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AIMS AND SCOPE

The primary aim of *World Journal of Gastrointestinal Endoscopy* (WJGE, *World J Gastrointest Endosc*) is to provide scholars and readers from various fields of gastrointestinal endoscopy with a platform to publish high-quality basic and clinical research articles and communicate their research findings online.

WJGE mainly publishes articles reporting research results and findings obtained in the field of gastrointestinal endoscopy and covering a wide range of topics including capsule endoscopy, colonoscopy, double-balloon enteroscopy, duodenoscopy, endoscopic retrograde cholangiopancreatography, endosonography, esophagoscopy, gastrointestinal endoscopy, gastroscopy, laparoscopy, natural orifice endoscopic surgery, proctoscopy, and sigmoidoscopy.

INDEXING/ABSTRACTING

The WJGE is now abstracted and indexed in Emerging Sources Citation Index (Web of Science), PubMed, PubMed Central, Reference Citation Analysis, China National Knowledge Infrastructure, China Science and Technology Journal Database, and Superstar Journals Database. The 2021 edition of Journal Citation Reports® cites the 2020 Journal Citation Indicator (JCI) for WJGE as 0.36.

RESPONSIBLE EDITORS FOR THIS ISSUE

Production Editor: Yi-Xuan Cai, Production Department Director: Xiang Li, Editorial Office Director: Jia-Ping Yan.

NAME OF JOURNAL

World Journal of Gastrointestinal Endoscopy

ISSN

ISSN 1948-5190 (online)

LAUNCH DATE

October 15, 2009

FREQUENCY

Monthly

EDITORS-IN-CHIEF

Anastasios Koulaouzidis, Bing Hu, Sang Chul Lee, Joo Young Cho

EDITORIAL BOARD MEMBERS

<https://www.wjgnet.com/1948-5190/editorialboard.htm>

PUBLICATION DATE

April 16, 2022

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INSTRUCTIONS TO AUTHORS

<https://www.wjgnet.com/bpg/gerinfo/204>

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<https://www.wjgnet.com/bpg/gerinfo/208>

ARTICLE PROCESSING CHARGE

<https://www.wjgnet.com/bpg/gerinfo/242>

STEPS FOR SUBMITTING MANUSCRIPTS

<https://www.wjgnet.com/bpg/GerInfo/239>

ONLINE SUBMISSION

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Observational Study

Endoscopic resection of superficial bowel neoplasia: The unmet needs in the Egyptian practice

Mohamed H Emara, Mariam Zaghloul, Haidi Karam-Allah Ramadan, Salem Youssef Mohamed, Mohammed Tag-Adeen, Ahmed Alzamzamy, Mohamed Alboraie, Ahmad Madkour, Ahmed Youssef Altonbary, Tarik I Zaher, Ahmed Abo Elhassan, Nermeen Abdeen, Mohammed Hussien Ahmed

Specialty type: Gastroenterology and hepatology

Provenance and peer review: Invited article; Externally peer reviewed.

Peer-review model: Single blind

Peer-review report's scientific quality classification

Grade A (Excellent): 0
Grade B (Very good): 0
Grade C (Good): C
Grade D (Fair): D, D
Grade E (Poor): 0

P-Reviewer: Hu B, Yoshida A

Received: November 12, 2021

Peer-review started: November 12, 2021

First decision: December 12, 2021

Revised: December 22, 2021

Accepted: March 26, 2022

Article in press: March 26, 2022

Published online: April 16, 2022



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Abstract

BACKGROUND

Management of superficial bowel neoplasia (SBN) in early stages is associated with better outcomes. The last few decades experienced a paradigm shift in the management of SBN with the introduction of advanced endoscopic resection techniques (ERTs). However, there are no clear data about the aspects of ERTs in Egypt despite the growing gastroenterology practice.

AIM

To investigate the knowledge, attitude, and practice of ERTs toward management of SBN among Egyptian practitioners and the suitability of the endoscopy units' infrastructures toward these techniques.

METHODS

An online 2-pages questionnaire was used. The first page comprised demographic data, and questions for all physicians, about the knowledge (11 questions) of and attitude (5 questions) toward ERTs as a therapeutic option for SBN. The second page investigated the practice of ERTs by endoscopists (6 questions) and the infrastructures of their endoscopy units (14 questions). The survey was disseminated through July 2021 and the data were collected in an excel sheet and later analyzed anonymously.

