SIES 2019

12th SYDNEY INTERNATIONAL ENDOSCOPY SYMPOSIUM

Incorporating the Westmead Endoscopy Symposium Nurses' Workshop and Mini Symposium: Progress in Colonoscopy

Wednesday 13, Thursday 14 and Friday 15 March, 2019
ICC Sydney

FINAL PROGRAM AND SYLLABUS

SIES Sydney International Endoscopy Symposium

SIES INTERNATIONAL FACULTY

- Peter Cotton, USA
- Evelien Dekker, The Netherlands
- Rehan Haidry, UK
- Michael Wallace, USA
- Hironori Yamamoto, Japan

www.sies.org.au

#SIES2019

HIGHLIGHTS INCLUDE

- Optimising adenoma detection: Devices, techniques and intangibles
- Snare polypectomy: Cold vs Hot, how and why
- Serrated polyps- specialised imaging and resection considerations
- Advanced Endoscopic tissue resection: EMR, ESD, hybrid and emerging techniques
- Endoscopic ultrasound: core technique and innovations
- Perforation: early recognition and management
- Treatment of achalasia including POEM
- ERCP: complex and basic therapeutics
- Optimal detection and characterisation of Barrett's neoplasia
- Early Barrett's neoplasia: EMR or ESD

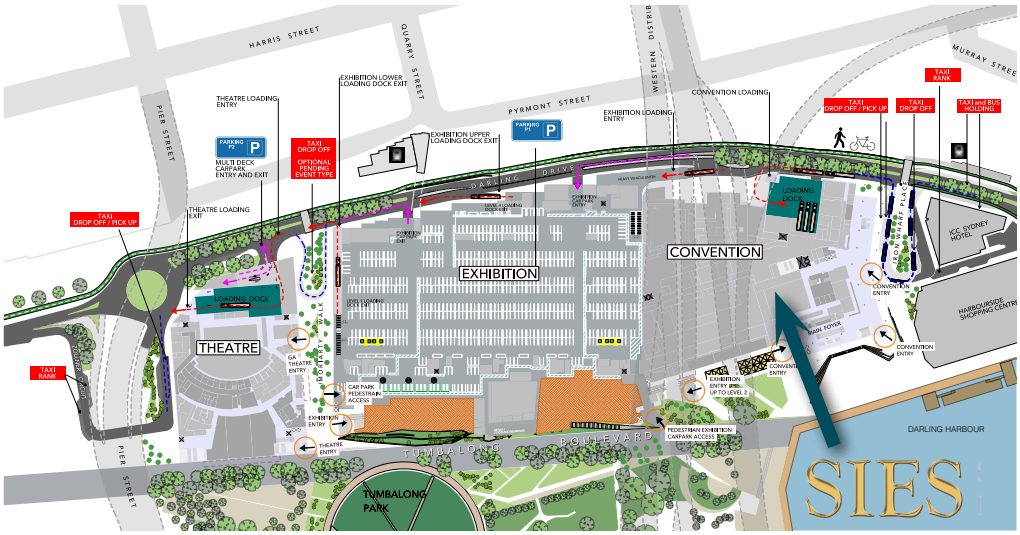
SIES Sydney International Endoscopy Symposium | SYDNEY ENDOSCOPY FOUNDATION | NSW GOVERNMENT Health Western Sydney Local Health District | ASGE | THIS COURSE IS ENDORSED BY THE AMERICAN SOCIETY FOR GASTROINTESTINAL ENDOSCOPY | ICC SYDNEY

ICC SYDNEY

PARKING

ICC Sydney has two car parks, providing patrons with access to a total of 826 parking bays, 365 days a year, 24 hours each day. The entrances to the car parks can be easily found by heading south along Darling Drive. Signage will assist and indicate how many bays are available or if the car park is full. **Delegates of SIES are recommended to use the car park located beneath the Exhibition Centre (P1). (Unfortunately no parking discounts are offered to SIES attendees). Standard rates apply)**

ACCESS PLAN - GROUND LEVEL



Parking Operating hours:

7 Days - 24 hours

Parking Rates:

0 - 1 hour	$18.00
1 - 2 hours	$30.00
2 - 3 hours	$38.00
3 - 4 hours	$44.00
4+ hours (to 4am only)	$49.00

Night rate

Entry after 5pm and exit before 4.00am

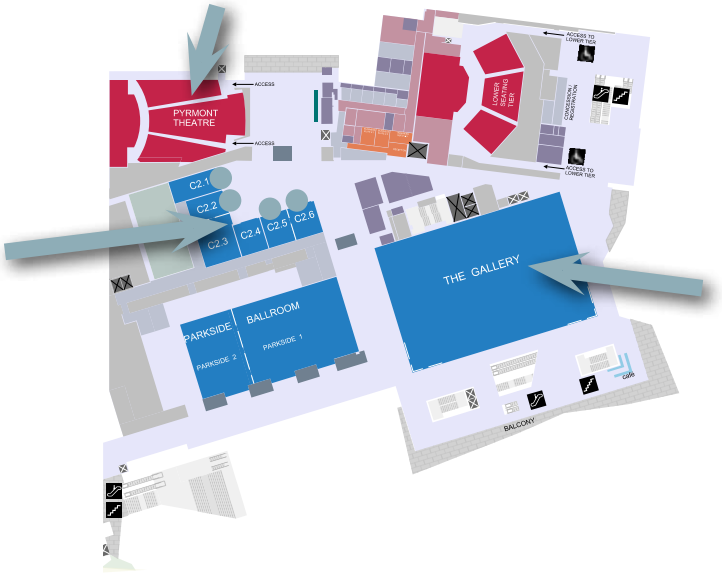
Car Park rates reset at 4.00am daily. $28.00

SIES will be held on Level 2 of the "Conventions" precinct of ICC Sydney. Registration, catering and the trade exhibition will be in "The Gallery". The plenary (for both the Nurses' Workshop and SIES) will be in the "Pyrmont Theatre". Signage and concierge staff in the foyer of ICC Sydney will assist you with directions if needed.

LEVEL TWO FLOORPLAN

SIES Sydney International Endoscopy Symposium

NURSES' WORKSHOP



REGISTRATION, CATERING & TRADE EXHIBITION

WELCOME

Dear Colleagues and Friends,

On behalf of our department, it is my great pleasure to welcome you to the 12th annual Sydney International Endoscopy Symposium.

We will again aim to provide a comprehensive demonstration of diagnostic and therapeutic endoscopy. Your support and enthusiasm has been overwhelming and this year will be our largest and I believe our most successful event yet.

The Symposium's content has been carefully designed to facilitate discussion. Please utilise the Symposium App via your mobile device to relay your questions through the chairs to our proceduralists. A strong emphasis on the cognitive processes behind the delivery of high quality endoscopy will feature. Several novel technologies will also be demonstrated.

On behalf of our Department, Nurses and Doctors alike, I thank you for your support and for interrupting your busy schedules to join us here for these three special days. I believe the international guests, in combination with our Australian faculty and the team from Westmead, will provide an enlightening and informative educational experience for you.

Please enjoy!

Yours sincerely

Michael Bourke

Chairman Sydney International Endoscopy Symposium 2019
Director of Gastrointestinal Endoscopy,
Westmead Hospital, Sydney

MARK YOUR DIARY

SIES 2020 - Wednesday 25, Thursday 26 and Friday 27 March, 2020

ICC SYDNEY

MARCH 2020

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

OFFICIAL APP SPONSOR

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SIES 2019 APP

Download the official app for SIES 2019!

Kindly brought to you by Olympus.

FREE WIFI

Log on to the ICC's WiFi: sieswifi

WiFi Access Code: sies2019

Available to you at no cost as a SIES delegate, our APP puts the event in the palm of your hand! This year we are using an updated app platform, that allows seamless integration with your registration details and offers great in-app features as always.

You can use the app to plan your time in advance, decide what you want to see and do, and also use it to:

- Discover the conference program and floorplan
- Access speaker bios, abstracts and presentations
- See profiles of all exhibitors and their staff and have access to additional information and documents
- Keep up with real time alerts, news and tweets during the show in the EventStream and post comments, photos and videos
- Exchange contact details with other attendees and exhibitors
- Find the people you're looking for and send messages
- Participate in live polling, Q&A and much more!

INITIAL INSTALLATION

In your device's Apple iOS or Android AppStore search for The Event App by EventsAir and download the free app.

If you have a Blackberry or Windows device you can access the app by scanning this QR code, or typing into your browser

https://ekiddna.eventsair.com/attendeeapp/2019sies/sies2019/

Enter the event code SIES2019 and you will be able to log in via the key icon.

Use your registered email address and your personal 4 digit pin you will have received in your welcome email and which is also printed on the reverse of your name badge.

If you are not able to locate the pin, just visit the App Concierge Desk next to the Olympus stand for assistance.

Once you have completed these initial steps you will be logged in for the duration the conference and beyond and you will receive updates and alerts automatically.

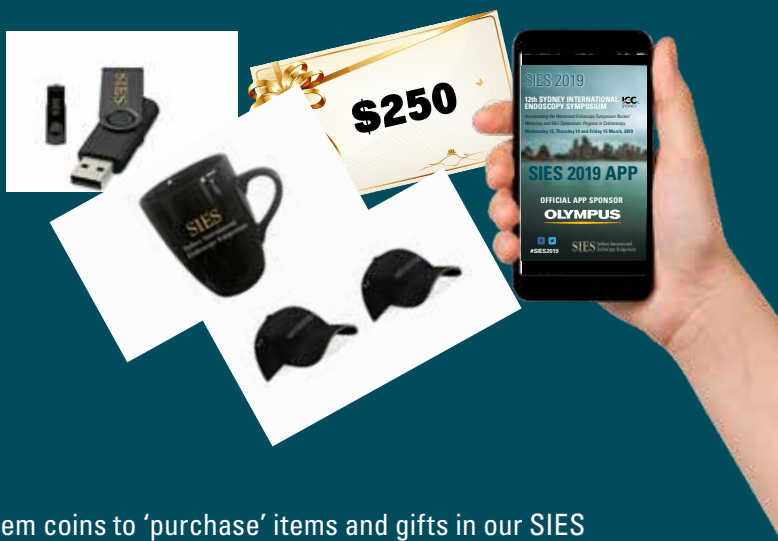
LIVE POLL AND Q&A FEATURES!

Ask questions in-session on the fly. Questions are moderated by the speaker/chair and can be answered by the panel or passed on to the Endoscopists at Westmead.

NEW!

EVENTSTREAM ENGAGE is a comprehensive platform to provide you with numerous games and goals to encourage interactions and engagement with your fellow delegates, speakers and exhibitors. **EVENTSTREAM ENGAGE** is all about engagement, finding activities, quests and goals to encourage you get the most out of networking and the trade exhibition. Earn points by:

- Connecting with other delegates
- Installing the Attendee App
- Visiting with exhibitors
- Participating in social networking (EventStream)
- Participating in Live Polling and Q&A
- Answering trivia questions
- Finding hidden QR codes
- Checking into functions
- Answering surveys and much more!



You can earn points, accumulate badges, win prizes and redeem coins to 'purchase' items and gifts in our SIES Merchandise Store.

WIN! Your points automatically enter you into the draws for our great prizes, the more points you earn the more entries you get. (These prizes do not have a monetary value)

- 1 x Full SIES Registration for 2020
- 1 x Nurses' Workshop One Day Registration for 2020
- 3 x $250 gift cards and 11 T-shirts!

REDEEM. Your points can also convert into coins (1 coin for every 10 points). You can use these coins to buy great SIES merchandise like Caps, Mugs and USBs.

Join in the fun and take your networking to the next level.

Find us on Facebook

#sies2019

Visit the App Concierge at the Olympus stand to view the EventStream and App Participation Leaderboard. Also to buy SIES merchandise with your earned coins!

INTERNATIONAL FACULTY

PROFESSOR PETER COTTON

Medical University of South Carolina Charleston, SC, USA

Peter Cotton graduated in 1963 from Cambridge University and St. Thomas Hospital Medical School (London). He developed the Endoscopy Laboratory at St. Thomas' Hospital whilst still officially in training, brought ERCP back from Japan in 1971 and named it in 1972. He joined the faculty of the Middlesex Hospital and Medical School (London) as Director of Gastroenterology, where he developed a new department integrating medical and surgical gastroenterology. His group pioneered many diagnostic and therapeutic endoscopy procedures, particularly ERCP (sphincterotomy and stenting) and was active in teaching. He attracted postgraduates from many countries, held numerous teaching courses, and pioneered live CCTV workshops.

Dr Cotton left England in 1986 to become Professor of Medicine and Chief of Endoscopy at Duke University, Durham, North Carolina, USA. He developed a state of the art endoscopy center. He maintained his interests in teaching (mainly through live video courses), new techniques, and careful outcome evaluation. He moved to Charleston, South Carolina in 1994 to initiate the Digestive Disease Center at the Medical University of South Carolina (MUSC). The center provides a multidisciplinary environment in which to provide patient-friendly, cost-effective care, and to pursue the research and teaching necessary to enhance it. Dr. Cotton retired from active clinical practice in 2011, and remains at MUSC doing research and teaching. He recently completed a major sham controlled study of sphincterotomy in patients with suspected sphincter of Oddi dysfunction, with game-changing results.

Dr Cotton has been active in many National and International organizations, and has given invited lectures and demonstrations in over 50 countries. His bibliography includes more than 900 medical publications. "Practical Gastrointestinal Endoscopy" (co-authored by Christopher Williams) is the standard teaching text, currently in its 7th Edition, and has been translated into 8 languages. He also recently published his "endoscopic memoirs" called "The tunnel at the end of the light".

PROFESSOR EVELIEN DEKKER

University of Amsterdam, The Netherlands

Dr Evelien Dekker is professor of Gastrointestinal Oncology, specialising in screening and diagnosing colorectal carcinoma, at the University of Amsterdam's Faculty of Medicine (AMC-UvA). Evelien Dekker obtained her PhD at the UvA and did her medical training to qualify as a junior doctor, internist and subsequently a gastroenterologist at the Amsterdam Medical Center (AMC) and OLVG hospital.

Dekker has worked as a gastroenterologist since 2005, a position she has combined with that of primary investigator in the Gastroenterology department of the AMC since 2009. Her clinical duties primarily engage her in the field of gastroenterology-oncology and as head of the outpatient clinic for hereditary intestinal tumours. Furthermore, she is a member of the board of Procolo, an innovative centre of expertise for colonoscopy.

Colon cancer is a key focus of Dekker's research, and her research group studies the screening methods for intestinal cancer, the quality and advanced technical developments within colonoscopy, the treatment of intestinal polyps and the early stages of intestinal cancer, and hereditary intestinal cancer and polyposis syndromes. Dekker is a member of several working groups of the National Institute for Public Health and the Environment (RIVM), which is tasked with implementing the national population study of intestinal cancer.

Dekker is also the chair of the Dutch Colonoscopy Surveillance Guideline Committee, a member of the same guideline committee at the European level and a member of the Dutch Hereditary Intestinal Cancer Guideline Committee. Dekker has been awarded many research grants, including grants from the Netherlands Organisation for Health Research and Development (ZonMW), the Dutch Cancer Society (KWF Kankerbestrijding) and the Maag Lever Darm Stichting (MLDS). Following a public vote in 2012, Dekker was a awarded a grant from the MLDS for the project 'Family Matters', a project for the early detection of people with a hereditary risk of contracting intestinal cancer. In 2013 Dekker was awarded, together with Ernst Kuipers (Erasmus MC), the ZonMw Pearl for her intensive involvement and close cooperation in the preparations for the national population study of intestinal cancer.

Dekker is a member of the advisory council of the scientific journal Nature Reviews in Gastroenterology & Hepatology. Dekker has written numerous articles in prominent scientific journals such as *Lancet Oncology*, *Gastroenterology*, *Endoscopy*, *Gastrointestinal Endoscopy*, *American Journal of Gastroenterology* and *Gut*.

DR REHAN HAIDRY

University College Hospital London, UK

Dr Haidry is a Consultant Gastroenterologist and interventional endoscopist at University College Hospital, London. He is the clinical lead for G.I medicine and the director of endoscopy at UCLH. His main interests are pre-malignant and malignant disorders of the upper gastrointestinal tract, with a particular interest in Barrett's and Squamous neoplasia, and oesophageal cancer. His main areas of clinical research focus on novel and innovative endoscopic imaging techniques like artificial intelligence and therapeutic endoscopic approaches such as endoscopic resection, radiofrequency ablation, cryoablation, and metabolic/ bariatric endoscopy. He is a member of the BSG endoscopy committee and has published several original articles and co-authored guidelines.

