in end colostomy					
Never	101 (45.3)	96 (43.0)	26 (11.6)	0.001	a
Current	20 (69.0)	9 (31.0)	0 (0.0)		b
Previous	5 (17.8)	11 (39.3)	12 (42.8)		c
Using prophylactic mesh would reduce the rate of parastomal hernias in end colostomy in my patients					
Never	124 (55.6)	86 (38.6)	13 (5.8)	< 0.001	a
Current	29 (100.0)	0 (0.0)	0 (0.0)		b
Previous	11 (39.3)	12 (42.8)	5 (17.8)		a
Uncertainty on which type of mesh to use is a significant barrier to my use of prophylactic mesh					
Never	127 (57.0)	40 (17.9)	56 (25.1)	< 0.001	a
Current	3 (10.3)	6 (20.7)	20 (69.0)		b
Previous	13 (46.4)	8 (28.6)	7 (25.0)		a
Uncertainty on the ideal technique of mesh insertion is a significant barrier to my use of prophylactic mesh					
Never	138 (61.9)	32 (14.3)	53 (23.8)	< 0.001	a
Current	0 (0.0)	7 (24.1)	22 (75.9)		b
Previous	13 (46.4)	6 (21.4)	9 (32.1)		a
I have reservations about the available research on prophylactic mesh as it may have been unduly influenced by industry factors					
Never	99 (44.4)	80 (35.9)	44 (19.7)	< 0.001	a
Current	2 (6.9)	5 (17.2)	22 (75.9)		b
Previous	17 (60.7)	5 (17.8)	6 (21.4)		a
Risk–benefit ratio					
Parastomal hernias have a negative impact on the quality of life of patients with an end colostomy					
Never	188 (84.3)	28 (12.6)	7 (3.1)	0.01	a
Current	28 (96.6)	1 (3.4)	0 (0.0)		b
Previous	23 (82.1)	4 (14.3)	1 (3.6)		a
Prophylactic mesh use in end colostomy increases the risk of short-term complications					
Never	84 (37.7)	100 (44.8)	39 (17.5)	0.001	a
Current	4 (13.8)	8 (27.6)	17 (58.6)		d
Previous	12 (42.8)	10 (35.7)	6 (21.4)		a
Prophylactic mesh use in end colostomy increases the risk of long-term complications					
Never	74 (33.2)	99 (44.4)	50 (22.4)	0.001	a
Current	1 (3.4)	5 (17.2)	23 (79.3)		b
Previous	10 (35.7)	10 (35.7)	8 (28.6)		a
Parastomal hernias are not problematic enough to justify prophylactic mesh placement					
Never	52 (23.3)	76 (34.1)	95 (42.6)	0.001	a
Current	0 (0.0)	1 (3.4)	28 (96.6)		b
Previous	5 (17.8)	11 (39.3)	12 (42.8)		a

Table 3 (part 2 of 2). Factors identified by respondents as affecting the adoption of prophylactic mesh into practice

Factor; mesh use	Response; no. (%) of respondents*			*p* value	Dunn test†
	Agree	Neutral	Disagree		
Prophylactic mesh placement is just too risky					
Never	57 (25.6)	95 (42.6)	71 (31.8)	0.001	a
Current	0 (0.0)	0 (0.0)	29 (100.0)		b
Previous	7 (25.0)	11 (39.3)	10 (35.7)		a
Technical factors					
There are better techniques than mesh placement to prevent parastomal hernias					
Never	25 (11.2)	82 (36.8)	116 (52.0)	0.04	a
Current	0 (0.0)	9 (31.0)	20 (69.0)		b
Previous	4 (14.3)	9 (32.1)	15 (53.6)		ab
Placing mesh during the creation of an end colostomy is technically easy					
Never	83 (37.2)	70 (31.4)	70 (31.4)	0.2	NS
Current	14 (48.3)	11 (37.9)	4 (13.8)		
Previous	14 (50.0)	3 (10.7)	11 (39.3)		
Placing a prophylactic mesh is too time consuming					
Never	52 (23.3)	82 (36.8)	89 (39.9)	0.03	a
Current	2 (6.9)	8 (27.6)	19 (65.5)		b
Previous	10 (35.7)	4 (14.3)	14 (50.0)		ab
Prophylactic mesh is a cost-effective intervention					
Never	44 (19.7)	129 (57.8)	50 (22.4)	0.001	a
Current	21 (72.4)	7 (24.1)	1 (3.4)		b
Previous	5 (17.8)	16 (57.1)	7 (25.0)		a
Professional factors					
I would face negative professional consequences if there were any complications from prophylactic mesh insertion					
Never	80 (35.9)	60 (26.9)	83 (37.2)	0.002	a
Current	5 (17.2)	6 (20.7)	18 (62.1)		b
Previous	8 (28.6)	5 (17.8)	15 (53.6)		ab
My patients would object to the placement of prophylactic parastomal mesh					
Never	15 (6.7)	83 (37.2)	125 (56.0)	0.001	a
Current	0 (0.0)	2 (6.9)	27 (93.1)		b
Previous	0 (0.0)	12 (42.8)	16 (57.1)		a
I would require prophylactic mesh to be used routinely by my colleagues before considering changing my practice					
Never	20 (9.0)	47 (21.1)	156 (70.0)	0.02	a
Current	1 (3.4)	3 (10.3)	25 (86.2)		b
Previous	3 (10.7)	7 (25.0)	18 (64.3)		ab
I am reluctant to use prophylactic mesh without a clinical practice guideline recommending its use					
Never	131 (58.7)	46 (20.6)	46 (20.6)	< 0.001	a
Current	1 (3.4)	4 (13.8)	24 (82.8)		b
Previous	11 (39.3)	6 (21.4)	11 (39.3)		c
I would face or have already faced institutional barriers in my hospital to obtaining and using prophylactic mesh in end colostomy					
Never	28 (12.6)	49 (22.0)	146 (65.5)	0.5	NS
Current	6 (20.7)	1 (3.4)	22 (75.9)		
Previous	5 (17.8)	3 (10.7)	20 (71.4)		

NS = no significant difference.
*n = 223 for never used mesh, n = 29 for currently using mesh and n = 28 for previously used mesh.
†Dunn analysis results were compacted into letter display format (a, b and c). Groups sharing the same letter were not significantly different.