RESULTS

The complete responses were 833/2300 (36.2%). The majority of the participants were males ($n = 560$, 67.2%), middle-aged ($n = 366$, 43.9%), consultants ($n = 464$, 55.7%), gastroenterologists ($n = 678$, 81.4%), spending ≥ 15 years in practice ($n = 368$, 44.2%), and were working in university hospitals ($n = 569$, 68.3%). The majority correctly identified the definition of SBN (88.4%) and the terms polypectomy, endoscopic mucosal resection (EMR), and endoscopic submucosal dissection (ESD) (92.1%, 90.2%, and 89.1% respectively). However, 26.9%, 43.2% and 49.5% did not recognize the clear indication of polypectomy, EMR, and ESD respectively. Although 68.1% of physicians are convinced about the ERTs for management of SBN; only 8.9% referred all candidate cases for ERTs. About 76.5% of endoscopists had formal training in the basic polypectomy techniques while formal training for EMR and ESD was encountered only in 31.9% and 7.2% respectively. About 71.6% and 88.4% of endoscopists did not perform EMR or ESD in the last one year. Consequently, the complication rate reported by endoscopists was limited to 18.1% ($n = 103$) of endoscopists. Only 25.8% of endoscopists feel confident in the management of ERTs-related complications and a half (49.9%) were not sure about their competency. Regarding the endoscopy units' infrastructures, only 4.2% of the centers had their endoscopes 100% armed with optical enhancements and 54.4% considered their institutions ready for managing ERTs-related complications. Only 18.3% ($n = 104$) of endoscopists treated their complicated cases surgically because the most frequent ERTs-related complications were procedural bleeding (26.7%), and perforations (17%).

CONCLUSION

A significant deficiency was reported in the knowledge and attitude of Egyptian practitioners caring for patients with SBN toward ERTs. The lack of trained endoscopists in both EMR and ESD in part is due to unsuitable infrastructures of many endoscopy units.

Key Words: Endoscopic submucosal dissection; Endoscopic mucosal resection; Polypectomy; Superficial bowel neoplasia; Egypt

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Core Tip: A paradigm shift in the management of superficial bowel neoplasia had been observed over the last few decades with the introduction of new endoscopic resection techniques and the advancements reported in the endoscopes and accessories. These advanced endoscopic resection techniques especially endoscopic mucosal resection (EMR) and endoscopic submucosal dissection (ESD) necessitates the insertion of knowledge and improvement of the practice attitude of the practitioners before delivering education and training programs to skilled endoscopists. The current study investigated these aspects among Egyptian practitioners and it revealed a significant deficiency in the knowledge and attitude with lack of trained endoscopists in both EMR and ESD in part is due to unsuitable infrastructures of many endoscopy units.

Citation: Emara MH, Zaghloul M, Ramadan HKA, Mohamed SY, Tag-Adeen M, Alzamzamy A, Alboraie M, Madkour A, Altonbary AY, Zaher TI, Elhassan AA, Abdeen N, Ahmed MH. Endoscopic resection of superficial bowel neoplasia: The unmet needs in the Egyptian practice. *World J Gastrointest Endosc* 2022; 14(4): 235-249

URL: <https://www.wjgnet.com/1948-5190/full/v14/i4/235.htm>

DOI: <https://dx.doi.org/10.4253/wjge.v14.i4.235>

INTRODUCTION

The prevalence of bowel cancer is variable around the globe. Colon cancer ranks 3rd among all cancers while cancer stomach which has geographic predilection ranks 6th. Cancer colon ranks 2nd while cancer stomach ranks 4th regarding cancer-related death[1]. In Egypt there is no recent formal prevalence rate, however, early reports showed that colorectal cancer ranks 7th most common cancer among Egyptians [2].

Management of early bowel malignancy has been associated with better treatment outcomes; low morbidity and mortality. Over the last two decades, there was a paradigm shift in the management of early bowel malignancy[3,4]. Surgical resection had been the therapeutic option of choice. However, the major advancements in gastrointestinal (GIT) endoscopy evolved in the development of new endoscopic resection techniques (ERTs) as alternative curative options.

Across the literature, ERTs have been associated with better outcomes and improved quality of life in comparison to conventional surgical techniques[3,5]. Different ERTs are currently known and include the standard snare polypectomy techniques, endoscopic mucosal resection (EMR), and endoscopic submucosal dissection (ESD). Each method had its indications, techniques, complications as well as training curve defined by many of the current practice guidelines[3,6,7].

In Egypt, there is a growing GIT endoscopy practice. Unfortunately, most of the institutions lack formal training programs for junior gastroenterologists. Consequently, no clear data are evident about the current practice of endoscopic resection techniques. We believe that investigating the current aspects of ERTs would alarm; currently and guide; in the near future, the practice as well as the training of advanced resection techniques among Egyptian practitioners. The current study aimed at investigating the knowledge, attitude, and practice of endoscopic resection techniques among Egyptian practitioners managing patients with SBN as well as the suitability of the infrastructures in the endoscopy units toward these techniques.