PROFESSOR MICHAEL WALLACE

Mayo Clinic Jacksonville, USA

Dr Wallace is a Professor of Medicine and Director of Digestive Disease Research at Mayo Clinic in Jacksonville Florida. He also is the current Editor in Chief of Gastrointestinal Endoscopy.

He received his medical degree from Duke University School of Medicine in 1992. He completed a residency program in Internal Medicine in 1995 and a fellowship in Gastroenterology and Hepatology in 1998 at the Brigham and Women's Hospital in Boston, Massachusetts. During that time, he also completed a Master's in Public Health with a focus on clinical research at the Harvard School of Public Health.

Dr Wallace completed an advanced endoscopy fellowship in Endoscopic Ultrasound (EUS) and Therapeutic Endoscopic Retrograde Cholangiopancreatography (ERCP) in 1999 at the Medical University of South Carolina.

He remained on faculty at MUSC until 2003, when he joined the Mayo Clinic as associate professor and director of Gastroenterology Research. He was promoted to professor in 2007, and to Chair of the Division in 2010-2013. Dr Wallace served multiple roles for the AGA and American Society for Gastrointestinal Endoscopy (ASGE) including Chair of the Research Committee, 2008-2011, co-chair of the technology assessment committee 2013-14, as well as Associate Editor for Gastroenterology 2006-09.

Dr Wallace's research focuses on advanced endoscopic imaging and therapies for gastrointestinal neoplasia including light scattering spectroscopy, autofluorescence imaging, narrow band imaging, confocal endomicroscopy and molecular imaging. He has also published extensively in esophageal, pancreatic and colorectal neoplasia detection and therapy.

Dr Wallace has published more than 300 peer reviewed manuscripts and more than 300 abstracts, book chapters, review articles and editorials. He has mentored more than 30 Gastroenterology and research fellows from around the world, many of whom have gone on to distinguished careers themselves.

PROFESSOR HIRONORI YAMAMOTO

Jichi Medical University Tochigi, Japan

Hironori Yamamoto is the Chairman and Professor of the Department of Medicine at Jichi Medical University, Tochigi, Japan. He also serves as the Director of the Endoscopy Center and the Vice President of Jichi Medical University Hospital. He is also a Director of the Japan Gastroenterological Endoscopy Society. He is the inventor of double-balloon endoscopy and also one of the pioneers of endoscopic submucosal dissection (ESD).

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NURSES' WORKSHOP

WELCOME TO NURSES

It is a great pleasure to welcome you to the 12th Annual Sydney International Endoscopy Symposium – Nurses' Workshop.

The Westmead Endoscopy team has prepared another fantastic and interesting array of talks and hands on demonstrations that will complement and increase your knowledge, skills and understanding in interventional Endoscopy. As in years past, the topics are not only extremely educational, but diverse as well, with topics on ESD, biologics of inflammatory bowel disease, human gut microbiome and FMT and the chronic liver disease patient. Our special guest speaker is Prof Evelien Dekker, on issues of Polypectomy and early cancer.

As professional nurses, we want to keep our skills and knowledge current and be actively seeking to build our competence to provide excellence in care. The Nurses' Workshop offers just that, from the hands of expert nurses and doctors handling the various endoscopy devices during the interactive demonstration stations. There will be lots of hands-on opportunities to try the common devices and also the latest ones on the market.

I would like to take this opportunity to thank all who have been coming faithfully every year to support us, and continue to build on the networking and interaction amongst the gastroenterology nurses. Learning and sharing fresh tips and tricks and collective experiences, will enable us to provide excellence in Endoscopy.

Nurses are encouraged to attend the mini-symposium which follows afternoon tea, as well as the following two full days of live high quality transmission from the Westmead Endoscopy Suite to the International Convention Centre Sydney, which will showcase the latest development with interesting and challenging cases, which demonstrate the skills and wisdom of the internationally renowned guest faculty.

CPD points will be available for nurses attending the Workshop and Symposium.

Yours sincerely

Mary Bong
Nurse Unit Manager Endoscopy Unit,
Westmead Hospital Organising Committee,
Sydney International Endoscopy Symposium, Nurses' Workshop 2019

Welcome to the 2019 Sydney International Endoscopy Symposium – Nurses' Workshop Program.

This program has been a success in previous years, and I would like to express a warm welcome to you all this year. I hope this will be an unprecedented experience that will allow you to gain valuable knowledge, skills and insights that you can apply in your areas of practice.

Westmead Hospital supports initiatives that further the professional development of nurses, and I am proud to support Westmead nurses in their journey to becoming leaders in gastrointestinal endoscopy.

These initiatives will help us better serve our community with safe, high quality Gastroenterology and Endoscopy services.

The Nurses' Workshop program promises to provide us with an inspiring combination of interactive demonstrations and innovative presentations. The activities today will help us build local and international networks and a culture of collaboration. Every opportunity should be taken to ensure we spend time gathering our collective experience and inspiring each other to provide the best possible care for our patients.

Regards

Kate Hackett
Director of Nursing and Midwifery
Westmead Hospital

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NURSES' WORKSHOP PROGRAM

WEDNESDAY 13 MARCH 2019 – C2.2 + C2.3 ROOMS

0730	Registration opens and arrival tea/coffee amongst the trade exhibitions in The Gallery		
0830 - 0845	Welcome note Mary Bong NUM and Kate Hackett DON, Westmead Hospital		
SECTION 1: ***Co-ordinators: Robyn Brown CNE and A/Prof Nick Burgess***			
0845 - 0930	*Issues on polypectomy and early cancer* – Prof Evelien Dekker		
0930 - 1000	*ESD expanding the spectrum of endoscopic resection* – A/Prof Nick Burgess		
1000 - 1030	*Optimal care of the chronic liver disease patient in 2019* – Prof Golo Ahlenstiel		
1030 - 1100	Morning tea in rooms amongst the trade exhibitions in The Gallery		
SECTION 2: ***Hands-on Demonstrations - Basic and Interventional Co-ordinator: Mary Bong NUM***			
	TRACK 1: DEMONSTRATIONS Room C2.1	**TRACK 2: Where are we with Infection Control in 2019 Rooms C2.2 & C2.3**	**TRACK 3: DEMONSTRATIONS Rooms C2.5 & C2.6**
1100 - 1300 (40 mins at each station)	*EUS principles imaging and management in the malignant setting* – Dr Vu Kwan and Sandra Ko CNS	*Biofilms: Latest release showing now near you* – Di Jones NUM *Standards and water quality* – Beth Wardle CNM	*ESD principles and equipment* – Dr Nick Burgess and Judy Tighe-Foster CNS *Everyday colonic polypectomy* – Dr Eric Lee and Mavis Chan RN
	ERCP stone management cholangioscopy – Dr Naaz Sidhu *Equipment for stone removal* – Marriam Khilwati RN and Alison Bannister RN	*CPE Update* – Robyn Brown CNE	*Endoscopic haemostasis: Established techniques* – Vanessa McArdle-Gorman RN and Christina Spiteri RN *New techniques* – Prof Golo Ahlenstiel
	Basic principles of electrocautery and safety – Betty Lo CNC		*Haemostasis patient presentations intra and post procedure* – Susan Lane RN
1300 - 1400	Lunch and trade displays in The Gallery		
SECTION 3: ***Co-ordinators: Judith Tighe-Foster CNS and Dr Vu Kwan***			
1400 - 1430	*The basics of biologics in inflammatory bowel disease* – Dr Vu Kwan		
1430 - 1445	*Quiz* – Marriam Khilwati RN		
1445 - 1515	*Human gut microbiome and FMT* – Dr Farzan Bahin		
1515 - 1530	*Quiz prizes, lucky draws and closure*		
1530 - 1600	Afternoon tea amongst the trade exhibitions in The Gallery		
SECTION 4: ***Mini-Symposium (Join SIES Delegates)***			
1600 - 1700	*Video based interactive case discussion with the expert panel* – Prof Evelien Dekker, Prof Rehan Haidry, Prof Michael Wallace and Prof Hironori Yamamoto		
1700 - 1800	Closing Drinks Function in The Pyrmont Theatre foyer All delegates are invited to our Wednesday Closing Drinks Function kindly brought to you by CANTEL		

This program is endorsed by the Westmead Hospital and 8 CPD points are awarded

Certificates of Attendance for the Nurses' Workshop will be emailed to all participants next week.

DEMONSTRATION STATIONS - what you need to know!

- There will be 3 Workshop groups.
- Your name badge will be colour coded (red, green or blue) to represent the group you have been allocated to. The red group will start at Track 1, the green group will start at Track 2, and the blue group will start at Track 3. Groups will then be rotated after 40 minutes.
- Please follow the Facilitators' (Westmead Hospital staff) instructions when moving from demonstration stations.

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St. Louis, Missouri.

*Benchtop test data on file at Cook Medical.

SIES PROGRAM

LIVE POLLING and Q & A

LIVE POLLING: This feature will only apply to the key note presentations at the lectern. The presenter will guide you to take part in the App at a time of his or her choosing.

Q & A: This feature will only apply during the Live Endoscopy sessions. There will be the opportunity to pose questions to the Surgeons at Westmead during each Live Endoscopy case on both days of the program. Please be specific with your questions as they may not be read out at the time of asking. (eg. In Live Endoscopy 1, Case XX, why did you xxx?)

WEDNESDAY 13 MARCH 2019 – The Pyrmont Theatre

1245 - 1345	Registration and lunch amongst the trade exhibitions in The Gallery
SATELLITE SYMPOSIUM: Progress in Colonoscopy	
Chairs: Prof Michael Bourke, Prof Evelien Dekker	
1400 - 1420	*Resect and Discard for Diminutive Polyps: Time to start or dream on?* – Prof Michael Wallace
1420 - 1440	*Lower GI Bleeding: Endoscopy or Radiology?* – A/Prof Gregor Brown
1440 - 1500	*The Cold Revolution: How far can it really go?* – Dr Nick Tutticci
1500 - 1530	*Panel Discussion*
1530 - 1600	Afternoon tea and trade displays in The Gallery
VIDEO FORUM	
1600 - 1700	*Video based interactive case discussion with the expert panel* – Prof Evelien Dekker, Prof Rehan Haidry, Prof Michael Wallace and Prof Hironori Yamamoto
1700	CLOSE
1700 - 1800	CLOSING DRINKS FUNCTION in The Pyrmont Theatre foyer All delegates are invited to our Wednesday Closing Drinks Function kindly brought to you by CANTEL

SIES Sydney International Endoscopy Symposium

SIES 2019 has been approved in the RACS CPD Program. Fellows who participate can claim one point per hour in Maintenance of Knowledge and Skills. Participation in this activity will be populated into your RACS CPD Online, please simply notify the registration desk that you authorise your details to be uploaded with the RACS for this process.

Royal Australasian College of Surgeons

RACS CPD Approved

DIETARY MEALS AT SIES

If you have advised the Conference organisers (at the time of your registration) of your dietary needs, then this has been noted and passed onto the venue. There will be a dedicated dietary buffet within the trade exhibition area for each catering break, please make yourself known to the staff and they will be more than willing to look after you.

SIES PROGRAM

THURSDAY 14 MARCH 2019 – The Pyrmont Theatre

0730	Registration opens and arrival tea/coffee amongst the trade displays in The Gallery
0830-0835	*Official conference open and welcome* – Prof Michael Bourke
RICHARD HOPE MINI SYMPOSIUM: The Elephant in the Room – Gastric Cancer in the West CHAIRS: Dr Stephen Williams and Prof Emad El Omar	
0835-0850	*Gastric Carcinogenesis: H. Pylori, Genetics, Ethnicity, Diet, Microbiome and Prevention* – Prof Emad El Omar
0850-0905	*Early gastric cancer in Western populations: Burden of disease and screening* – Prof Michael Wallace
0905-0915	*Endoscopic treatment for Early Gastric Cancer: 'The must knows' for all Endoscopists in a changing space* – Prof Michael Bourke
0915-0935	*Discussion*
0935-1030	**LIVE ENDOSCOPY 1 Chairs: Stephen Williams, Milan Bassan, Cameron Bell**
1030-1100	Morning tea and trade displays in The Gallery
1100-1300	**LIVE ENDOSCOPY 2 Chairs: Rita Lin, Ian Norton, Raj Singh** Including clinical update 1: *What's New in UGI Bleeding: When, Why and What to Expect* – Dr Bronte Holt
1300-1400	Lunch and trade displays in The Gallery
1400-1530	**LIVE ENDOSCOPY 3 Chairs: Robert Cheng, Darren Pavey, David van der Poorten**
1530-1600	Afternoon tea and trade displays in The Gallery
SIES STATE OF THE ART LECTURE 1	
1600-1630	*Barrett's Oesophagus game changers for 2020: Screening, surveillance, biomarkers and more* – Prof Rehan Haidry
1630-1645	*General endoscopy quiz (prizes awarded on Friday afternoon)* – Dr Iddo Bar-Yishay
MINI SYMPOSIUM: CHANGING PARADIGMS IN EARLY GI MALIGNANCY	
1640-1700	*Tailoring treatment to pathology: Drivers, evidence, logic and multi-disciplinary informed consent* – A/Prof Nick Burgess
1700 - 1720	*Early colon cancer: Tandem talk* – Prof Evelien Dekker and Prof Hironori Yamamoto
1720 - 1740	*Early oesophageal cancer: Tandem talk* – Prof Rehan Haidry and Prof Michael Bourke
1740 - 1800	*Panel Discussion*
1800	1800 CLOSE **1815: HMAS SIES – boarding commences (Refer to next page for further information)**
1900 - 2200	OFFICIAL SYMPOSIUM RECEPTION – Museum of Contemporary Art Australia 'Sculpture Terrace' *Refer to next page for further information*

Certificates of Attendance for the delegates attending SIES will be automatically emailed next week.

SIES PROGRAM

SYMPOSIUM RECEPTION

Venue: Museum of Contemporary Art Australia
'Sculpture Terrace' – Level 4

Date: Thursday 14 March, 7.00pm – 10.00pm

Cost: $85 per delegate

Inclusions: Gourmet substantial canapés, drinks and return cruise boat transfers

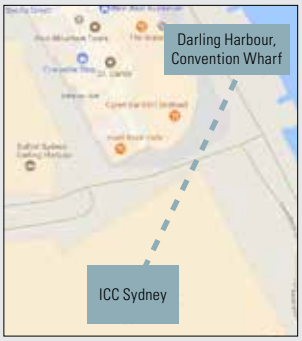
The Museum of Contemporary Art Australia, boasts spectacular views of the world famous Sydney Opera House and Harbour Bridge.

Welcome aboard HMAS SIES!

Tickets are still available! See registration desk

HMAS SIES FORWARD TRANSFER
Boarding: 6.15pm @ Convention Wharf
Must depart by 6.30pm
Disembark: 7.00pm @ Commissioner Steps

HMAS SIES RETURN TRANSFER
Boarding: 10.10pm @ Commissioner Steps
Disembark: 10.45pm @ Convention Wharf



FRIDAY 15 MARCH 2019

MEET THE PROFESSOR BREAKFAST SESSIONS LEVEL 2 ROOMS (OPPOSITE THE PYRMONT THEATRE)
Pre-registration is required. If the back of your name badge does not outline a breakfast session, then you have not pre-booked this. Please see the registration desk.

0715 - 0815	*Keeping out of trouble. Adverse events, definitions, avoidance and management*	Prof Peter Cotton	C2.3
	Advanced imaging in colonoscopy: Detection and differentiation of lesions made easy	Prof Evelien Dekker	C2.5+ C2.6
	How and why to learn ESD in the West	Prof Hironori Yamamoto	C2.1
	eFTR in the colon with the FTRD system: Sparing the surgeon AG	Prof Thomas Gottwald, Ovesco Endoscopy	C2.2
0800	Registration opens and arrival tea/coffee amongst the trade displays in The Gallery		

SIES STATE OF THE ART LECTURE 2 (THE PYRMONT THEATRE)

0830 - 0850	*Hereditary colorectal cancer: Recognition, new concepts and chemoprevention* – Prof Evelien Dekker
0850 - 0900	*Panel Discussion*
0900 - 1030	**LIVE ENDOSCOPY 4 Chairs: Sina Alexander, Vu Kwan, Mark Appleyard**
1030 - 1100	Morning tea and trade displays in The Gallery
1100 - 1300	**LIVE ENDOSCOPY 5 Chairs: Thao Lam, William Tan, Ian Norton** including clinical update 2: Screening high risk individuals for Pancreas Cancer – Prof Michael Wallace
1300 - 1400	Lunch and trade displays in The Gallery
1400 - 1530	**LIVE ENDOSCOPY 6 Chairs: Eric Lee, Matthew Remedios**
1530 - 1600	Quiz answers and awards for the winners – Dr Iddo Bar-Yishay Summary and meeting close – Prof Michael Bourke

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*Fujimoto D, Muguruma N, Okamoto K et al. Linked color imaging enhances endoscopic detection of sessile serrated adenoma/polyps. Endoscopy International Open 2018; 06(03): E322-E334.