Table 4. Factors identified by respondents on open-ended questions as affecting the adoption of prophylactic mesh into practice

Factor; mesh use	No. (%) of respondents	Representative quote
Barriers		
Never (*n* = 164)		
Risk	57 (34.8)	Worry about infection, fear of complications, too risky
Lack of guidelines	35 (21.3)	No recommendation by ASCRS, awaiting consensus
Current evidence	33 (20.1)	Waiting to see good studies and positive results
No need	24 (14.6)	Not a big problem, they rarely need surgery
Insufficient benefit	23 (14.0)	Poses risks without sustained benefits
Cost	21 (12.8)	Insurance won't pay for it
Consensus	16 (9.8)	Still reviewing technique and type of mesh best to use
Time	13 (7.9)	Time-consuming, adds more general anesthesia
Other	21 (12.8)	Habit
Previous (*n* = 25)		
Risk	5 (20.0)	I still have concerns about placing mesh in such close proximity to the [gastrointestinal] tract
Current evidence	5 (20.0)	The data [have] not shown a true benefit to prophylaxis
Insufficient benefit	4 (16.0)	Inconsistent results
Resources	4 (16.0)	The permanent mesh I used was recalled
Lack of guidelines	3 (12.0)	—
Cost	3 (12.0)	It is not covered by insurance in most cases
Time	3 (12.0)	Added too much time in the operating room
Other	5 (20.0)	—
Current (barriers overcome) (*n* = 22)		
Technique	5 (22.7)	Had to learn technique after fellowship
Cost	4 (18.2)	—
Risk	3 (13.6)	My own fear
Institution	2 (9.1)	Hospital administration
Other	4 (18.2)	
Information and tools required		
Never (*n* = 109)		
Further evidence	35 (32.1)	Long-term data, better nonbiased studies
Guideline	23 (21.1)	Clinical practice guidelines or official statement from [such bodies as] ASCRS/SAGES
Education	16 (14.7)	More information and technical details
Technique	15 (13.8)	Delineation of the type of mesh to use and ideal placement
None	9 (8.2)	—
Other	10 (9.2)	Number needed to treat, successful use by colleagues
Previous (*n* = 18)		
Further evidence	8 (44.4)	Better data … long-term (> 5 yr) follow-up
Guideline	3 (16.7)	Consensus on the type of mesh and best technique for placement
Technique	2 (11.1)	—
Cost	2 (11.1)	—
Other	2 (11.1)	—
Current (tools and information used) (*n* = 23)		
Evidence	16 (69.6)	Literature search, evidence-based medicine
Consensus	7 (30.4)	Experience with colleagues
Cost	1 (4.3)	Approval by insurance

ASCRS = American Society of Colon and Rectal Surgeons; SAGES = Society of American Gastrointestinal and Endoscopic Surgeons.

is available for most surgical practices. Yet, surgeons may have a higher threshold for the adoption of this practice given the perception of risk owing to first- or second-hand experiences with mesh complications. Furthermore, surgeons not using mesh remained concerned with the influence of industry on the current evidence. Although cost was not commonly identified as a barrier, the cost of a polypropylene mesh, used in the majority of studies, would be much less

substantial than that of the biologic counterparts. The applicability of current data to a North American population may also be a point of contention given that the majority of the RCTs were conducted in European populations. A review of the current evidence by a national organization, along with guidelines, would address the concerns of a minority of surgeons not currently using mesh; however, this was not a major barrier for the majority of our respondents.

Limitations

Our low response rate represents a potential source of bias common to many studies that rely on voluntary response to surveys. Survey respondents were more likely to have stronger opinions with regard to the use of prophylactic mesh than the general colorectal surgeon population. As a result, surgeons using prophylactic mesh and those who had used it previously may be overrepresented. Colorectal surgeons less familiar with the current evidence may have been less likely to respond. Because of this, it is unlikely that our findings underestimate the use of prophylactic mesh for parastomal hernia prevention in North America, although we may have overestimated the use of mesh by US surgeons.

Conclusion

The use of prophylactic mesh to prevent parastomal hernias remains a relatively uncommon practice among North American surgeons despite interest in the practice. Persistent concerns about the efficacy and long-term safety of prophylactic mesh will need to be addressed before this practice gains more widespread acceptance.

Affiliations: From the Department of Surgery, Faculty of Medicine, University of Toronto, Toronto, Ont. (Holland, Chesney, Dossa, Acuna, Fleshner, Baxter); the Department of Surgery, Li Ka Shing Knowledge Institute, St. Michael's Hospital, Toronto, Ont. (Dossa, Acuna, Baxter); and the Institute of Health Policy, Management and Evaluation, Dalla Lana School of Public Health, University of Toronto, Toronto, Ont. (Dossa, Acuna, Baxter).

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