MATERIALS AND METHODS

Questionnaire development

An online questionnaire was developed and designed only for Egyptian physicians caring for patients with SBN. Besides the demographic data (gender, age, career specialty, the main hospital of practice, *etc.*) in this questionnaire (Supplementary Material), four domains were investigated: (1) Knowledge about the cancerous process of the bowel and its management options, either from authorized websites as international guidelines or real experience (11 questions); (2) Attitude toward (5 questions) ERTs as an acceptable therapeutic option for management of SBN; (3) Practice of ERTs (6 questions); and (4) infrastructures of the national endoscopy units (manpower, endoscopes, accessories, policy, and procedures): One of the important determinants for performing ERTs are infrastructures of the endoscopy units (14 questions)

For all physicians (non-endoscopists and endoscopists), the knowledge about and attitude toward ERTs were assessed while endoscopists only were surveyed for their practice and the infrastructures of their endoscopy units

The questionnaire dissemination

The survey was disseminated through 3 main channels: First, through 2 WhatsApp groups for national gastroenterology physicians. Second, through emails of the national societies for gastroenterologists, internists, and surgeons. Third, through Facebook accounts of the relevant groups. The survey was disseminated through July 2021. A reminder announcement and emails were sent again one week before the closure of the survey. The responses were collected in an online platform (2 online pages; the first page focused on demographic data, knowledge, and attitude while the second page comprised data for endoscopists; evaluating the skills in practice and the infrastructures of their endoscopy units). The data were exported to an excel sheet and were analyzed later anonymously.

Participants

Egyptian physicians manage patients with gastroenterology problems (gastroenterologists, internists, and surgeons).

Sample size calculation

The primary objective of this study was to measure the knowledge, attitude, and practice among Egyptian physicians caring for patients with SBN. Consequently, we tried to reach as many physicians as we can without fixing a sample size, aiming that a large number of recruited physicians improve the reliability of the results.

Ethical considerations

In this survey form, all participants were informed about the volunteer role to participate. The data were analyzed anonymously and the data of participants were not disclosed. The institutional review board of Kafrelsheikh University approved the questionnaire (approval code MKSU code 36-9-21).

Statistical analysis

The data were collected and analyzed using Statistical Package for Social Sciences (SPSS version 26.0) software (IBM SPSS Inc. Chicago, United States). There were no incomplete responses to be excluded from the analysis. The data were expressed as numbers and proportions.

RESULTS

Study participants

In this survey, about 2300 Egyptian physicians were invited. The complete responses were obtained from 833/2300 with a percentage of 36.2%. There were no missing responses from visitors to the first page of the questionnaire (the measure of knowledge and attitude among endoscopists and non-endoscopists) nor to the second page of the questionnaire (endoscopists). About two-third of the participants were males (560, 67.2%) and the majority were middle-aged between 36–45 years ($n = 366$, 43.9%), were consultants ($n = 464$, 55.7%), and were gastroenterologists ($n = 678$, 81.4%). The majority were experienced in practice; spending more than 15 years in practice ($n = 368$, 44.2%), and about two-third also were working in university hospitals ($n = 569$, 68.3%) (Table 1).

Although the respondents represented the 4 major regions of Egyptian practice (Cairo, Alexandria, Nile Delta, Upper Egypt), some regions were not represented in the responses *e.g.* the region of Sinai and Suez Canal. More details are shown in [Supplementary Table 1](#).

Knowledge

Although the current survey demonstrated that 88.4% of the physicians correctly identified the SBN as a cancerous process of the bowel that is limited to the mucosa and submucosa, 34.3% and 36.9% of them missed the correct diagnostic (different endoscopic methods) and therapeutic (ERTs) maneuvers for SBN, respectively. These findings explain why 43.2% of the surveyed practitioners failed to describe the different therapeutic modalities for bowel cancer in general. More details about the correct and incorrect responses are shown in [Table 2](#).

The majority of the surveyed physicians identified what is meant by polypectomy, EMR, and ESD correctly in 92.1%, 90.2%, and 89.1% respectively. However, a substantial proportion of them lacks the correct knowledge about the endoscopic treatment for mucosal lesions and the lack of recognition of the correct answer parallels the complexity of the maneuver. For polypectomy, 26.9% did not recognize that endoscopic treatment of pedunculated polyp is snare polypectomy, compared to 43.2% who did not correctly recognize EMR as the standard endoscopic resection technique for non-pedunculated lesions ≤ 15 mm. Furthermore, the frequency rises to 49.5% when ESD was investigated as the endoscopic resection technique for non-pedunculated lesions ≥ 20 mm. Consequently, 28.5% of the surveyed physicians did not recognize the spectrum of indications of ERTs to involve Barrett's high dysplasia, polyps, and SBN (Table 2).

Attitude

Early diagnosis of SBN necessitates picking up cases so early before even any manifestations develop; consequently, screening of average-risk population and/or surveillance of high-risk patients is necessary. However, the screening policy seems deficient in Egyptian practice. According to the personal attitude toward the SBN measured in the current questionnaire by 5 questions, only 15.1% of physicians refer all candidates of screening for endoscopic surveillance. Furthermore, 12.2% of the physicians did not refer the high-risk patients for endoscopic screening, the main bulk of practitioners (72.6%) invariably refer the candidates for screening (Table 3).