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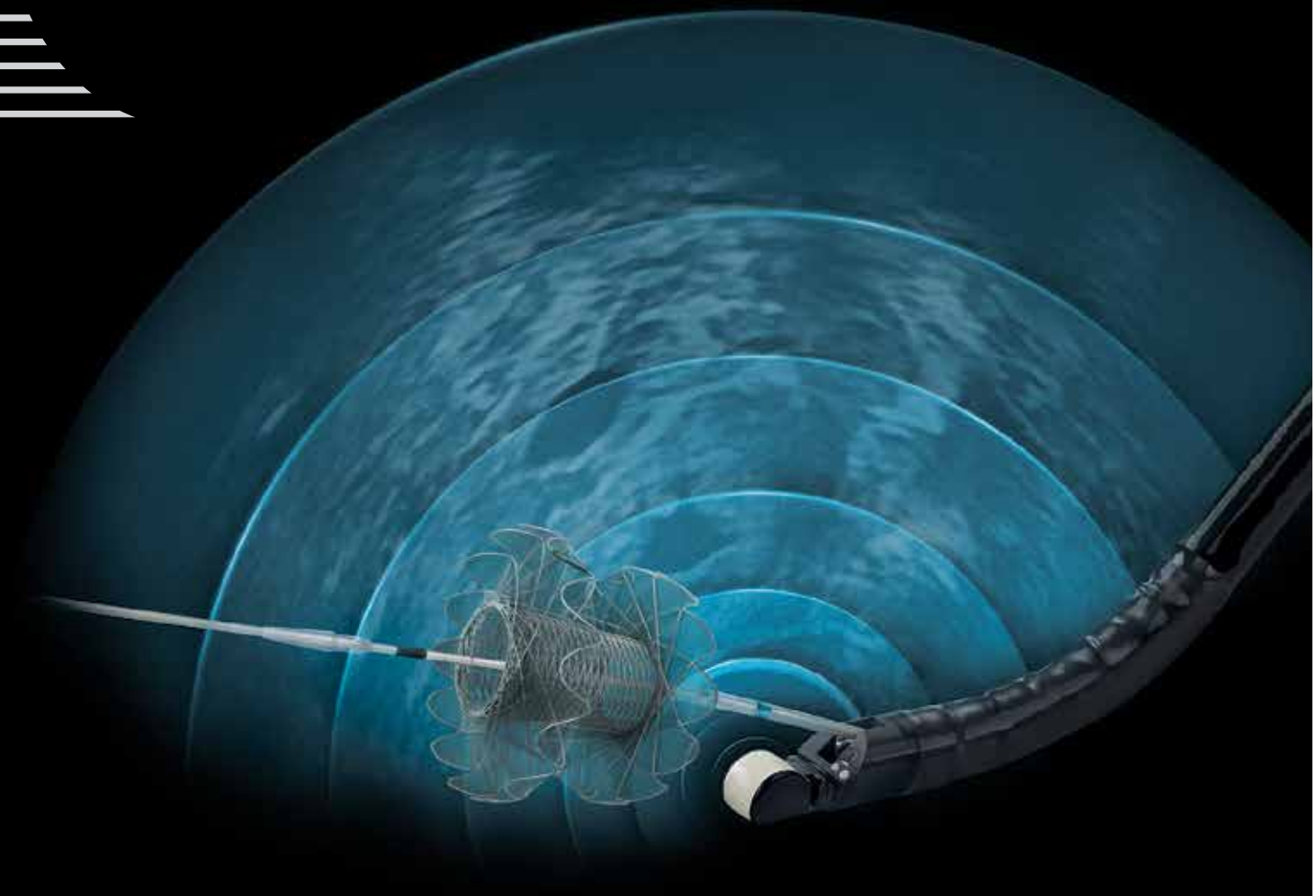

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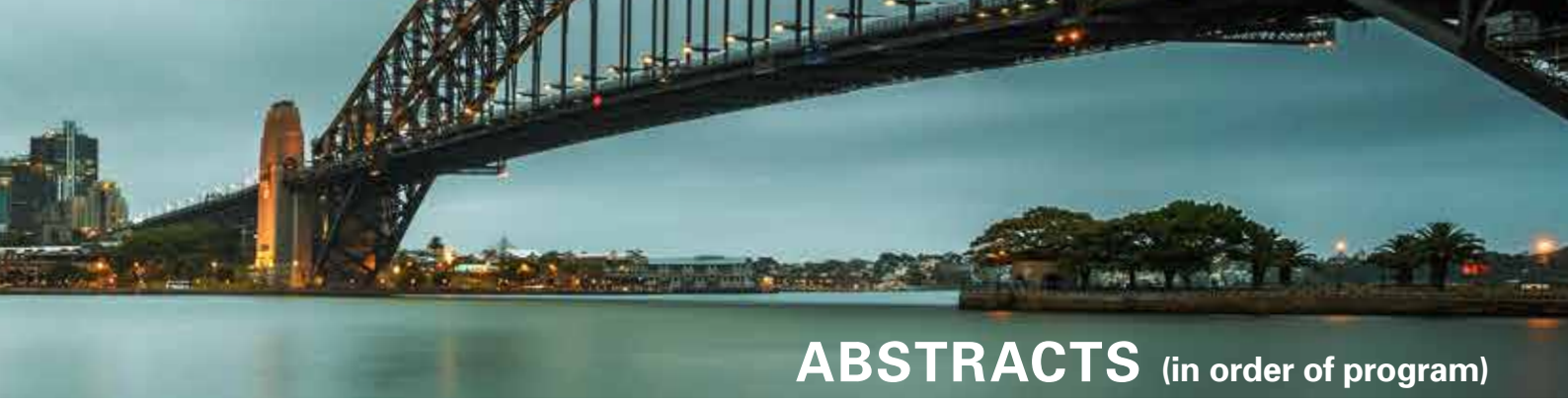

ABSTRACTS (in order of program)

WEDNESDAY 13 March 2019

NURSES' WORKSHOP

ESD: Expanding the spectrum of Endoscopic Resection

A/Prof Nick Burgess
Westmead Hospital, Sydney

Endoscopic Submucosal Dissection (ESD) is an advanced endoscopic resection technique. It involves a combination of submucosal injection and mucosal resection using an electrosurgical "knife". The key advantage of ESD is the ability to precisely resect mucosal lesions and remove them in a single piece or "en-bloc". Removing a lesion in one piece means that it is less likely that any may be left behind (residual) or regrow later (recurrence). Lesions with dysplasia confined to the mucosa may be cured by ESD. Lesions that are more advanced such as early cancer may also be potentially cured, provided they have not infiltrated into deeper layers. ESD requires an understanding of the endoscopic appearance, location and the behaviour of lesions in order to inform whether or not to resect or refer for surgery. The key aspect to understand is the potential for lymph node metastasis (LNM) which means that neoplastic cells have migrated to local lymph nodes. In some cases resection of a lesion by ESD may be the best way to estimate the risk that the cells have spread. Patients who are candidates for surgery can then make an informed decision on what the LNM risk is and then plan an approach. This may include neoadjuvant chemotherapy, surgery or a conservative strategy. In older patients who are not candidates for surgery, despite a higher risk of LNM, ESD may provide the best option for local control or potential cure. The principles of ESD have informed other resection and treatment techniques including per-oral endoscopic myotomy (POEM) for achalasia, Gastric POEM (G-POEM) for gastroparesis, submucosal tunnelling endoscopic resection (STER) and Zenker's diverticulotomy. Although ESD techniques are time consuming for endoscopists, they often have a low adverse event profile and can be performed as a day case procedures or only require a one night stay in hospital. ESD is expanding the resection spectrum to provide a minimally invasive treatment modality for many patients who may previously have only had surgery as an option. It also allows treatment of those who may have been ineligible for surgery and is complementary to surgery as it provides accurate staging information to guide decision making.

Biofilms: Latest release showing now near you

Di Jones NUM
Logan Hospital, Brisbane

Defined as communities of microorganisms attached to a surface and producing extracellular polymeric substances (Roberts 2013). Bacteria within biofilms exhibit a very different phenotype to planktonic cells, with generally more resistance to inactivation by chemical agents.

Establishment of biofilms occurs in a stepwise form, with preconditioning by deposition of a basement layer of organic material. There initially then follows a reversible attachment of microorganisms, irreversible attachment and subsequent formation of microcolonies. The maturation of biofilms then provides for release of new colonising cells to start biofilms new surfaces downstream. This process occurs widely in nature as well as in health care. Routine cleaning procedures may not reliably remove biofilm from endoscopes channels and this may explain the unexpected failure of decontamination encountered in practice despite good adherence to infection control guidelines.

Recognition of the role that biofilms play in transmission of infection, not only in endoscopy services but hospital wide, has begun a rethink of many hospital decontamination practices. The understanding that biofilm contamination of the environment occurs with both wet and dry biofilms has led to changes in practice for room cleaning and use. Much research has and is taking place in examining the drying phase of endoscope reprocessing as a means of avoiding the build up of biofilm within endoscope channels.

Australian Standards (AS4187) & water quality requirements for endoscopy

Elizabeth Wardle CNM
The Wesley Hospital, Brisbane

Australian Standards released AS/NZS 4187:2014 ; Reprocessing of reuseable medical devices in health service organisations in December 2014. This document in conjunction with Infection Control in Endoscopy and the relevant ISO standards provide us with guidance to ensure our reprocessing practices meet best practice requirements.

Since the release of the document there has been concern re the ability of endoscopy units to meet the water quality requirements listed in Table 7.2 of the standard.

The requirements were reviewed and have been revised by the committee. The process of the revision, a brief outline of what is required by the standard and the final outcome of the water requirement review will be discussed during the session, in particular the changes to water requirements for the automated endoscope reprocessor & final rinse water as mandated by the latest version of AS/NZS 4187:2014.

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Carbapenemase-producing Enterobacteriaceae (CPE): The Australian Response

Robyn Brown CNE
Westmead Hospital, Sydney

This talk will outline the response in Australia to the global concern of CPE associated with duodenoscopes.

Since the 2010 publication of GESA's Infection Control in Endoscopy Guidelines, there have been several overseas outbreaks of carbapenemase-producing Enterobacteriaceae (CPE) linked to the use of flexible endoscopes. In response to these outbreaks, the Board of the Gastroenterological Society of Australia (GESA) appointed a multi-organisation expert committee to develop consensus statements addressing this issue. The committee comprises representatives from GESA, the Gastroenterological Nurses College of Australia (GENCA), the Australasian College for Infection Prevention and Control (ACIPC) and the Australasian Society for Infectious Diseases (ASID). The committee examined and assessed the published literature and using the Delphi methodology produced the following consensus statements which have now been published in the Journal of Gastroenterology and Hepatology.

The statements covered in this talk outline the following points: Where endoscopic procedures should be performed. The importance of timely and meticulous cleaning, The use of a TGA approved AFER, Quality control, The risk of patient- to- patient transmission, Informed consent, High risk instruments, Management protocols and Storage.

Human Gut Microbiome and FMT

Dr Farzan Bahin
Blacktown Hospital, Sydney

There is presently great interest in the human gut microbiome as it is linked to an increasing range of diseases, particular those of the gastrointestinal tract and liver. Dysbiosis of the microbiome is now a well established aetiology for conditions such as clostridium difficile infection. In addition, obesity, inflammatory bowel disease, alcoholic and nonalcoholic fatty liver disease,colorectal and hepatocellular carcinoma all have been linked to the microbiome in human beings, and changes in the microbiome have been shown to induce or modify these diseases in animal models. The basics of the gut microbiome, relationship to disease and modification of the microbiome, particularly with prebiotics, probiotics and fecal microbial transplantation will be discussed.

WEDNESDAY 13 March 2019

MINI SYMPOSIUM: Progress in colonoscopy

The cold revolution; how far can it really go?

Dr Nick Tutticci
QEII Jubilee Hospital Brisbane
The Royal Brisbane and Women's Hospital

Cold snare polypectomy CSP is now an established method for the removal of small and diminutive polyps. Safety and cost advantages first encouraged widespread adoption of the technique with the shift subsequently supported by efficacy data. This superior safety profile makes the prospect of CSP therapy for larger, higher risk polyps alluring. However these safety properties CSP are balanced by the inherent limitations; as electrocautery permits a greater volume of tissue resection, deeper resection and a thermal penumbra providing hypothetical insurance against residual. Transection limitations practically mean that CSP for polyps 10mm in size or larger, along with the obligatory margin of normal mucosa, requires a transition to a piecemeal polypectomy technique. This shift from en bloc to piecemeal resection occurs at much larger polyp sizes for conventional EMR, compounding differences between the techniques. Although heterogeneous, there is accumulating data demonstrating that CSP remains a very safe technique even for polyps of large circumference. Mirroring the evolution of CSP for small polyps, the establishment of safety has been followed by work on efficacy. Several studies have now demonstrated compelling high efficacy of CSP for sessile serrated lesions but not yet for adenomatous lesions where a lack of surveillance and use of poor CSP techniques permit only limited conclusions[1-3]. So although CSP advocates can now fairly champion cold resection for small adenomas and sessile serrated lesions regardless of size, large adenomas represent the unknown frontier of polypectomy. While it is clear that not all adenomas are suitable for cold resection, for those that are we need to know if CSP can achieve comparable efficacy while maintaining a superior safety profile and still lead to the correct histopathologic diagnosis. Although unstudied ideal cold resection technique has two guiding principles which attempt to overcome the lack of electrocautery. The first is optimal snare selection and tissue volume targeting at each resection to achieve ready transection and the second is resection of an obligatory margin of normal mucosa. Further refinement of CSP techniques and comparative studies with conventional EMR are both required to harness fully the potential safety and cost advantages of cold resection. With potential advantages clear, practitioners, patients and health services are right to ask; how far can the cold revolution go?

ABSTRACTS

1. Tate DJ, Awadie H, Bahin FF et al. Wide-field piecemeal cold snare polypectomy of large sessile serrated polyps without a submucosal injection is safe. *Endoscopy* 2017, DOI: 10.1055/s-0043-121219:

2. Tutticci NJ, Hewett DG. Cold endoscopic mucosal resection of large sessile serrated polyps at colonoscopy (with video). *Gastrointestinal endoscopy* 2017, DOI: 10.1016/j.gie.2017.11.002:

3. Thoguluva Chandrasekar V, Spadaccini M, Aziz M et al. Cold snare endoscopic resection of nonpedunculated colorectal polyps larger than 10 mm: a systematic review and pooled-analysis. *Gastrointestinal endoscopy* 2019, DOI: 10.1016/j.gie.2018.12.022:

THURSDAY 14 March 2019
SIES Day 1

Barrett's Oesophagus game changers for 2020: Screening, surveillance, biomarkers and more

Dr Rehan Haidry
University College Hospital London, UK

Oesophageal adenocarcinoma (OAC) remains a deadly disease with a low survival rate. Despite advances in medical and surgical therapy the outcome for these patients is poor, with an unchanged 5 year survival of less than 15%. Compared to other solid organ tumours this is a concerning statistic and work remains underway to improve survival after diagnosis but early detection, risk stratification of at-risk populations and minimally invasive intervention for early cancer need addressing.

The only known precursors of OAC where one can intervene and focus attention are patients with chronic GORD and those that then go on to develop and be diagnosed endoscopically with Barrett's Oesophagus. Attention to this cohort of patients can potentially yield improved outcomes if those at risk are followed up closely and intervention can be offered at an early stage where long term survival is much improved. Those with known BE are at an advantage as surveillance programs and imaging enhancements now show improved survival compared to the background population if early neoplasia is picked up.

Those that still remain a challenge are those who are not diagnosed. Screening remains the holy grail of BE related OAC. Who do we offer screening to? How do we do it? And if we can will it be an acceptable and cost-effective test to yield enough pathology so we can intervene? All international societies have suggested that those at risk of BE (such as age > 50 years, male sex, white race, intra-abdominal fat distribution with truncal obesity, tobacco use, elevated body mass index (BMI), and hiatal hernia) could benefit from screening and endoscopic assessment. There are several pitfalls associated with this strategy. Despite the rising incidence of OAC, the annual cancer incidence of OAC from BE has been shown to be only 0.1 to 0.3%, which is still relatively low. Furthermore, nearly 40% of the patients with OAC have no prior history of GORD and only 10% of the patients with OAC have a prior diagnosis of BE. Furthermore, the vast majority of Barrett's Oesophagus cases (> 80%) are currently undiagnosed, and as a result, > 90% esophageal cancer presents de novo.

Aside from determining the target population, the next main consideration is the screening method proposed, and as outlined by the WHO criteria, there should be scientific evidence of screening program effectiveness. There are many data comparing the sensitivity and specificity of screening technologies, but the focus with GORF is implementation at high volume, bearing in mind that a given technology must be considered from the perspective of the health service (costs, skills required and ease of use, confidence in the technology and willingness to embrace it) as well as the end user (acceptability and experience).

The cystospore (Medtornic, USA) is a novel and minimally invasive approach to mass screening. Cytosponge is a mesh surrounded by gelatin capsule attached to a string passed transorally. Five minutes after swallowing, the capsule dissolves in the proximal stomach, expanding the mesh to a sphere of 3cm. The sample containing cytological specimen is stained with TFF3 which is a biomarker for IM. In a prospective study of 504 patients with a prescription for acid suppressants, Cytosponge with TFF3 had a sensitivity of 73.3% (95% CI 44.9% - 92.2%) and specificity of 93.8% (95% CI 91.3% - 95.8%) for detecting BE ≥1 cm of circumferential length. Population based primary care studies with the cytosponge are underway in the United Kingdom.

Standard sedated upper endoscopy (sOGD) is expensive and associated with a small risk of complications and carries indirect patient-related costs. Therefore, it is not an ideal tool for screening of large populations and there exists a need for an alternative, cheap, widely available and accurate method of screening. Unsedated Transnasal Endoscopy (uTNE) is performed with an ultrathin endoscope using topical anaesthesia obviating the need for sedation. Compared to sOGD, the sensitivity of uTNE for detection of columnar lined oesophagus has been shown to be 98% and of IM was 91% and specificity was 100%. Procedure time ranged from 3.7±1.8minutes to 5.5±1.7 minutes and the mean recovery time was quicker in uTNE compared to OGD (18.5minutes vs. 67.3minutes; p<0.001).

All international societies advocate endoscopic surveillance following a confirmed diagnosis of BE. In those fit for repeated endoscopy and the following interventions were neoplasia to be detected should undergo surveillance depending on criteria such as BE length and degree of neoplasia. Advances in

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endoscopic imaging now allow higher accuracy of neoplasia detection to meet ASGE PIVI standards. Studies show a survival advantage in patients with BE undergoing surveillance endoscopy. In a cohort study of about 30,000 patients with BE followed for over five years, patients diagnosed with OAC during surveillance, were detected at an earlier stage (stage 0 to 1: 74.7% vs. 56.2; p<0.001), survived longer (median 3.2 vs. 2.3 years; p<0.001) and had lower cancer-related mortality (34.0% vs. 54.0%, p<0.0001) compared to those not in surveillance. Despite these advantages of earlier detection of OAC with surveillance, the current approach is invasive, time-consuming with concerns of lead and length time bias influencing the improvement in mortality. Biomarkers may provide the necessary information to help risk stratify those that need escalation to surveillance and endoscopic intervention and those that can be reassured and discharged.

Endoscopic treatment for Early Gastric Cancer: 'The must knows' for all Endoscopists in a changing space

Prof Michael Bourke
Westmead Hospital, Sydney

Early Gastric Cancer (EGC) refers to intramucosal disease (including high-grade dysplasia which is classified as EGC in Asia) and invasive disease limited to the submucosa. An extensive body of evidence indicates that well- to moderately-differentiated EGC, with superficial invasion (< 500 µm) and the absence of lymphovascular invasion, when resected en bloc with R0 resection is curative. This has revolutionized gastric endoscopic tissue resection, given the associated morbidity of gastric surgery.

Early gastric cancer is recognized endoscopically as a demarcated area with variation in pit pattern to the surrounding mucosa. It is most often found in the diseased or atrophic stomach. Superficial ulceration may be present. Meticulous optical evaluation with high-definition endoscopes is the pivotal step for delineating the appropriate treatment approach. Endoscopic ultrasound is not useful in detecting early invasive disease and may overestimate T-stage. Extensive biopsies are not helpful, as they may not be representative and can lead to submucosal fibrosis making endoscopic resection more challenging. Piecemeal endoscopic mucosal resection is not an acceptable treatment approach as it makes lesion margin evaluation uninterpretable.

Tailoring treatment to pathology: Drivers, evidence, logic and multi-disciplinary informed consent

A/Prof Nick Burgess
Westmead Hospital, Sydney

Endoscopic resection of premalignant lesions throughout the gastrointestinal tract has now become a standard of care. Piecemeal snare based resection techniques are suitable for the majority of lesions however they are inadequate for larger lesions with advanced histology or early cancer. For these lesions, the decision on endoscopic resection modality or referral for surgery requires an understanding of the endoscopic appearance, location, and the behaviour of the lesion as well as the patient comorbidities. Several principles are common to resection in all locations, but the underlying pathology is a key driver of decision making. There is now

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growing evidence to inform decision making on Barrett's and squamous cell lesions in the oesophagus, early gastric cancer in the stomach and early colorectal cancer in the colon. Each of these locations present different challenges for endoscopic resection, have differing pathology characteristics and risks of lymph node metastasis and carry differing risks and benefits for surgical treatment. The endoscopist requires a comprehensive understanding of all of these factors in order to inform the patient and make treatment decisions. In many hospitals the most appropriate place for comprehensive decision making is a multi-disciplinary team (MDT) meeting. In an ideal world, MDT meetings serve as a patient centred decision making node with collaborative input from clinicians providing the most appropriate patient care. Local resource and expertise may hamper consideration of endoscopic resection alternatives. Resection techniques such as ESD are in their infancy in Western countries but are becoming more widely available as evidence supports their use and training opportunities increase. If ESD is not available locally it may be available within a wider network and endoscopists should understand the potential indications in order to advocate for it as a treatment option. ESD holds great potential for a select group of patients and is set to become established as a standard of care in the future. Endoscopist engagement at MDT meetings will help to incorporate endoscopic resection as a treatment option and drive patient centred outcomes.

FRIDAY 15 March 2019

SIES Day2

Detection and differentiation of colorectal lesions made easy.

Evelien Dekker
Amsterdam University Medical Center, the Netherlands

The efficacy of CRC screening programs relies heavily on the ability to detect colorectal cancer (CRC) and its precursor lesions during colonoscopy. This depends on an optimal prepared bowel to allow for meticulous inspection. Furthermore, the efficacy of colonoscopy is heavily operator dependent and relies on expertise as well as a meticulous technique for inspecting the bowel. To evaluate the quality of the endoscopist, several useful quality indicators have been proposed, some of which have been linked to the incidence of post-colonoscopy CRCs. Monitoring these quality indicators in daily practice is useful and implementation and feedback seems to improve the overall quality of the service.

Besides optimal bowel cleansing and meticulous inspection by the endoscopist, advanced endoscopic imaging techniques like conventional chromoendoscopy, NBI, BLI, LCI and iScan may further improve the efficacy of colonoscopy by visualizing the colorectal lesions better. The use of advanced imaging techniques has not shown to increase lesion detection rates in the average risk population and is therefore not recommended for routine practice. Besides, another potential method to increase detection rates is by making the difficult areas for lesion detection, e.g. behind flexures or curves, more visible by distal attachments or back-viewing lenses. In this field, although some studies have been positive, no technique has shown its definite benefit yet.

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A correct real-time diagnosis of colorectal lesions (a so-called optical diagnosis) during colonoscopy would enable optimal decision-making for therapy. Deep invasive lesions should be sent for surgery whereas early invasive cancers could be treated endoscopically. Besides, a correct optical diagnosis could replace the formal histological analysis, thereby improving cost-effectiveness of colonoscopy ("Resect-and-Discard" and "Diagnose-and-leave-in" strategies). For optical diagnosis, high-definition endoscopes as well as advanced imaging techniques have shown their benefit. Kudo has originally described the pit pattern of normal colonic mucosa, polyps and cancer, and since then other validated classification systems have taken this concept further, like NICE and WASP. A good distinction between early and deep invasive cancer has shown to be difficult in practice, and classifications like JNET and OPTICAL seem helpful here. Whether optical zoom and application of chresyl violet, like the Japanese colleagues do, is necessary to facilitate an accurate optical diagnosis for early cancer is not yet known.

Literature:

* Kaminski MF et al. Performance measures for lower gastrointestinal endoscopy: a European Society of Gastrointestinal Endoscopy (ESGE) Quality Improvement Initiative. *Endoscopy* 2017;49:378-397.

* Vleugels JLA, Hazewinkel Y, Dekker E. Morphological classifications of gastrointestinal lesions. *Best Pract Res Clin Gastroenterol* 2017;31:359-367.

* Iwatate M et al. Validation study for development of the Japan NBI Expert Team classification of colorectal lesions. *Dig Endosc.* 2018;30:642-651.

Hereditary colorectal cancer: Recognition, new concepts and chemoprevention

Evelien Dekker
Amsterdam University Medical Center, the Netherlands

Many adults will have a relative, friend, neighbor or colleague affected by colorectal cancer (CRC). This is not surprising, as CRC is among the most commonly diagnosed types of cancer worldwide and in a Western population the lifetime risk of developing CRC is approximately 5%. Of all CRC cases, an estimated 15-20% is related to familial or hereditary factors. The majority of cases with multiple first- and second-degree family members with CRC are classified as Familial CRC (FCC), in whom no underlying genetic cause has been identified so far. Approximately 3-6% of all CRCs have a well-defined inherited genetic predisposition. These hereditary CRC syndromes can be classified as either diseases that are characterized by the presence of multiple colorectal polyps (polyposis) or only one or several polyps (non-polyposis), of which Lynch-syndrome is the most prevalent. Because of its phenotype, polyposis syndromes are usually diagnosed, and the histological subtype of polyps generally leads to the appropriate diagnosis. The diagnosis of Lynch-syndrome is often missed, although diagnosis is important for appropriate surveillance programs. Strategies of universal or more selective molecular testing of CRCs (IHC or MSI) or systematic questionnaires on family history have the potential for better identification of this syndrome.

Two new germline mutations for Lynch syndrome have been identified in the past decade: PMS-2 and EPCAM. Due to the accelerated adenoma-carcinoma pathway in Lynch-syndrome, quality indicators for colonoscopy as well as appropriate intervals and adherence to these surveillance are of utmost importance. Patients with MSH-6 and PMS-2 have appeared at a later and lower risk for CRC than patients with other Lynch-mutations, and starting age for surveillance might be

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extended. For polyposis syndrome, it is the number of polyps and balanced decision-making in endoscopic vs surgical interventions that determines quality of care, which should be delivered in expert centers.

Serrated polyposis syndrome does not seem to be a monogenetic syndrome. However, its prevalence is higher than that of other polyposis syndromes. In the past more CRCs occurring in patients in this syndrome were interpreted as having arisen by an accelerated serrated pathway to CRC, but more probably are caused by an inadequate detection of serrated polyps and/or recognition of the disease.

Chemoprevention would be ideal for those at an increased risk for CRC, however, for none of the syndromes effective medications have been identified. Aspirin might be effective for patients with Lynch syndrome, but the prospective CAPP3-study should validate the previous positive results, identify the most appropriate doses and enable to balance benefits and risks better. For FAP, Sulindac and COX-2 inhibitors have not shown long-term effectivity in preventing CRC or necessary surgery. Recently, in an RCT with comparing Sulindac and erlotinib with placebo, the combination resulted in significantly lower colorectal polyp burden after 6 months of treatment. However, long-term data are not available yet. Other potential medications and combinations, e.g. eflornithine alone or combined with sulindac and fish-oil seem promising and studies are underway.

Literature:

* E. Dekker, F.G.J. Kallenberg, J.E.G. IJspeert, B.A.J. Bastiaansen. Inheritable cancer syndromes. Book Gastroenterological Endoscopy, 3rd Edition, Thieme Publishers 2018.

* Burn J et al. Long-term effect of aspirin on cancer risk in carriers of hereditary colorectal cancer: an analysis from the CAPP2 randomised controlled trial. Lancet. 2011 Dec 17;378(9809):2081-7.

* Samadder NJ et al. Association of Sulindac and Erlotinib vs Placebo With Colorectal Neoplasia in Familial Adenomatous Polyposis: Secondary Analysis of a Randomized Clinical Trial. JAMA Oncol 2018;4:671-677.

Keeping out of trouble. Defining, avoiding and managing adverse events.

Peter B Cotton MD FRCS FRCP
Medical University of South Carolina Charleston, SC, USA

Endoscopists aim to please, but patients and family members are sometimes unhappy. The process may be unpleasant, the procedure may fail to help, and something bad can happen. Adverse events are an inevitable part of interventional endoscopy. An ASGE workshop offered precise definitions and levels of severity, so that records can be collected and compared (1). The incidence of adverse events can be minimized by optimal training and careful practice. Reducing their emotional impact and the possibility of medico-legal action depends on how endoscopists behave before and after the procedure. Patients and family members are disappointed when bad things happen, but their reactions depend on two main points.

The first key is the quality of the pre-procedure discussion. "Consent" is not a hurried signature on a piece of paper. It should consist of a calm review (preferably in a clinic environment) of the four key elements: the potential benefits of the planned procedure, the risks, the limitations and the alternatives.

The second over-riding issue is the attitude of the endoscopist, especially when there has been a complication. Having a bad one, especially your first, is distressing, but it is part of endoscopic practice. It is essential to continue to communicate calmly and effectively, and to act professionally.

"So, the x-ray does confirm a small perforation. You remember that we spoke about that risk yesterday, don't you? I am sorry it happened to you. Here's what we need to do."

Saying sorry, showing sympathy, is now widely recommended (not "sorry I messed up"). Showing that you care is essential, and the best defense against legal jeopardy (2).

1.Cotton PB, Eisen GM, Aabakken L, Baron TH, Hutter MM, et al.

A lexicon for endoscopic adverse events: report of an ASGE workshop. *GIE* 2010 Mar; 72(3):446-54.

2. Cotton PB. Medicolegal issues in ERCP, in ERCP, eds Baron t, Kozarek R, Carr-Locke D. *Elsevier* 2016

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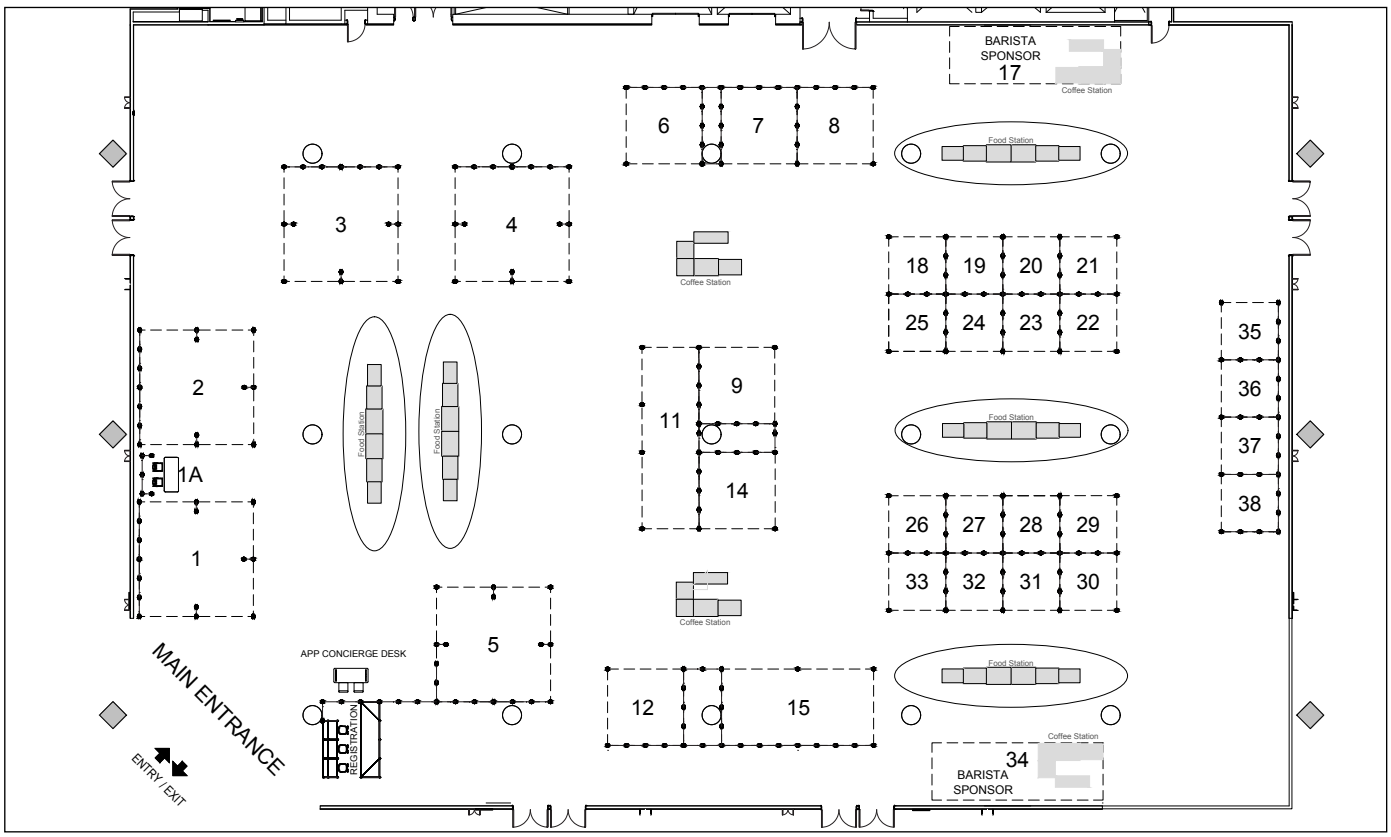

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NOTES

Colorectal polypectomy and endoscopic mucosal resection (EMR): European Society of Gastrointestinal Endoscopy (ESGE) Clinical Guideline

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Bibliography

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Appendix e1, e2
Online content viewable at: https://www.thieme-connect.com/DOI/DOI?10.1055/s-0043-102569

MAIN RECOMMENDATIONS

1 ESGE recommends cold snare polypectomy (CSP) as the preferred technique for removal of diminutive polyps (size ≤ 5 mm). This technique has high rates of complete resection, adequate tissue sampling for histology, and low complication rates. (High quality evidence, strong recommendation.)