Although 68.1% of physicians are convinced about the ERTs as management for SBN; only 8.9% of them refer all candidate cases for ERTs which represents a sort of reluctance in the decision making. When SBN is suspected/confirmed endoscopically only 14.4% of practitioners refer their patients for surgical resection and surprisingly 17.6% did not refer them for surgical resection at all and the main bulk of the surveyed physicians (68%) prefer the patients to resection with variable frequencies (Table 3).

Table 1 Demographic characteristics of the surveyed physicians

Variable	Frequency (n = 833)	Percent (%)
Gender		
Male	560	67.2
Female	273	32.8
Age (yr)		
≤ 35	276	33.1
36-45	366	43.9
> 45	191	22.9
Academic categories		
Consultants	464	55.7
Residents	36	4.3
Specialist	333	40.0
Career specialty		
Gastroenterologist	678	81.4
General medicine	121	14.5
Surgery	34	4.1
Years of practice (yr)		
< 5	145	17.4
5-10	120	14.4
10-15	200	24.0
> 15	368	44.2
Main hospital of practice		
Central	80	9.6
General	111	13.3
Teaching institution	73	8.8
University	569	68.3

It seems that the above-mentioned attitude toward endoscopic detection and endoscopic management of SBN is related to individual opinions and behavior because most of the institutions (62.2%) are lacking for panels discussing the management of SBN.

Practice

About two-third of the surveyed physicians were endoscopists ($n = 570$, 68.4%). More than two-third of the endoscopists had formal training in the basic polypectomy techniques (67.5%), while formal training focusing on the advanced ERTs namely EMR and ESD was encountered only in 31.9% and 7.2% respectively which represents a substantial deficiency in training for the advanced ERTs in the Egyptian community. Although most of the endoscopists (58.1%) are familiar with the Paris classification for reporting SBN, only 34.9% are popular with or using Kudo classification, and only 10.5% of endoscopists use other classification systems in reporting their lesions. About two-third (63.7%) were aware of the causes that increase the submucosal fibrosis which ultimately affect the success rates of advanced ERTs (Table 4).

Regarding the personal/individual skills (Table 5) for ERTs, a substantial number of the surveyed endoscopists (67.4%) did not excise polyps in the last year, although the cause is not clear this probably reflects the low prevalence of bowel neoplasia in the Egyptian community. This seems accepted because 71.6% did not perform EMR in the last year and 88.4% of the endoscopists did not perform ESDs in the last year. Consequently, it is accepted that the complication rate reported by endoscopists was limited to 18.1% ($n = 103$) of endoscopists. An alarm reported in the current survey is the competency in management of ERTs-related complications. Only 25.8% of endoscopists feel confident in the management of complications and nearly half of the surveyed endoscopists (49.9%) are not sure about their competency.

Table 2 Assessment of knowledge among the surveyed physicians

Variable	Number	Percent
What is superficial bowel neoplasia?		
True	736	88.4
False	97	11.6
Superficial bowel neoplasia can be diagnosed with?		
True	547	65.7
False	286	34.3
What is the best option for the treatment of bowel cancer in general?		
True	473	56.8
False	360	43.2
What is the best treatment for superficial bowel neoplasia?		
True	526	63.1
False	307	36.9
What does polypectomy mean?		
True	767	92.1
False	66	7.9
What does EMR stand for?		
True	751	90.2
False	82	9.8
What does ESD stand for?		
True	742	89.1
False	91	10.9
The best endoscopic treatment option for pedunculated polyps		
True	609	73.1
False	224	26.9
The best endoscopic treatment option for non-pedunculated lesions ≤ 15 mm in diameter		
True	473	56.8
False	360	43.2
The best endoscopic treatment option for non-pedunculated lesions ≥ 20 mm		
True	421	50.5
False	412	49.5
Endoscopic resection is a suitable treatment?		
True	596	71.5
False	237	28.5

Infrastructures of the national endoscopy units

One of the important determinants for performing ERTs is infrastructure of the endoscopy units, which was focused in the current survey (Table 6).

Manpower: About 70.2% ($n = 400$) of the surveyed endoscopists had ≥ 5 independent endoscopists in their units, which means a suitable number of endoscopists to deliver training in each unit. However, most of the nursing staff (52.1%) are not formally trained for advanced resection techniques.