2 ESGE suggests CSP for sessile polyps 6 – 9 mm in size because of its superior safety profile, although evidence comparing efficacy with hot snare polypectomy (HSP) is lacking. (Moderate quality evidence, weak recommendation.)

3 ESGE suggests HSP (with or without submucosal injection) for removal of sessile polyps 10 – 19 mm in size. In most cases deep thermal injury is a potential risk and thus submucosal injection prior to HSP should be considered. (Low quality evidence, strong recommendation.)

4 ESGE recommends HSP for pedunculated polyps. To prevent bleeding in pedunculated colorectal polyps with head ≥ 20 mm or a stalk ≥ 10 mm in diameter, ESGE recommends pretreatment of the stalk with injection of dilute adrenaline and/or mechanical hemostasis. (Moderate quality evidence, strong recommendation.)

5 ESGE recommends that the goals of endoscopic mucosal resection (EMR) are to achieve a completely snare-resected lesion in the safest minimum number of pieces, with adequate margins and without need for adjunctive ablative techniques. (Low quality evidence; strong recommendation.)

6 ESGE recommends careful lesion assessment prior to EMR to identify features suggestive of poor outcome. Features associated with incomplete resection or recurrence include lesion size > 40 mm, ileocecal valve location, prior failed attempts at resection, and size, morphology, site, and access (SMSA) level 4. (Moderate quality evidence; strong recommendation.)

7 For intraprocedural bleeding, ESGE recommends endoscopic coagulation (snare-tip soft coagulation or coagulating forceps) or mechanical therapy, with or without the combined use of dilute adrenaline injection. (Low quality evidence, strong recommendation.)

An algorithm of polypectomy recommendations according to shape and size of polyps is given (▶ **Fig. 1**).

This Guideline is an official statement of the European Society of Gastrointestinal Endoscopy (ESGE). The Grading of Recommendations Assessment, Development, and Evaluation (GRADE) system was adopted to define the strength of recommendations and the quality of evidence.

Introduction

The endoscopic removal of colorectal polyps reduces the incidence and mortality of colorectal cancer (CRC) and is considered an essential skill for all endoscopists who perform colonoscopy [1 – 3]. Various polypectomy techniques and devices are available, their use often varying based on local preferences and availability [4 – 6]. This evidence-based Guideline was commissioned by the European Society of Gastrointestinal Endoscopy (ESGE). It addresses all major issues concerning the practical use of polypectomy and endoscopic mucosal resection (EMR), to inform and underpin this fundamental technique in colonoscopy and in CRC prevention.

This Guideline does not address management of anticoagulants and other medications in the periprocedural setting, nor post-polypectomy surveillance or quality measurements, as these are addressed in separate Guidelines [7 – 9].

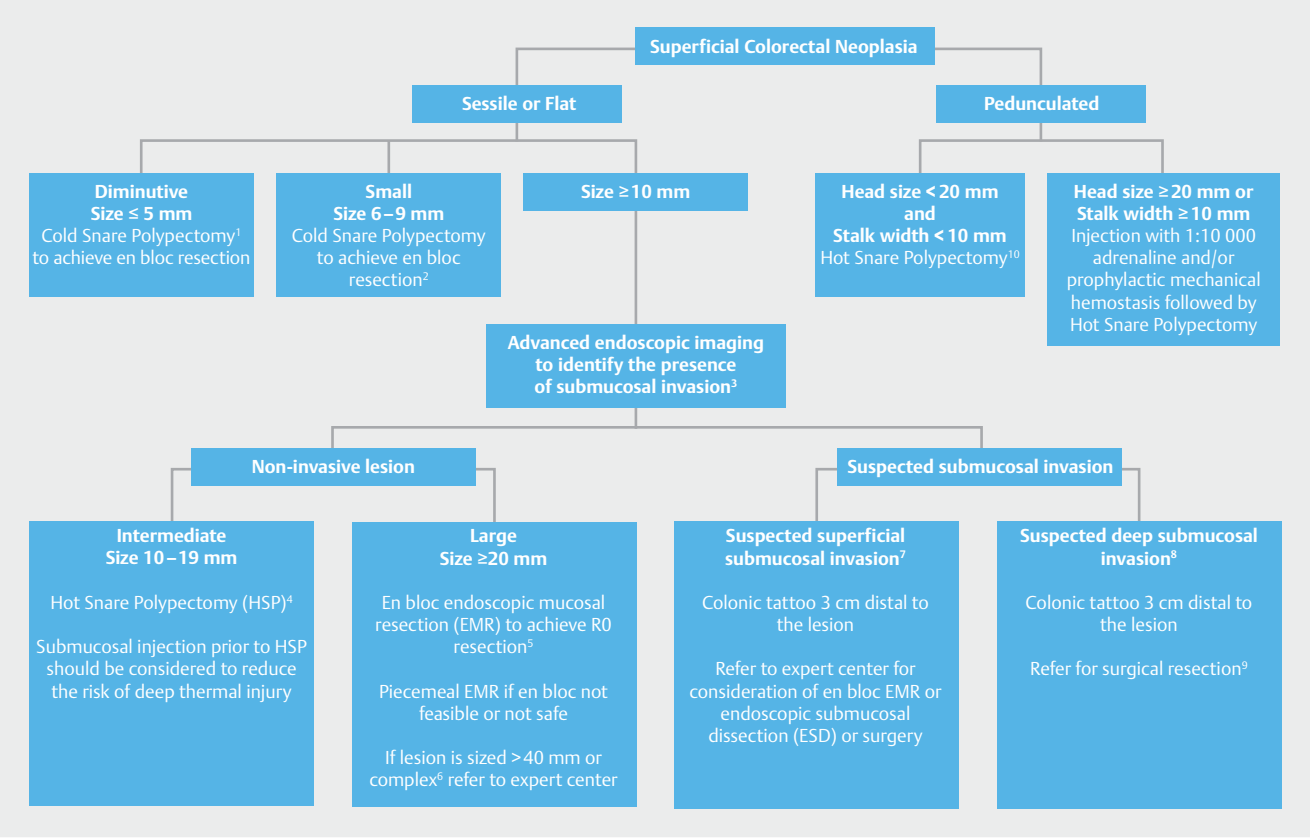
Methods

The European Society of Gastrointestinal Endoscopy (ESGE) commissioned this Guideline and appointed a Guideline leader (M. F.) who invited the listed authors to participate in the project development. The key questions were prepared by the coordinating team (M. F, A. M., M. J. B., C. H.) and then approved by the other members. The coordinating team formed task force subgroups, each with its own leader, and divided the key topics (polyp classification, polypectomy for polyps sized < 20 mm, EMR for polyps ≥ 20 mm, technical considerations, adverse events, histopathology) among these task forces (see **Appendix 1,** available online in Supplementary material).

Each task force performed a systematic literature search to prepare evidence-based and well-balanced statements on their assigned key questions. Searches were performed in Medline. Articles were first selected by title; their relevance was then confirmed by review of the corresponding manuscripts, and articles with content that was considered irrelevant were excluded. Evidence tables were generated for each key question, summarizing the evidence of the available studies (see **Appendix 2,** available online in Supplementary material). For important outcomes, articles were individually assessed by the level of evidence and strength of recommendation according to the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) system [10, 11].

ABBREVIATIONS

ASGE	American Society for Gastrointestinal Endoscopy
CBF	cold biopsy forceps
CI	confidence interval
CRC	colorectal cancer
CSP	cold snare polypectomy
EMR	endoscopic mucosal resection
ESD	endoscopic submucosal dissection
ESGE	European Society of Gastrointestinal Endoscopy
FICE	flexible spectral imaging color enhancement (also Fuji Intelligent Chromo Endoscopy)
GRADE	Grading of Recommendations Assessment, Development and Evaluation
HBF	hot biopsy forceps
HD-WLE	high definition white light endoscopy
HSP	hot snare polypectomy
IPB	intraprocedural bleeding
I-SCAN	i-SCAN digital contrast (Pentax; image processing providing digital image-enhanced endoscopy [IEE])
LSL	laterally spreading lesion
LST	laterally spreading tumor
MP	muscularis propria
NBI	narrow-band imaging
NICE	NBI International Colorectal Endoscopic Classification
NPV	negative predictive value
PEC	prophylactic endoscopic coagulation
PPB	post polypectomy bleeding
PPV	positive predictive value
RCT	randomized controlled trial
RR	relative risk
SMI	submucosal invasion
SMSA	size, morphology, site, and access
STSC	snare-tip soft coagulation
TEMS	transanal endoscopic microsurgery
WHO	World Health Organization
WLE	white light endoscopy



▶ **Fig. 1** Recommended resection techniques for colorectal polyps according to shape and size. [1] Cold biopsy forceps could be considered as a second-line option, but should only be used for polyps of size ≤ 3 mm where cold snare polypectomy (CSP) is technically difficult. [2] When en bloc resection is not achieved, oligo-piecemeal excision is acceptable; however complete retrieval of specimens for histology is necessary. [3] Standard chromoendoscopy if advanced endoscopic imaging is not available. [4] Piecemeal cold snare resection may be considered in cases where risk of deep thermal injury is high or unable to be tolerated, but further evidence of efficacy is required. [5] This may be feasible for lesions of size ≤ 25 mm and especially those in the left colon or rectum. [6] Difficult location or poor access (e. g. ileocecal valve, periappendiceal, or anorectal junction); prior failed attempts at resection; non-lifting with submucosal injection; size, morphology, site, and access (SMSA) level 4. [7] Kudo Vi, Sano IIIa. [8] Kudo Vn, Sano IIIb, narrow-band imaging (NBI) International Colorectal Endoscopic (NICE) classification 3, polyp morphology including ulceration, excavation, deep demarcated depression. [9] Surgical resection is required because both the lesion and the local draining lymph nodes require excision. [10] When bleeding risk is high because of antiplatelet or anticoagulant medication or coagulopathy, an individualized approach is justified and prophylactic mechanical hemostasis should be considered.

Each task force proposed statements on their assigned key questions which were discussed and voted on during a guideline meeting in Barcelona in October 2015. In July 2016, a draft prepared by the leaders and coordinating team was sent to all group members. The manuscript was also reviewed by two members of the ESGE Governing Board and sent for further comments to the National Societies and Individual Members. After agreement on a final version, the manuscript was submitted to the journal *Endoscopy* for publication. All authors agreed on the final revised manuscript.

This Guideline was issued in 2017 and will be considered for review and update in 2022 or sooner if new and relevant evidence becomes available. Any updates to the Guideline in the interim will be noted on the ESGE website: http://www.esge.com/esge-guidelines.html.

1. Definition, classification, removal, and retrieval of polyps

RECOMMENDATION

ESGE recommends that gross morphology of polyps should be described using the Paris classification system and sized in millimeters. (Moderate quality evidence; strong recommendation.)

RECOMMENDATION

ESGE recommends that for flat and sessile (Paris II and Is) polyps ≥ 10 mm, termed laterally spreading lesions (LSLs) or laterally spreading tumors (LSTs), surface morphology should be also described as granular or nongranular. (Moderate quality evidence; strong recommendation.)

The Paris classification of superficial neoplastic lesions (▶ **Table 1**) [12] updated in 2005 [13], has been adapted from the Kudo classification of early colorectal cancers published in 1993 [14], The Paris classification allows prediction of advanced histology and invasive cancer (type IIc lesions) [15 – 17] and it is associated with completeness of endoscopic resection [18]. However, its validity has been questioned as, in a recent study, the interobserver agreement between 7 Western expert endoscopists was only moderate (kappa 0.42) and pairwise agreement, before and after training, was also low at 60 % [19].

LSTs, described in the original Kudo classification, were not included in the Paris classification. LSTs have been further subdivided into granular (homogeneous or nodular-mixed) and nongranular (elevated or pseudodepressed) types because of substantial differences in the risk of invasive cancer [13, 20, 21].

The size of both polypoid and nonpolypoid lesions has been shown to be an additional predictive factor for the risk of invasive cancer, allowing a more accurate stratification of the risk according to morphology and size [12, 15 – 17].

RECOMMENDATION

ESGE recommends that all polyps be resected except for diminutive (≤ 5 mm) rectal and rectosigmoid polyps that are predicted with high confidence to be hyperplastic. (High quality evidence; strong recommendation.)

RECOMMENDATION

ESGE recommends retrieval of all resected polyps for histopathological examination. In expert centers, where optical diagnosis may be made with a high degree of confidence, a "resect and discard" strategy may be considered for diminutive polyps. (Moderate quality evidence; strong recommendation.)

Diminutive colonic polyps present a very low risk of cancer (0 – 0.6 %) that justifies a "resect and discard" strategy. For hyperplastic polyps located in the rectosigmoid, a "diagnose and leave behind" strategy is appropriate because these harbor an even lower risk of cancer [22]. To guide decisions for diminutive colonic polyps, their histopathology should be assessed during endoscopy in real time with a high accuracy, and the American Society for Gastrointestinal Endoscopy (ASGE) has proposed that, in order to:

1. "Diagnose and leave behind" rectosigmoid diminutive hyperplastic polyps, the technology used should provide a negative predictive value (NPV) ≥ 90 % for adenomatous histopathology;
2. "Resect and discard" diminutive polyps, the technology, when used with high confidence and in combination with the histopathological assessment of polyps > 5 mm, should provide a ≥ 90 % agreement in assignment of post-polypectomy surveillance intervals compared to decisions based on histopathological assessment of all polyps [23].

▶ **Table 1** The original Paris classification of superficial neoplastic lesions [12 – 14].

Pedunculated	Ip
Semipedunculated	Isp
Sessile, higher than height of closed forceps (2.5 mm)	Is
Slightly elevated, below height of closed forceps (2.5 mm)	IIa
Completely flat lesion, does not protrude above mucosal surface	IIb
Slightly depressed, lower than mucosa but depth less than 1.2 mm	IIc
Excavated/ulcerated, deep ulcer below mucosa below 1.2 mm	III

A meta-analysis showed that the NPVs of narrow band imaging (NBI), flexible spectral imaging color enhancement (FICE; also Fuji Intelligent Chromo Endoscopy) and i-SCAN digital contrast (I-SCAN) for adenomatous polyp histology of small and diminutive colorectal polyps were, for all endoscopists, 91 %, 84 %, and 80 %, respectively; in expert and novice hands, respectively, the NPVs were 93 % and 87 % (NBI), 96 % and 72 % (FICE), and 80 % and 80 % (I-SCAN) [24 – 26]. Therefore, NBI complies with the abovementioned requirements for both strategies. The important caveats with regard to real-time optical diagnosis concern the endoscopist's expertise in optical biopsy and degree of confidence.

2. Resection of polyps < 20 mm in size

2.1 Resection of diminutive polyps (≤ 5 mm)

RECOMMENDATION

ESGE recommends cold snare polypectomy (CSP) as the preferred technique for removal of diminutive polyps (size ≤ 5 mm). This technique has high rates of complete resection, adequate tissue sampling for histology, and low complication rates. (High quality evidence; strong recommendation.)

Studies show that cold snare polypectomy (CSP) is superior to cold biopsy forceps (CBF) for completeness of diminutive polyp resection. In a randomized controlled trial (RCT) that included 117 diminutive polyps sized < 5 mm in 52 consecutive patients, the rate of histologic eradication was significantly higher in the

CSP group than in the CBF group (93 % vs. 76 %, $P = 0.009$). Furthermore, the time taken for polypectomy was significantly shorter in the CSP group (14 s vs. 22 s, $P < 0.001$) [27]. In another RCT that included 145 polyps sized < 7 mm, the complete resection rate for adenomatous polyps was significantly higher in the CSP group compared with the CBF group (96.6 % vs. 82.6 %; $P = 0.01$) [28]. CSP also avoids the adverse events associated with thermal electrocautery in hot biopsy forceps (HBF) and hot snare techniques.

RECOMMENDATION

ESGE recommends against the use of cold biopsy forceps (CBF) excision because of high rates of incomplete resection. In the case of a polyp sized 1 – 3 mm where cold snare polypectomy is technically difficult or not possible, cold biopsy forceps may be used. (Moderate quality evidence; strong recommendation.)

In a prospective study of 52 patients with diminutive polyps that were removed by CBF until no residual polyp tissue was visible, the polypectomy sites were then excised by EMR. The EMR histology showed that only 39 % of the polyps were completely resected using CBF [29]. However, higher complete resection rates have been demonstrated in another study where CBF excision of 86 diminutive polyps was performed with chromoendoscopy until no visible polyp was observed. Each polyp base was then resected using EMR. The complete resection rate was 92 % for all diminutive adenomas (95 % confidence interval [95 %CI] 85.8 – 98.8 %) and 100 % for 1 – 3-mm adenomas (95 %CI 81.5 – 100 %) [30]. Furthermore, in a retrospective study that evaluated the results from 102 jumbo biopsy forceps polypectomy and 161 standard biopsy forceps polypectomy, one-bite CBF polypectomy using either standard or jumbo forceps achieved complete resection for diminutive polyps < 3 mm, though more bites were required with standard forceps for polyps sized 4 – 5 mm [31].

RECOMMENDATION

ESGE recommends against the use of hot biopsy forceps (HBF) because of high rates of incomplete resection, inadequate tissue sampling for histopathological examination, and unacceptably high risks of adverse events in comparison with snare excision (deep thermal injury and delayed bleeding). (High quality evidence; strong recommendation.)

In a prospective study involving 62 diminutive rectosigmoid polyps removed via HBF, 17 % had persisting viable polyp remnants as shown during follow-up flexible sigmoidoscopy 1 – 2 weeks later [32]. Another prospective study involving patients with diminutive rectal adenomas found that the rate of remnant adenoma tissue after HBF polypectomy was 10.8 % [33]. The overall diagnostic quality of specimens removed by HBF was shown to be inferior to those removed by jumbo CBF in a prospective study (80 % vs. 96 %; $P < 0.001$); furthermore, 92 % of HBF specimens in this study demonstrated cautery damage or crush artifact [34]. In a retrospective study of 1964 diminutive polyps in 753 consecutive colonoscopies, 1525 were removed by HBF, 436 were removed by CBF, and 3 were removed by snare. The risk of significant hemorrhage with HBF was 0.4 % overall, with the risk highest in the right colon (1.3 % in cecum and 1.0 % in the ascending colon) [35]. High rates (32 % – 44 %) of transmural colonic injury with HBF were demonstrated in animal studies [36, 37].

2.2 Resection of small polyps (6 – 9 mm)

RECOMMENDATION

ESGE recommends snare polypectomy for sessile polyps 6 – 9 mm in size. ESGE recommends against the use of biopsy forceps for resection of such polyps because of high rates of incomplete resection. (High quality evidence; strong recommendation.)

In an RCT of CSP versus CBF, the rate of residual neoplastic tissue found after polypectomy for polyps sized 5 – 7 mm was significantly lower in the CSP group compared with the CBF polypectomy group (6.2 % vs 29.7 %; $P = 0.13$) [28]. A similarly low rate of residual neoplastic tissue (6.8 %) was found in a prospective study that evaluated hot snare polypectomy (HSP) for polyps sized 5 – 9 mm [38].

RECOMMENDATION

ESGE suggests CSP for sessile polyps 6 – 9 mm in size because of its superior safety profile, although evidence comparing efficacy with HSP is lacking. (Moderate quality evidence; weak recommendation.)

An RCT of HSP vs. CSP for polyps up to 10 mm in size in 70 patients receiving anticoagulation treatment found that there were significantly higher rates of intraprocedural bleeding (23 % vs. 5.7 %, $P = 0.042$) and post-procedural bleeding requiring hemostasis (14 % vs. 0 %; $P = 0.027$) in the HSP group compared to the CSP group. Complete polyp retrieval rates were equivalent (94 % vs. 93 %) [39]. Another RCT found higher rates of intraprocedural bleeding for CSP vs. HSP (9.1 % vs. 1.0 %; $P < 0.001$) for 3 – 8-mm polyps, although bleeding resolved spontaneously in all cases and therefore was of little clinical significance [40]. In another RCT involving 80 patients with polyps sized ≤ 8 mm, no bleeding requiring hemostasis occurred in the HSP or in the CSP group. However, post-procedure abdominal symptoms were more common in the HSP group (20.0 % vs. 2.5 %; $P = 0.029$), and procedure time was significantly shorter with CSP [41]. The advantages of CSP over HSP therefore include lower rates of delayed bleeding, lower frequency of post-polypectomy syndrome, and shorter procedure duration.

2.3 Polypectomy of sessile polyps (10 – 19 mm)

RECOMMENDATION

ESGE suggests hot snare polypectomy (HSP) (with or without submucosal injection) for removal of sessile polyps 10 – 19 mm in size. In most cases deep thermal injury is a potential risk and thus submucosal injection prior to HSP should be considered. (Low quality evidence; strong recommendation.)

HSP is the predominant technique for removal of polyps of size 10 – 19 mm, though the data comparing HSP to other techniques in this setting are limited. In a retrospective study of 941 polyps, of the 248 polyps sized > 5 mm that were removed endoscopically, 191 (77 %) were resected using HSP [42]. For polyps sized 10 – 19 mm, CSP usually cannot achieve "en bloc" resection and the use of biopsy forceps is ineffective for achieving complete resection as well as time-consuming.

In contrast, en bloc resection via HSP is possible, particularly if submucosal injection is used. Submucosal injection can also enhance the safety of HSP for polyps of this size, by reducing the risk of deep thermal injury. The choice of the substance used for submucosal injection used may influence outcomes of HSP for polyps of this size. For example, 196 patients with polyps sized < 20 mm were randomized to undergo EMR following submucosal injection with either 0.13 % hyaluronic acid or normal saline. Complete resection was achieved in 79.5 % of polyps in the 0.13 % hyaluronic acid group and in 65.6 % of polyps in the normal saline group ($P < 0.05$).

The Complete Adenoma Resection ("CARE") study showed that the rates of incomplete resection with HSP are significantly higher for polyps sized 10 – 20 mm compared to smaller polyps (17.3 % vs. 6.8 %; $P = 0.003$) [38]. Therefore, colonoscopists must take time to ensure completeness of resection.

RECOMMENDATION

In certain situations, there may be a role for piecemeal cold snare polypectomy to reduce the risk of deep mural injury, but further studies are needed. (Low quality evidence; weak recommendation.)

In a retrospective study that evaluated piecemeal CSP outcomes in sessile polyps of size > 10 mm, 30 sessile polyps > 10 mm in size were analyzed, of which 15 were between 10 and 19 mm. All polyps were completely retrieved without any adverse events such as delayed bleeding, post-polypectomy syndrome, or perforation [43]. Of 27 patients who underwent follow-up colonoscopy within 6 months, 80 % did not have residual polypoid tissue at the resection site.

A prospective Argentinian cohort study involving 124 patients, evaluated the safety of CSP where a piecemeal technique was used as required. Of 171 sessile polyps, 43 were sized between 10 and 19 mm. Although there were no subgroup analyses of 10 – 19-mm lesions, no immediate or delayed adverse events such as bleeding or perforation were observed in the overall cohort [44].

Piecemeal CSP has therefore been shown to be safe; however subsequent histological assessment may be less accurate and further prospective studies are required to determine the clinical relevance of this technique and its efficacy for completeness of resection for sessile polyps sized 10 – 19 mm.

2.4 Polypectomy of pedunculated lesions

RECOMMENDATION

ESGE recommends HSP for pedunculated polyps. To prevent bleeding, in pedunculated colorectal polyps with head ≥ 20 mm or a stalk ≥ 10 mm in diameter, ESGE recommends pretreatment of the stalk with injection of dilute adrenaline and/or mechanical hemostasis. (Moderate quality evidence; strong recommendation.)

Most pedunculated lesions are usually easily removed completely by HSP. The main adverse event is post-polypectomy bleeding (PPB). Large pedunculated polyps have an increased risk of PPB because of the presence of a large blood vessel within the stalk [45]. Studies have shown that polyp-related risk factors for PPB include polyp size > 10 mm, stalk diameter > 5 mm, location in the right colon, and the presence of malignancy [45 – 48].

Mechanical hemostasis with endoloops or clips and pharmacological intervention with injection of dilute adrenaline are effective in reducing PPB in pedunculated polyps of size > 10 mm, with the greatest benefit observed in polyps > 20 mm [49, 50]. RCTs showed that pretreatment by infiltration of the polyp stalk with 1:10 000 adrenaline significantly reduces PPB compared with no intervention ($P < 0.05$) [49, 51]. However, in another RCT of adrenaline vs. normal saline injection before polypectomy of polyps > 10 mm in size, the lower rates of bleeding found with adrenaline did not reach statistical significance [52]. Mechanical prophylaxis such as the use of endoloops or endoclips may be superior to adrenaline injections in achieving hemostasis. Two RCTs involving polyps > 20 mm in size, showed that the use of mechanical devices for pretreatment of the stalk, alone or in combination with adrenaline injection, significantly decreased PPB compared with adrenaline injection alone [53, 54].

2.5 Which polyps should be removed by an expert endoscopist in a referral or tertiary center?

RECOMMENDATION

Large (≥ 20 mm) sessile and laterally spreading or complex polyps, should be removed by an appropriately trained and experienced endoscopist, in an appropriately resourced endoscopy center. (Moderate quality evidence, strong recommendation.)

Large laterally spreading and sessile colorectal lesions ≥ 20 mm in size (Paris classification 0-IIa, 0-Is, 0-Isp), or lesions located in difficult sites such as the ileocecal valve, appendiceal orifice, and anorectal junction, or located behind haustral folds, should be referred to an expert endoscopist in a tertiary center for removal [4, 55 – 57]. In the largest cohort of advanced lesions involving the ileocecal valve (53 patients, median lesion size 35 mm), among 47 patients who underwent EMR, complete adenoma clearance was achieved endoscopically in 94 % and ultimately surgery was avoided in 81 % [56]. Although surgery was previously the preferred technique for these "defiant" lesions, endoscopic resection techniques such as EMR offer a safe and effective alternative [58 – 61]. Recent large EMR cohort studies have demonstrated technical success rates of > 90 % for large laterally spreading and sessile colorectal lesions [55, 57, 60].

There are few studies that compare differences in outcomes between expert and non-expert colonoscopists. In a retrospective cohort study that compared the outcomes of endoscopic resections of 130 large sessile polyps by 2 specialist and 2 non-specialist colonoscopists, specialist colonoscopists had a higher success rate (75 % vs. 40 %, $P = 0.01$) [62]. However, a clear definition of an expert endoscopist is not evident in the literature. Similarly, there is no clear definition of what constitutes an appropriately resourced endoscopy center. However, since EMR for large or complex polyps carries substantially greater risk than standard diagnostic colonoscopy, to ensure that patient safety is optimized, the health facility should have the capability to address the range of possible adverse events such as perforation or bleeding. These would include radiology with computed tomography scanning, surgical support, and capability for blood product administration.

2.6 Polyps requiring other (non-snare) techniques, e. g. endoscopic submucosal dissection (ESD) or surgery

RECOMMENDATION

The majority of colonic and rectal lesions can be effectively removed in a curative way by standard polypectomy and/or by EMR. (Moderate quality evidence; strong recommendation.)

Many studies have shown that snare polypectomy or EMR using submucosal injection followed by en bloc or piecemeal snare resection are suitable for removing the majority of nonmalignant colonic polyps [4, 61, 63, 64]. Piecemeal EMR for large polyps is associated with moderate rates of recurrent adenoma (16 % in a large prospective study); however, these recurrent lesions are usually diminutive in size and can mostly be easily removed at surveillance colonoscopy, with an ultimately high success rate of 93 % [4, 60]. The EMR approach is safe, efficient, and cost-effective compared to surgical or other more complex endoscopic alternatives [57, 65 – 69].

RECOMMENDATION

En bloc resection techniques such as en bloc EMR, ESD, or surgery should be the techniques of choice in cases of suspected superficial invasive carcinoma. (Moderate quality evidence; strong recommendation.)

In cases of suspected superficial invasive carcinoma, endoscopic treatment may be considered curative where the histology shows complete en bloc R0 resection, well-differentiated adenocarcinoma, and sm1 type (< 1 mm submucosal invasion) with no lymphovascular invasion [70]. En bloc resection allows optimal histologic assessment of these factors (see below for additional high risk factors). En bloc EMR is generally limited to lesions 20 mm in size, with larger lesions usually requiring ESD or surgery for achievement of en bloc resection [71].

RECOMMENDATION

ESD can be considered for removal of colonic and rectal lesions with high suspicion of superficial submucosal invasion and which otherwise cannot be removed en bloc by standard polypectomy or EMR. (Moderate quality evidence; strong recommendation).

Where the risk of submucosal invasive carcinoma within a lesion is considered high, and en bloc EMR or polypectomy is not achievable, ESD or surgery is recommended.

Surgery is currently the gold standard of treatment with no study showing that ESD has better outcomes than surgery [70]. Surgery has the additional benefit of removing the local lymph nodes in most cases. The main exception may be in the rectum where the complexity of the traditional surgical approach with a higher risk of poor functional outcomes and the risk of abdominoperineal amputation might prompt ESD instead of surgery. A surgical transanal approach may be considered; however this also has limitations including the possibilities of difficult access, suboptimal visualization risking incomplete excision, and postoperative complications [70].

Good outcomes from ESD have been demonstrated in Japanese studies, with disease-specific survival rates of 100 % at the 3-year and 5-year marks, in a cohort with a median follow-up of 38.7 months (range 12.8 – 104.2 months) [72]. A systematic re-

view of ESD reported complete resection rates for large colonic polyps of 96 % (95 %CI 91 % – 98 %) and a per-lesion summary estimate for R0 resection rate of 88 % (95 %CI 82 % – 92 %) [73]. However, ESD of large colonic lesions is technically difficult, time-consuming, mandates multiday hospital stay, and, in Western countries, limited numbers of endoscopists have sufficient experience and expertise to achieve the results described in the East Asian literature.

According to the ESGE ESD Guideline, colorectal ESD may be considered for lesions with high suspicion of limited submucosal invasion based on depressed morphology or irregular surface pattern, or for lesions that otherwise cannot be optimally and radically removed by snare-based techniques [70]. However, further studies comparing ESD to surgery in a Western setting are required to establish the optimal technique. Local expertise will play a major role in determining which approach is used.

RECOMMENDATION

ESGE recommends that successful EMR be defined endoscopically by the absence of neoplastic tissue at the completion of the procedure after careful inspection of the post-EMR mucosal defect and margin. (Low quality evidence, strong recommendation.)

RECOMMENDATION

ESGE recommends that endoscopic cure for lesions resected by EMR should be confirmed at surveillance colonoscopy by advanced endoscopic imaging and systematic biopsy. (Low quality evidence; strong recommendation.)

RECOMMENDATION

ESGE recommends that suspected residual or recurrent adenoma identified at surveillance colonoscopy is snare-resected within the same procedure. Where snare resection is not possible, ablation should be performed. (Moderate quality evidence; strong recommendation.)

The goal of EMR is to resect the entire lesion, avoiding recurrence or residual tissue. Ideally the lesion should be resected en bloc, with histologically assessed clear margins (R0 resection). Piecemeal resection prevents the histological assessment of complete excision as the snare excision margins divide the polyp and cannot be distinguished from the in vivo polyp margins.

Complete endoscopic resection refers to complete removal of endoscopically visible polyp either piecemeal [74 – 76] or en bloc [77]. Inspection of the margins by magnifying endoscopy at the completion of resection has been shown to result in lower rates of recurrence, in a retrospective case – control analysis [78]. There is however no prospective evidence that use of magnification or high definition endoscopy reduces recurrence. It has been suggested that extending excision margins may reduce recurrence after EMR [74, 79, 80]; however a prospective observational cohort study of > 800 patients failed to show any reduction in recurrence at scheduled surveillance at 4 – 6 months [81].