Endoscopes and accessories: About 54.4% of the endoscopists see that the total number of endoscopes in their units is not sufficient to perform the daily endoscopic procedures including the ERTs. Furthermore, the endoscopes with optical enhancements (NBI, i-SCN, FICE) are lacking in 23.7% of

Table 3 Attitude of the surveyed physicians towards superficial bowel neoplasia

Question (%)	Frequency	Percent
How frequently do you refer your patients for endoscopic screening of superficial bowel cancer in high-risk groups? (% of the high-risk patients you see)		
0	102	12.2
25	386	46.3
50	116	13.9
75	103	12.4
100	126	15.1
How convinced you are with endoscopic treatment of superficial bowel cancer?		
Convinced	567	68.1
I don't Know	175	21
Not convinced at all	91	10.9
How frequently do you refer a patient with endoscopic features of superficial bowel cancer for endoscopic resection? (% of the patients you see)		
0	235	28.2
25	301	36.1
50	115	13.8
75	108	13
100	74	8.9
How frequently do you refer a patient with endoscopic features of superficial bowel cancer for surgical management? (% of the patients you see)		
0	147	17.6
25	290	34.8
50	212	25.5
75	64	7.7
100	120	14.4
In your institution do you have a panel to discuss the treatment options for superficial bowel neoplasia?		
No	518	62.2
Yes	315	37.8

endoscopy theaters, and 42.5% had $\leq 25\%$ of the endoscopes with optical enhancement which means a deficiency of magnification facility and diminished probability of accurate diagnosis while only 4.2% of the centers had their endoscopes 100% armed with optical enhancements. More than two-third of the centers had advanced diathermy units (68.2%), meanwhile, argon plasma coagulation and haemoclips available to enable resections and guard against adverse events were available in 89.3% and 86.1%, respectively. Again the probability of diagnosis seems defective if relied on chromoendoscopy because only 20.2% of endoscopists had in their units the dyes for chromoendoscopy and tattooing.

Procedure: Focusing on the procedures, most centers (80.7%) perform ERTs under anesthesiologist observation. Furthermore, 72.5% of endoscopists reported that a surgical back up team is available for management of complications and that is why 54.4% of them decided that their institutions are ready for managing complications following ERTs. Only 18.3% ($n = 104$) of endoscopists treated their complicated cases surgically, because the most frequent complication during ERTs was procedural bleeding (26.7%), and perforations were the second common complication (17%).

DISCUSSION

In fact, the last 2-3 decades experienced a paradigm shift in the endoscopic management of SBN in particular for the colonic lesions due to the advancements in magnification endoscopy (imaging), introduction of CO₂ insufflation and the advent of modern electrosurgical devices with adoption of new techniques mainly EMR and ESD. Both have been associated with improved patient oriented outcomes

Table 4 Basic endoscopic practice knowledge for endoscopic resection techniques among the surveyed endoscopists

Question	Number (N = 570)	Percentage (%)
Are you trained formally on endoscopic polypectomy?		
No	134	23.5
Yes	436	76.5
Are you trained formally on EMR?		
No	388	68.1
Yes	182	31.9
Are you trained formally on ESD?		
No	528	92.6
Yes	42	7.4
Do you use Paris classification in reporting the lesions?		
No	239	41.9
Yes	331	58.1
Do you use Kudo classification in reporting the lesions?		
No	371	65.1
Yes	199	34.9
Do you use classifications other than Paris and Kudo in reporting the lesions?		
No	510	89.5
Yes	60	10.5
Which of the following practices increase sub-mucosal fibrosis and hence affect the success of advanced endoscopic resection techniques		
All apply	363	63.7
Extensive biopsies	117	20.5
Partial snare polypectomy	24	4.2
Tattoo injection for marking immediately under or close by a lesion	66	11.6

EMR: Endoscopic mucosal resection; ESD: Endoscopic submucosal dissection.

with improved quality of life and that is why a growing interest in such techniques became rapidly a global era.

However, these advanced techniques are not widely available in all endoscopy units and need special advanced training. Furthermore, we believe that certain communities may lack the basic knowledge and practice attitude toward these techniques as the currently preferred management for early stages of bowel neoplasia in comparison to the surgical excision and this was the rationale to investigate the Egyptian practice about these high-quality ERTs. To the best of our knowledge, this is the first trial to estimate different aspects of ERTs in the Egyptian community.

In this study, the knowledge among the physicians managing patients with SBN was not sufficient, especially in the area of endoscopic diagnosis and the clear indications of each technique. Furthermore, there was also a deficiency in the knowledge of the spectrum of indications for ERTs, although the description of the proper diagnostic and management approach to SBN and description of such techniques and their indications are defined by many of the published practice guidelines[3,8].

According to the current survey, there was an obvious reluctant attitude at both institutional and individual levels. Most of the Egyptian institutions lack panels discussing the management of SBN. The individual reluctance is obvious not only in the endoscopic screening of high-risk patients and hence early recognition of SBN[9], but also clear in the lack of referring all candidate patients for ERTs although most of the physicians are convinced in ERTs.