Snare resection should be prioritized at the initial resection to remove all polyp, or as much polyp as possible [82]. The detection of residual or recurrent polyp at surveillance colonoscopy is of high importance. Recurrence occurs in 15 % – 20 % of EMRs [83]. There are few studies that have examined the accuracy of endoscopic imaging for the prediction of histological recurrence. Recently a large prospective study using a simple standardized imaging protocol with high definition white light endoscopy followed by NBI showed an NPV for recurrence of 98.6 % (95 %CI 95.1 % – 99.8 %). The use of NBI in addition to high definition white light endoscopy improved sensitivity for recurrence from 67 % to 93 %, the difference mainly due to detection of flat recurrence [84].

Residual or recurrent polyp tissue detected at endoscopic surveillance can be effectively treated [60]. Snare resection provides superior outcomes to other modalities [60]. For areas not amenable to snare resection, multiple endoscopic modalities have been described in the past to destroy residual polyp, although none have been demonstrated in a systematic way to reduce recurrence in conjunction with contemporary EMR techniques [85]. Hot avulsion is a technique that can be applied to small areas of non-lifting polyp and was effective in a small prospective study [86, 87]. Alternative strategies for non-lifting polyp including cold avulsion in conjunction with thermal ablation are being investigated. Recurrent lesions with substantial fibrosis may be suitable for ESD resection. The en bloc resection rate in Japanese studies is lower for salvage ESD than for naive lesions [88]. Underwater EMR has been examined in a small study as an alternative salvage therapy, with en bloc resection rates in this setting of 47.2 % vs. 15.9 % for standard EMR [75].

RECOMMENDATION

ESGE recommends the use of advanced endoscopic imaging to identify the potential presence of superficial submucosal invasion. (Moderate quality evidence; strong recommendation.)

Advanced imaging techniques such as narrow band imaging (NBI) and magnifying chromoendoscopy (MCE) have been shown to improve the identification of morphological features suggestive of submucosal invasion, such as irregular or absent surface vascular patterns [89 – 91]. NBI studies showed that the Sano capillary pattern IIIB, Hiroshima C3, and NBI International Colorectal Endoscopic Classification (NICE) 3 are highly indicative of deep invasion [92 – 95]. MCE studies demonstrated that Kudo pit pattern Vn is associated with a high likelihood of deep submucosal invasion [96, 97]. Sano IIIA, and Kudo pit pattern Vi are predictive of superficial submucosal invasive carcinoma, and can therefore identify patients who will benefit from en bloc resection.

RECOMMENDATION
ESGE suggests that when advanced imaging is not available, standard chromoendoscopy may be beneficial. (Moderate quality evidence; strong recommendation.)

Polyp morphology such as ulceration, excavation, deep demarcated depression, Paris classification II-c and IIa + c, nongranularity, mucosal friability, fold convergence and Kudo pit pattern V are associated with submucosal invasive carcinoma [4, 98 – 101]. Many of these features may be visible with standard or high definition white light inspection. Even when magnification technology is not available, standard chromoendoscopy may be useful in further enhancing the identification of these features.

RECOMMENDATION
ESGE recommends that polyps with advanced endoscopic imaging characteristics of deep submucosal invasion should not be considered for endoscopic treatment and should be referred for surgery. (Moderate quality evidence; strong recommendation.)

Polyps demonstrating endoscopic signs of deep submucosal invasion are at high risk of lymphovascular invasion and lymph node metastasis [102 – 104]. In a meta-analysis of 23 cohort studies involving 4510 patients, a significantly higher risk of lymph node metastasis was associated with a depth of submucosal invasion > 1 mm compared with superficial invasion (odds ratio [OR 3.87], 95 %CI 1.50 – 10.00; $P = 0.005$). Lymphovascular invasion (OR 4.81, 95 %CI 3.14 – 7.37; $P < 0.001$), poorly differentiated tumors (OR 5.60, 95 %CI 2.90 – 10.82; $P < 0.001$), and tumor budding (OR 7.74, 95 % CI 4.47 – 13.39; $P < 0.001$) were significantly associated with lymph node metastasis [104]. Therefore, in addition to excision of the lesion, the local draining lymph nodes must also be removed when deep submucosal invasion is suspected or proven, which can only be achieved by surgery.

RECOMMENDATION
ESGE recommends that polyps without characteristics of deep submucosal invasion should not be referred for surgery without consultation with an expert endoscopy center for evaluation for polypectomy/EMR. (Low quality evidence, strong recommendation.)

Polyps without characteristics of deep submucosal invasion, have a high likelihood of being successfully removed endoscopically at expert centers, and these patients should be offered a consultation to discuss endoscopic management before proceeding to surgery [105]. In a recent EMR study, 36 patients with 38 large or complex polyps without biopsy-proven cancer were redirected to consultation with an EMR expert by a colorectal surgeon who received the original referrals: 79 % of lesions could be successfully treated endoscopically and surgery was avoided in 71 % of the patients [106].

2.7 Colonic tattooing: which lesions should be tattooed, and what is the best technique and location for tattoo placement?

RECOMMENDATION
ESGE recommends that lesions that may need to be located at future endoscopic or surgical procedures should be tattooed during colonoscopy. (Low quality evidence, strong recommendation.)

Colonoscopic tattooing is performed to enable future identification, at colonoscopy or surgery, of malignant lesions (proven or suspected), polypectomy, EMR, or ESD sites, difficult-to-detect polyps, or dysplastic areas. All such lesions, other than those definitely located in the cecum, adjacent to the ileocecal valve, or in the low rectum, should be tattooed.

RECOMMENDATION
ESGE recommends sterile carbon particle suspension as the preferred tattoo agent. (Low quality evidence, strong recommendation.)

A variety of substances were previously used for endoscopic tattooing, including india ink, methylene blue, indigo carmine, and indocyanine green [107]. These were limited by difficulties including lack of permanence, infection resulting from impurities, or complex preparation. A sterile and biocompatible prepackaged suspension containing highly purified and very fine carbon particles (Spot; GI Supply, Camp Hill, Pennsylvania, USA) has been developed for endoscopic tattooing and this has enhanced the accessibility, ease of use, and safety of the procedure [108].

RECOMMENDATION
ESGE recommends the formation of a saline bleb in the submucosal layer of the colon prior to tattoo injection. (Low quality evidence; strong recommendation.)

Sterile carbon particle suspension is not biologically inert and has been associated with clinically significant complications [109]. These include reported cases of peritonitis resulting from transmural injection [107, 109, 110] and submucosal fibrosis that makes EMR or ESD difficult and hazardous and has contributed to endoscopic perforation [109, 111]. Furthermore, poor injection technique has resulted in failure to identify the tattoo at surgery [110]. These risks can be reduced by choosing an appropriate location for tattooing [109, 112, 113],

and by the use of the saline bleb injection method [110, 114]. The saline bleb injection method involves performing a normal saline injection initially to find the submucosal plane and ensure that a submucosal bleb is safely created. Once the submucosal bleb has been formed, the normal saline syringe is replaced with the tattoo syringe, and injection is recommenced. This ensures tattoo injection into the submucosal plane, avoiding transmural injection that may cause localized peritonitis, and is also associated with more accurate surgical location compared with standard tattooing [110, 114].

RECOMMENDATION

ESGE recommends that tattoos be placed ≥ 3 cm anatomically distal (anal side) to the lesion, with 2 or 3 separate injections being made at this level on opposite sides of the lumen, to increase the likelihood of detection. Endoscopic and surgical team members should agree on a standardized location of tattoo injection at their institution. The details of tattoo injection should be clearly text- and photo-documented in the endoscopy report, using unambiguous terminology. (Low quality evidence; strong recommendation.)

The recommended tattoo location of 2 – 3 cm distal (on the anal side) to the lesion [109, 112, 113] is at an adequate distance to limit the likelihood of inadvertent spread beneath the lesion and also avoid inadvertent injection through the lesion that may cause needle-track seeding [109, 112, 115, 116]. The carbon particles can spread a significant and often unexpected distance within the submucosal plane as the submucosal bleb flattens and expands laterally, potentially spreading underneath the lesion and inducing submucosal fibrosis, which can limit subsequent endoscopic therapy.

It is also recommended that 2 or 3 separate injections should be performed at this level of 2 – 3 cm distal (anal side) to the lesion. One injection should be in line with the lesion, and one should be on the opposite aspect of the lumen. This may increase the likelihood that the tattoo will be seen at future endoscopy or surgery. A tattoo volume of at least 1.0 – 1.5 mL at each injection site has been recommended [109, 110]. A volume of 3 mL of sterile carbon particle suspension has also been suggested if one is confident that the needle-tip is located within the submucosal plane [110].

3. Endoscopic mucosal resection (EMR) for sessile laterally spreading lesions ≥ 20 mm in size

EMR involves injection of a solution into the submucosal space to separate a mucosal lesion from the underlying muscularis propria. The lesion can then be resected by snare electrosurgery. The submucosal cushion theoretically reduces the risk of thermal or mechanical injury to the underlying muscularis propria.

Sessile and flat colorectal laterally spreading lesions (LSLs) (or laterally spreading tumors [LSTs]) ≥ 20 mm in size require advanced techniques for resection. Large prospective studies have demonstrated that EMR is safe and efficacious [4, 63, 117]. There is now a growing evidence base for several key technical aspects of the procedure, aimed at improving complete resection rates, reducing recurrence, and lowering rates of complications including perforation, bleeding, and post-procedural pain. Advanced endoscopic resection requires a patient- and lesion-centered approach, where the endoscopist must carefully appraise the risks of submucosal invasive cancer, the risks and benefits of resection techniques, and the co-morbidities of the patient. Although EMR is effective and safe for the vast majority of sessile flat colorectal LSLs without imaging features suggestive of invasive disease, surgical resection or endoscopic submucosal dissection (ESD) may be appropriate alternatives for higher risk lesions.

RECOMMENDATION

ESGE recommends careful lesion assessment prior to EMR to identify features suggestive of poor outcome. Features associated with incomplete resection or recurrence include lesion size > 40 mm, ileocecal valve location, prior failed attempts at resection, and size, morphology, site, and access (SMSA) level 4. (Moderate quality evidence; strong recommendation.)

Large polyp size as a predictor of recurrence or failed endoscopic therapy has been demonstrated in several studies [4, 55, 61, 118]. Prior attempts at resection have been shown to be associated with failed subsequent endoscopic resection. Non-lifting due to previous intervention was associated with failed resection in the large prospective Australian Colonic EMR (ACE) study (OR 3.75) [60] and a US study identified prior resection attempts as a risk factor for failure of complete resection (OR 0.081; $P < 0.001$), or recurrence (OR 18.8; $P < 0.001$) [119]. Lesion location may be associated with incomplete resection. Lesions at the ileocecal valve were associated with failed resection in the ACE study (OR 2.61) and, although good endoscopic outcomes can be achieved in this location, involvement of the ileum or both the superior and inferior lips of the valve was associated with recurrence [120]. Other locations that may prove challenging include the appendiceal orifice and anorectal junction [121]. Methods to overcome these challenges have been described and prospectively studied [120, 121]. Difficult access was associated with failed endoscopic resection in the ACE study [4] (OR 2.17), and locations behind folds, in a constrained sigmoid colon, or in peridiverticular locations may also reduce complete resection rates.

Post-EMR bleeding occurs in 5 % – 7 % following resection of lesions ≥ 20 mm [122, 123]. Identified risk factors for bleeding include proximal colon location [48, 122, 124] and increasing lesion size, especially ≥ 40 mm [77, 125]. The combined effects of size and location in the English Bowel Cancer Screening Programme identified a predicted risk of bleeding of 1 in 8 [125]. Perforation is an uncommon event, and meta-analyses show pooled estimates of 1.4 % – 1.5 % [123, 126]. Few studies have identified independent risk factors for perforation as analyses

are prone to error when there are few outcomes. In large series examining standard polypectomy, "adverse event" outcomes (combining bleeding and perforation) have identified endoscopist inexperience and increasing lesion size as risk factors [127 – 130].

A simple method for stratifying lesion complexity, based on the size, morphology, site, and access (SMSA), has been developed by a working group of UK experts [131]. This stratifies polyps into four levels of difficulty with level 1 being the easiest and level 4 being very difficult to resect. Validation of this system in 220 lesions ≥ 20 mm in size demonstrated higher complication rates (8.6 % vs. 0 %, $P = 0.007$) and lower clearance rates (87.5 % vs. 97.5 %, $P = 0.009$) for SMSA level 4 polyps as compared to SMSA level 2 and 3 [55]. The classification is user-friendly, takes account of most described risk predictors and may be valuable for the assessment of large and complex polyps.

Lesions that have high risk features suggesting poor outcomes may be more safely and effectively handled at a high volume tertiary referral centre. The endoscopist must be confident that the resources available to them (staff, equipment, time, and endoscopic skill) are sufficient to remove the entire lesion safely and manage potential adverse events. If not, referral to a tertiary care center should be strongly considered [57, 61].

RECOMMENDATION

ESGE recommends that the goals of EMR are to achieve a completely snare-resected lesion in the safest minimum number of pieces, with adequate margins, and without need for adjunctive ablative techniques. (Low quality evidence; strong recommendation.)

Effective resection technique relies on multiple interdependent factors, but is difficult to study objectively as it requires the intersection of a number of endoscopic skills, including optical diagnosis, endoscope shaft and tip control, injection technique, snare selection and manipulation, visual and haptic feedback, and judgment. Several sources including technical reviews and expert opinion are available to guide technique [78, 82,132,133].

Complete and safe excision often requires an adaptable approach to the lesion and the techniques employed may vary slightly between operators. Factors associated with the lowest recurrence risk are complete snare resection, en bloc or oligopiecemeal excision, and the absence of adjunctive thermal ablative techniques.

RECOMMENDATION

ESGE suggests the use of submucosal injectates for EMR that are more viscous than normal saline and whose safety has been proven, including succinylated gelatin, hydroxyethyl starch, or glycerol, since their use is associated with superior technical outcomes and reduced procedural time. (High quality evidence; weak recommendation.)

RECOMMENDATION

ESGE recommends that a biologically inert blue dye such as indigo carmine should be incorporated into the submucosal injection solution to facilitate identification of fluid cushion extent, lesion margins, and deep mural injury. (Moderate quality evidence; strong recommendation.)

The ideal submucosal injectate should provide a sustained lift, facilitate en bloc or oligo-piecemeal resection, be inexpensive, widely available, and have few adverse effects [134]. The traditional EMR submucosal injectate is normal saline; however several other solutions have been investigated [135, 136].

Succinylated gelatin (Gelofusine; B. Braun, Crissier, Switzerland), has been compared to normal saline in an Australian double-blind RCT of EMR for lesions ≥ 20 mm (n = 80 patients). Succinylated gelatin results in fewer snare resections per lesion (3.0 vs. 5.5, $P = 0.028$) and shorter procedure duration (12.0 min vs. 24.5 min, $P = 0.006$) [137]. Succinylated gelatin is not universally available and there is a theoretical risk of an allergic reaction to bovine protein; however it has been used in a large multicenter cohort of over 1000 patients without complications [60].

Hydroxyethyl starch (Voluven; Fresenius Kabi Ltd, Runcorn, UK) has been shown to improve mucosal lift time, reducing the need for additional injections in a randomized controlled study [138]. Hyaluronic acid has also been demonstrated to improve complete resection and prolong mucosal elevation in several animal and human studies [139 – 142]. It is commonly used in ESD procedures [143]; however it is expensive [144] and not widely available, which has limited its uptake. In addition, murine models have suggested a potential for the stimulation of growth of residual adenoma [145].

Glycerol is a hypertonic solution consisting of 10 % glycerin and 5 % fructose in normal saline. In a retrospective case – control study, en bloc resection rates were improved with use of glycerol compared with normal saline [146]. Glycerol is widely available and inexpensive in Japan, but is not used extensively elsewhere [144].

Other hypertonic crystalloid solutions have been investigated in human and animal studies. Hydroxypropyl methyl cellulose sustains mucosal lift in animal studies [147] and is non-inferior to normal saline in humans [148 – 150]. Dextrose solutions produce a sustained mucosal lift [151 – 153]; however tissue damage has been reported in animal studies, particularly with concentrations over 20 % [154]. In a double-blind, randomized human EMR study, post-polypectomy syndrome was significantly more likely in patients treated with submucosal injection of 50 % dextrose with adrenaline compared with normal saline with adrenaline [151]. Similar effects have been noted with hypertonic saline [154].