In fact, the knowledge and attitude to ERTs have not -to the best of our knowledge- been investigated previously, yet did the current survey and we identified a reasonable deficiency in the knowledge and deviation of the attitude of the surveyed physicians. The barriers to knowledge and attitude vary and are not limited to; lack of sufficient time to access the educational materials[10], lack of funds[11], among others. We believe that delivering educational materials focusing on these techniques and supplying reports with documented efficacy of such techniques in the management of SBN with its

Table 5 Individual competency in endoscopic resection techniques among the surveyed endoscopists

Question	Number (N = 570)	Percentage (%)
How many polyps did you excised in the last year?		
0	384	67.4
11-20	96	16.8
21-30	30	5.3
41-50	36	6.3
Less than 10	12	2.1
More than 50	12	2.1
How many EMRs did you perform in the last year?		
0	408	71.6
10-20	48	8.4
20-30	12	2.1
Less than 10	102	17.9
How many ESDs did you perform in the last year?		
0	504	88.4
10-20	12	2.1
Less than 10	54	9.5
How many complications from endoscopic resection techniques have you had in the last year (% of your total cases)?		
0	329	57.7
0.25	91	16.0
0.5	12	2.1
I don't practice advanced endoscopic techniques	138	24.2
How competent are you in managing the complications of endoscopic resection techniques?		
Competent	147	25.8
I am not sure	284	49.8
Non-competent	139	24.4

EMR: Endoscopic mucosal resection; ESD: Endoscopic submucosal dissection.

impact on the quality of life among the patients would improve both the knowledge and attitude among the Egyptian practitioners. This was proved in previous reports in other practice topics, for example, the knowledge and attitude of students and healthcare professionals was effectively improved through the delivery of teaching materials through different means ranging from face-to-face learning seminars, lectures and curricula[12], attending online curriculum[13], sending regular SMS to the practitioners [14], disseminating leaflets and hand-outs[15], and allowing quick *e.g.* through mobile phones, access to online resources[16].

In the current study, the barriers to knowledge and attitude toward ERTs in the management of SBN were not investigated. However, some data from previous reports can be inferred. These barriers are not limited to lack of evidence with limited belief in the value of available tools[17], because 78.1% of physicians are convinced about ERTs, or to lack of effective collaboration and teamwork skills[17], which is a growing interest in our practice, but rather extend to lack of formal education programs, the reluctance of sticking to the application of the guidelines and probably also to lack of continuous clinical audits[18].

The door is then open for the national leaders in the field to deliver these educational materials in the local conferences and meetings that run in the country over the year. In addition, directors of the gastroenterology curricula are responsible to insert these data in the course syllabus to be an integral part of the topic rather than an advancement delivered only to the subgroup of experts performing endoscopy. This has been proved effective per reports from Asia that proved improvement in the knowledge of practitioners toward early diagnosis and management of SBN after delivering structured training programs[8].

Table 6 Parameters of the endoscopy units' infrastructures among the surveyed endoscopists

%	Number (n = 570)	Percent
How many independent endoscopists are in your unit?		
Less than 5	170	29.8
5-10	164	28.8
More than 10	236	41.4
The nursing staff in your endoscopy unit are knowledgeable and trained on endoscopic resection techniques		
No	297	52.1
Yes	273	47.9
How sufficient is the number of endoscopes in your unit to perform all endoscopy duties?		
I am not sure	36	6.3
Not- Sufficient	310	54.4
Sufficient	224	39.3
How many endoscopes with optical enhancement (NBI- i-SCAN- FICE) are available in your unit (% of the total scopes in your unit)		
0.00	135	23.7
25.00	242	42.5
50.00	126	22.1
75.00	43	7.5
100.00	24	4.2
Dyes for chromoendoscopy are available in your unit		
No	455	79.8
Yes	115	20.2
Advanced Diathermy unit with different endoscopy modes is available in your unit		
No	181	31.8
Yes	389	68.2
APC is available in your unit		
No	61	10.7
Yes	509	89.3
Haemoclips are available in your unit		
No	79	13.9
Yes	491	86.1
In your endoscopy unit, the endoscopic resection techniques are operated under anesthesiologist's observation		
No	110	19.3
Yes	460	80.7
The most commonly reported complications from endoscopic resection techniques in your unit		
Delayed bleeding	24	4.2
Perforations,	97	17.0
Procedural bleeding	152	26.7
Sedation or anesthesia-related	12	2.1
We do not perform advanced endoscopic resection	285	50.0
Your institution is ready for managing the complications of endoscopic resection techniques?		
I am not sure	218	38.2
No	42	7.4

Yes	310	54.4
The surgical backup team is usually ready to manage complications of your cases		
No	157	27.5
Yes	413	72.5
How many complicated cases following endoscopic resection treated under surgical repair in the last one year within your institution (% from complicated cases)		
0.00	430	75.4
25.00	74	13.0
50.00	30	5.3

Per the current survey, a deficiency was reported not only in training for but also in performing ERTs, especially EMR and ESD. Furthermore, a small number of endoscopists are popular or using endoscopic classification systems and a reasonable number lack the competency in facing ERTs-related complications. The high-quality practice in ERTs relies on many pillars, the most important among it is training. Many endoscopic societies[3,19] formulated stepwise training curves for such procedures. It seems that an endoscopist should pass in the training curve from the basic polypectomy techniques to EMR and later to ESD in parallel with the advanced techniques. This could explain the results of the current survey. In an ascending frequency; polypectomy, EMR, and ESD were performed by Egyptian endoscopists at rates of 32.6%, 28.4%, and 11.6% respectively because this matches the complexity of each. Furthermore, the centers offering training for both EMR and ESD are very limited. However, the standard polypectomy is more popular, less technically demanding, and hence was the commonly practiced technique among the surveyed.

The delivery of high-quality resection techniques needs a recognized skill in delivering the resection and in managing the complications, especially the bleeding and perforation not only at an individual endoscopist level but rather very important at an institutional level. This emphasizes the importance of a teamwork management plan including basically an endoscopist, surgeon, anesthesiologist, and interventional radiologist. Favorably, there is a growing trend in the Egyptian practice toward teamwork activities for many GIT case scenarios including ERTs although in its early milestones.

The availability of skilled endoscopists is the stone cornerstone of performing ERTs. Their availability guarantees not only delivering a high-quality resection, but also a training platform to the possible trainees. Although, the current survey revealed recognized skills in the standard polypectomy, it did reveal a fair experience in EMR and very limited skilled endoscopists in ESD, and it also revealed a lack of competency in the management of ERTs-related complications. This should alarm the stakeholders for the urgent need to establish training centers and exchange experience with worldwide leaders in advanced endoscopy to train a new generation of Egyptian gastroenterologists in ERTs. In Egypt, we have a few endoscopy workshops that usually operate such cases both as hands-on training on models and live transmission of real cases but this seems non-sufficient solely in delivering the desired training, although it is important.

Although EMR was introduced before ESD, the experience in its application still needs training and assurance of competency. This ultimately grantee quality and improved patient outcomes. This needs to be inserted in post-graduate courses and continuing education settings[20].

One recently published report surveyed Korean endoscopists showed that both observation and performing ESD under direct supervision were the most important determinants of ESD training[21]. The authors reported also that, hands-on-courses were implemented by all the training centers. It is worth mentioning that in Korea at least 45 centers implement formal ESD practice and training in comparison to very few centers in Egypt. The problem of delivery of a formal training program for advanced resection techniques such as ESD has its own reasons that vary from the far East to the West and are not limited to trainees' background, differences in the type of the pathology seen, the availability of highly qualified mentors and training centers, availability of high-quality endoscopes among others[22]. Hence, it is expected to have a global shortage in training for ESD and not only in Egypt and Middle East countries.

The infrastructures (both in equipment, procedures, and skilled personnel) of endoscopy units nationwide need improvements. Most of the endoscopy centers are not equipped with enough scopes and specifically, the units lack advanced scopes with optical enhancements. The procedures with the availability of surgical backup teams look accepted, however, there was a shortage in the formal nurse training.

In the Egyptian community, tertiary referral centers (university hospitals, teaching institutions) are rather equipped than the general and central hospitals as per the data from the current survey. Consequently, these centers offer most of the national daycare service and training. However, focusing on EMR and ESD very few centers are currently delivering the service for real cases with a very limited number of trainees. Hence, we can deliver a very important message to the local health authorities for

the necessity to equip endoscopy units nationwide with the required equipment and establish multidisciplinary teams for managing cases of SBN and running formal training programs.

The plan is to deliver lectures in the meetings, conferences to insert the knowledge and improve the attitude among all physicians caring for patients with SBN. Later on, endoscopists can have a rising training curve that begins with hands-on courses[21], on *ex vivo* models[23-25] and *in vivo* on the animals[25,26], then trainee needs to watch videos, attend live cases, observes and assist in cases and finally perform under direct supervision. Implementation of this step-up fashion of training will enable trainees to learn early and to have a great chance to had supervised techniques[27,28]. Both have been associated with trainee satisfaction in previous studies[21]. Although attendance of conferences, meetings, face to face theoretical courses, watching recorded videos, attending live cases demonstrations are essential to improve knowledge and attitude, performing these advanced techniques under direct supervision by experts seems the most important method of training and hence we encourage our local leaders to propose a teaching and training algorithms in certified centers that end with practice and performance of ERTs under direct supervision by experts. This, ultimately fill the missing gaps in Egyptian practice.

This study had some limitations. First, include use of non-gastroenterologists. In fact, evaluation of knowledge and attitude of non-gastroenterologists is very essential because they constitute an integral role of care and sometimes are the first relay in delivering the care for patients with SBN and that is why there was a generalization in the questions of the knowledge domain. Second, lack of coverage for some geographic areas in the country. We distributed the questionnaire aiming at covering the whole country but usually, the response rates from the online questionnaires are limited due to many reasons. Third, the is a non-inclusion of the private sector. Currently, the law is not allowing practicing endoscopy in private clinics. However, endoscopy still running in private hospitals although it is sometimes difficult to assess the private sector due to many reasons including but not limited to the heterogeneity of the working endoscopists. Fourth, we did not investigate the barriers to the deficiency in all aspects focused. These can be focused on future surveys.

CONCLUSION

In conclusion, to the best of our knowledge, this is the first survey to focus ERTs status in Egypt and despite the limitations we have, this survey revealed a significant deficiency not only in the knowledge and attitude of Egyptian practitioners caring for patients with SBN toward ERTs, but it also spotted the light on the lack of trained endoscopists in both EMR and ESD in part due to unsuitable infrastructures of many endoscopy units around the country. These findings would enforce stakeholders for the urgent need to deliver educational and training programs focusing ERTs hand in hand with improving the infrastructures of the endoscopy units. Stakeholders of gastroenterology practice in Egypt are asked to improve all aspects of practice. They should focus on giving basic knowledge, improve the attitude of practitioners before giving the advanced training and supply the required infrastructures.

ARTICLE HIGHLIGHTS

Research background

Stakeholders of gastroenterology practice in Egypt are asked to improve all aspects of practice. They should focus on giving basic knowledge, improve the attitude of practitioners before giving the advanced training and supply the required infrastructures. The barriers to the deficiency in all aspects of primary and secondary outcomes can be focused on in future surveys.

Research motivation

Our study concluded that lack of knowledge towards endoscopic resection techniques (ERTs), reluctant attitude, lack of well-trained endoscopists, and shortage of infrastructures are the main obstacles that hamper performing endoscopic mucosal resection (EMR) and endoscopic submucosal dissection (ESD) on wider scale and on a routine basis in Egypt.

Research objectives

Complete responses were 833/2300. The majority correctly identified the definition of superficial bowel neoplasia (SBN), the terms polypectomy, EMR, and ESD (88.4%, 92.1%, 90.2%, and 89.1% respectively). However, 26.9%, 43.2%, and 49.5% did not recognize the clear indications of polypectomy, EMR, and ESD respectively. Although 68.1% are convinced about the ERTs; only 8.9% referred all candidate cases for ERTs. About 76.5% of endoscopists had formal training in the basic polypectomy techniques while formal training for EMR and ESD was encountered only in 31.9% and 7.2% respectively. About 71.6% and 88.4% of endoscopists did not perform EMR or ESD in the last year. Only 25.8% of endoscopists feel confident in the management of ERTs-related complications. Only 4.2% of the centers had their

endoscopes 100% armed with optical enhancements.

Research methods

This observational study began with the development of a questionnaire during May and June 2021, after agreement upon it an online 2-page questionnaire was developed and distributed through July 2021. The questionnaire was distributed through social media including WhatsApp and Facebook as well as emails from the national relevant scientific groups. The study focused on Egyptian physicians caring for patients with gastrointestinal health problems

Research results

The primary aim of our study was to assess the knowledge and attitude of Egyptian physicians caring patients with SBN toward the ERTs as potential curative methods. Furthermore, the practice of Egyptian endoscopists practicing ERTs was also investigated. The secondary endpoint was to assess the infrastructure of the endoscopy units regarding the manpower, scopes, and accessories, as well as policies within.

Research conclusions

In Egypt we have a growing endoscopy practice, however little is known about physician knowledge, attitude, and practice toward ERTs. Furthermore, the nationwide spread of endoscopy units needs to be explored as regards the suitability to run these advanced techniques.

Research perspectives

There is a global era in the management of SBN due to the introduction of advanced ERTs mainly EMR and ESD.

ACKNOWLEDGEMENTS

The authors would thank all colleagues who answered the survey. Without their response, these important data were not completed

FOOTNOTES

Author contributions: Emara MH, Ahmed MH, Mohamed SY, Ramadan HKA, Alboraie M, and Zaghloul M proposed the concept; Emara MH, Ahmed MH, Mohamed SY, Ramadan HKA, Alboraie M, Zaghloul M, Altonbary AY, Madkour A, Zaher TI, Abdeen N, Abo Elhassan A, Tag-Adeen M, A Alzamzamy proposed the questionnaire and revised it; Zaghloul M performed statistical analysis; Emara MH, Ahmed MH, Mohamed SY, Ramadan HKA, Alboraie M, Zaghloul M, and Tag-Adeen M wrote the draft; all authors revised the article, read the final manuscript and all approved it; all authors performed web search, aid in questionnaire distribution.

Institutional review board statement: The institutional review board of Kafrelsheikh University approved the questionnaire (approval code MKSU code 36-9-21).

Informed consent statement: In this survey form all participants were informed about the volunteer role to participate.

Conflict-of-interest statement: All authors declare that they did not have any conflict of interest.

Data sharing statement: Technical appendix, statistical code, and dataset available from the corresponding author at [emara_20007@yahoo.com].

STROBE statement: All the authors have read the STROBE Statement—checklist of items, and the manuscript was prepared and revised according to the STROBE Statement—checklist of items.

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S-Editor: Liu JH

L-Editor: A

P-Editor: Liu JH

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