Fibrinogen and blood injectates have also been used for EMR in animal models; however there are concerns regarding pathogen contamination and practicality [155, 156].

Incorporation of a biologically inert dye into the submucosal injectate facilitates identification of fluid cushion extent, lesion margins, and deep mural injury [5, 135]. Topical application of injectate with a chromic agent to resection defects may assist in the delineation of deep injury [157].

RECOMMENDATION

ESGE suggests that en bloc EMR should be limited to lesions ≤ 20 mm in the colon and ≤ 25 mm in the rectum. (Low quality evidence, weak recommendation.)

En bloc resection by EMR for lesions ≥ 20 mm is reported in 16 % – 48 % of lesions [60, 61, 79, 158]. It is associated with lower recurrence rates than piecemeal resection in both EMR and ESD studies [60, 143]. No studies have defined a cutoff point for size where en bloc resection is unsafe, so it remains a decision that is based on lesion morphology and location. The factors that limit en bloc resection by EMR are polyp size, location, EMR technique, and the experience of the endoscopist [159]. Finally however the primary driver must be consideration of safety. For flat and sessile colonic lesions the maximum size that can be reliably excised en bloc by EMR is 15 – 20 mm proximal to the splenic flexure where the risk of perforation is higher, and 20 – 25 mm in the sigmoid and rectum [160]. If en bloc resection is not possible, the lesion should be removed in as few pieces as possible [160].

Circumferential incision of lesions using ESD techniques (c-EMR, CSI-EMR, or EMR-precut) may allow extension of the size limits while mitigating perforation risk [79, 80, 161]. Use of special devices such as dual-loop snares may also increase the rate of en bloc resection for lesions ≥ 20 mm to 64 % [162]. Underwater EMR has demonstrated en bloc resection rates of 55 % for colorectal lesions of 20 – 40 mm [163].

RECOMMENDATION

ESGE recommends complete snare resection during EMR, because adjunctive thermal ablative techniques (e. g. argon plasma coagulation [APC]) are not as effective and are associated with higher adenoma recurrence. (Moderate quality evidence; strong recommendation.)

RECOMMENDATION

ESGE suggests that where complete snare excision cannot be achieved, the optimal method for adjunctive removal of residual adenoma requires further study. (Low quality evidence; weak recommendation.)

RECOMMENDATION

ESGE suggests that where complete snare excision EMR has been achieved, the role of adjuvant thermal ablation of the EMR resection margins to prevent recurrence requires further study. (Low quality evidence; weak recommendation.)

Ablation at the margins of the EMR defect may have two roles: as an “adjunct” treatment, where residual tissue not amenable to snare resection is ablated, or as an “adjuvant” treatment, where ablation is applied to clean defect margins in an effort to reduce recurrence.

Two small RCTs have demonstrated conflicting results for adjuvant APC, with one showing a significantly reduced rate of recurrence with APC application [164, 165] and the other showing no effect [141]. There are no contemporary high quality studies examining adjuvant thermal ablation techniques.

Small low quality prospective cohort studies have examined adjunctive thermal ablation with APC; however results have been inconclusive [85, 166].

The prospective ACE study (n = 479 patients, 514 lesions, mean size 35.6 mm) aimed for a treatment goal of complete snare resection. Where this was not achieved, remnant tissue was ablated by APC or snare-tip soft coagulation. Independent predictors of lesion recurrence included lesion size > 40 mm (OR 4.37) and use of APC (OR 3.51) [4]. The role of adjuvant thermal ablation of the post-EMR margin, where no endoscopically visible adenoma remains despite meticulous inspection, requires further rigorous evaluation.

RECOMMENDATION

ESGE recommends that when a lesion appears suitable for EMR, but does not lift with submucosal injection, referral should be made to an expert endoscopist in a tertiary center. (Moderate quality evidence, strong recommendation.)

Obliteration of the submucosal space that precludes lesion elevation with submucosal injection may be caused by early colorectal cancer, and with the associated desmoplastic response the mucosal layer can be tethered to the underlying muscularis propria. Fibrosis related to polyp prolapse, prior resection attempts [119, 167], or as a reaction to submucosal injection of tattoo particles [109] may also cause this. Non-lifting is evident when submucosal injection fails to elevate the lesion, but lifts the surrounding mucosa creating a canyoning effect. Infiltration into the submucosal space may not be possible, resulting in a jet of fluid exiting the lesion under pressure.

Non-lifting was first described in 1994 in a prospective series [168] and was strongly associated with submucosal invasion (SMI). It was subsequently shown that superficial SMI (SM1, involvement of the submucosa < 1000 µm; SM2, involvement of the submucosa < 2000 µm) was not as strongly associated with

non-lifting as deep SMI (SM3, > 2000 µm involved), as the underlying preserved submucosa may still expand [169]. Other studies have re-demonstrated this association of non-lifting with SM3 disease [170, 171]. Kobayashi et al. showed that endoscopic assessment with chromoendoscopy was superior to non-lifting for predicting submucosal invasion [171], so careful endoscopic assessment of surface pattern and morphology is considered to be the optimal method of determining invasion, preferably using magnification endoscopy and digital or topical chromoendoscopy [172].

Endoscopic resection by a typical inject and resect method may be ineffective or incomplete, requiring the use of adjunctive thermal ablation [173] or avulsion techniques (hot or cold) [86, 87] to remove all visible polyp. All visible adenoma should be excised before ablation is considered. Good outcomes have been reported at high volume tertiary referral centers [4, 61, 119] and in series using ESD techniques [88].

RECOMMENDATION

ESGE recommends that all EMR specimens be retrieved for histological evaluation. (Moderate quality evidence; strong recommendation.)

Although the Roth retrieval net device is usually used to retrieve polyp fragments after large or piecemeal polypectomy without compromising pathologic evaluation [174], systematic literature search yields no evidence-based data on this point regarding LSLs.

4. Equipment considerations for polypectomy and EMR

4.1 Type of current

RECOMMENDATION

ESGE suggests the use of a microprocessor-controlled electrocautery generator for polypectomy. (Low quality evidence; weak recommendation.)

Electrosurgical units convert energy from high frequency currents (between 300 kHz and 1 MHz) into heat. When high frequency electrosurgical current flows from a snare wire through tissue, the high density current at the point of contact results in a sharp rise in tissue temperature.

Cutting currents are produced at temperatures greater than 100 °C, which leads to boiling of cellular water and subsequent cellular rupture.

Coagulation currents are produced at temperatures of 70 – 100 °C. This leads to dehydration and contracting of cells, without rupture.

With use of blended currents, the ratio of cells cut to those coagulated can be varied.

For polypectomy, it is recommended that automated microprocessor technologies are used that enable controlled tissue cutting by providing an appropriate blend of cutting and coagulation currents. This provides enough coagulation current to maximize the hemostatic effect and minimize the risk of perforation [175, 176].

RECOMMENDATION

ESGE recommends against using low power coagulation current for EMR because of the increased risk of post-procedural bleeding. (Low quality evidence; strong recommendation.)

Use of diathermy current for polypectomy varies according to individual practitioner. A North American survey [177] of polypectomy practice of nearly 200 endoscopists demonstrated that 46 % favour a blended current, 46 % a pure coagulation current, 3 % a pure cutting current, and 4 % used a variety. More recently an Israeli survey [178] showed similar results, with 42 % favouring pure coagulation and 38 % blended current with a higher use of pure cutting current at 20 %. Pure cutting current is best avoided because of the risk of immediate post-polypectomy bleeding [47].

Pure coagulation current is popular amongst endoscopists because of its efficient hemostatic properties; however, it is well recognised that prolonged use of coagulation results in deep thermal tissue injury [179], increasing the risk of perforation, particularly in the right colon. A large study of nearly 1500 polypectomies [180] retrospectively compared blended versus pure coagulation current. Overall complication rates were the same between the two groups. However, there was a statistically significant difference in the timing of bleeding: for blended current within 12 hours, and for pure coagulation current within 2 – 8 days. Pure coagulation current when applied for EMR of flat lesions especially in the right colon is likely to increase the risk of perforation and is best avoided.

Use of an electrosurgical current not controlled by a microprocessor was associated with clinically significant post-endoscopic bleeding (OR 2.03; $P = 0.038$) [122].

RECOMMENDATION

ESGE recommends against using pure cutting current for pedunculated polypectomy because of an increased risk of intraprocedural bleeding. (Low quality evidence; strong recommendation.)

Pure cutting current is not recommended for polypectomy because of the increased associated risk of intraprocedural bleeding. A large, multicenter Korean study [47], with a total of 9336 polypectomies, found that cutting current and inadvertent cold polypectomy had the highest ORs for immediate post-polypectomy bleeding, at 6.95 (95 %CI 4.42 – 10.94) and 7.15, (95 %CI 3.13 – 16.36), respectively. A large retrospective study

[180] also found that immediate post-polypectomy bleeding was observed more with blended current and delayed post-polypectomy bleeding occurred more frequently with coagulation current.

A retrospective review encompassing 4735 polypectomies performed using pure cutting current found that bleeding occurred in 3.1% of the patients. In this study, hemoclips were prophylactically placed at the endoscopist's discretion and a significant proportion of patients (12%) received them [181].

Resection of pedunculated polyp is achieved by cutting the pedicle. This minimizes the risk of perforation as the pedicle is away from the colon wall, but the pedicle could contain a thick vessel. Inadequate coagulation of this vessel can result in catastrophic bleeds. Therefore, it may be logical to use pure coagulation current for resection of pedunculated polyps. However, there are no high level data comparing pure coagulation current to microprocessor controlled current for pedunculated polyps.

4.2 Carbon dioxide (CO_2) insufflation

RECOMMENDATION

ESGE suggests the use of carbon dioxide (CO_2) insufflation during colonoscopy and polypectomy. (Low quality evidence, strong recommendation.)

Carbon dioxide (CO_2) is absorbed > 100 times more quickly than air and can reduce patient discomfort during and after the procedure. A meta-analysis of 9 RCTs involving 1577 patients showed fewer patients with intraprocedural abdominal pain in the CO_2 group (relative risk [RR] 0.77, 95%CI 0.62 – 0.96). Use of CO_2 also reduced immediate post-procedural pain at 1 hour (RR 0.26, 95%CI 0.16 – 0.43) and 6 hours (RR 0.36, 0.20 – 0.64), and post-procedure discomfort at 24 hours (RR 0.53, 0.31 – 0.91) though there was no significant difference in cecal intubation rate [182].

An RCT assessing the impact of CO_2 insufflation on toilet use after screening colonoscopy showed that at 2 hours post-procedure, 30% in the CO_2 group had used the toilet at least once, compared to 83% in the air insufflation group (P < 0.001). The average duration of each toilet visit was also significantly shorter in the CO_2 group [183].

RECOMMENDATION

ESGE recommends the use of CO_2 insufflation for EMR. (Moderate quality evidence; strong recommendation.)

EMR is associated with a higher risk of perforation than standard colonoscopy.

Performing EMR also lengthens the procedure time and the duration of gas insufflation. A prospective cohort study of patients undergoing EMR of large colonic lesions demonstrated a 62% reduction in the number of post-procedure admissions when CO_2 insufflation was used compared to air (8.9% vs. 3.4%, P = 0.01) [184]. CO_2 insufflation is advisable in case EMR leads to perforation, as use of CO_2 will allow clinicians more time to manage the perforation as compared to use of air which can lead to rapid abdominal distension, tension pneumoperitoneum, gas tracking, pain, and hemodynamic compromise.

4.3 Type of snare

Limited data exist that compare the roles of different types of snares. We recommend that clinicians use snares with which they are familiar and whose performance characteristics are known. Snare size should be appropriately selected depending on the size and morphology of the polyp. Snares come in different shapes (circular, oval, hexagonal, etc.) but no clear benefit of one shape over the other has been demonstrated. Structurally, snares are either monofilament or polyfilament. The potential advantage of monofilament snares is that the snare wire is thin (< 0.4 mm), so current density is greater, tissue transection swifter, and unintentional diathermic injury to the colonic wall less likely. The potential advantage of polyfilament snares are that the wire is thicker (0.4 mm – 0.5 mm) and thus they may better grip the mucosal surface (depending on what other performance enhancements have been included in the wire design) enabling more effective capture of flat polyps. However, these differences in performance have not been proven and ESGE strongly recommends further research in this field.

4.4 Fluid pump

RECOMMENDATION

ESGE suggests the use of a fluid jet pump to enable efficient irrigation of the colonic mucosa and polypectomy sites and management of bleeding. (Low quality evidence; weak recommendation.)

Use of a fluid jet can be very effective in locating the exact point of bleeding during polypectomy or EMR. This fluid may be water or normal saline. If the fluid jet is delivered via a separate dedicated channel in the endoscope (as in most modern endoscopes) then the working channel of the endoscope is available for the endoscopist to employ hemostatic devices whilst the fluid jet is delineating the precise bleeding point.

5. Polypectomy-associated adverse events: definitions and management

5.1 Bleeding

Consensus on the definition of post-polypectomy bleeding is lacking. Definitions vary throughout the literature. For the purposes of these guidelines, two terms were used: intraprocedural bleeding and post-procedural bleeding. These were defined as follows:

- Intraprocedural bleeding (IPB) is bleeding occurring during the procedure that persists for more than 60 seconds or requires endoscopic intervention.

- Post-procedural bleeding (PPB) is bleeding occurring after the procedure, up to 30 days post-polypectomy, that results in an unplanned medical presentation such as emergency department visit, hospitalization, or re-intervention (repeat endoscopy, angiography, or surgery).

RECOMMENDATION

For intraprocedural bleeding, ESGE recommends endoscopic coagulation (snare-tip soft coagulation or coagulating forceps) or mechanical therapy, with or without the combined use of dilute adrenaline injection. (Low quality evidence; strong recommendation.)

IPB occurs in 2.8 % of patients undergoing standard polypectomy [49] and in 11.3 % of patients with lesions ≥ 20 mm treated with endoscopic mucosal resection (EMR) [122] and it is rarely serious. Management of IPB can be achieved with endoclips, coagulation forceps, and snare-tip soft coagulation. Snare-tip soft coagulation has been shown to be an effective method of IPB control [185]. Coagulating forceps are reserved for more severe cases [82, 132]. Vigorous irrigation, preferably by using a water pump, improves visualization and may aid cessation of bleeding originating from small vessels [82, 132]. Adrenaline injection (1:10 000 or 1:20 000 dilution with saline) may be used to gain initial control of active bleeding but should always be used in combination with a second mechanical or thermal hemostatic method.

IPB that occurs after removal of a pedunculated polyp, can be managed by placing a clip or an endoloop. In cases of immediate massive IPB, the snare may be used to resnare the remaining stalk with temporary control of bleeding providing time for subsequent clip or endoloop application. Where a significant volume of blood is pooling and overlying the bleeding point, this can make it difficult to identify and treat the precise bleeding point. In such a case, rolling the patient so that the bleeding point is away from the gravity-dependent position will enable the bleeding point to be clearly visualized and treated. The over-the-scope clip (OTSC; Ovesco Endoscopy, Tuebingen, Germany) has also been shown to be effective for control of IPB that is refractory to other endoscopic modalities [186]. The advantage of using this device is that it can grasp a much wider area and larger volume of tissue than the through-the-scope endoclips; however withdrawal of the endoscope to load the device is necessary, further delaying hemostasis.

RECOMMENDATION

ESGE does not recommend routine endoscopic clip closure or other methods of prophylaxis to prevent delayed bleeding for sessile polyps. (Moderate quality evidence; weak recommendation.)

An RCT, has reported that prophylactic clip application does not decrease PPB after EMR [187]. However, in an uncontrolled retrospective study of 524 unselected polyps ≥ 20 mm in size, prophylactic clipping of resection sites was found to reduce the risk of PPB [188]. More RCTs on this subject are required. Moreover, in another RCT, prophylactic endoscopic coagulation of nonbleeding visible vessels within the mucosal defect after wide-field EMR, using coagulation forceps at fixed low power, did not reduce the incidence of PPB [189].

RECOMMENDATION

ESGE suggests that there may be a role for mechanical prophylaxis (e. g. clip closure of the mucosal defect) in certain high risk cases after polypectomy or EMR. This decision must be individualized based on the patient's risk factors. (Low quality evidence; weak recommendation.)

Factors associated with the incidence of post-procedural bleeding (PPB) are either related to polyp characteristics such as size, morphology, and location of the polyp, or to the patient's health status such as age > 65 years, the presence of hypertension, renal disease, and use of anticoagulant. PPB complicates 6 % – 7 % of wide-field EMRs [122]. Data from EMR of sessile colorectal polyps ≥ 20 mm in size showed, that PPB was associated with proximal location, use of an electrosurgical current not controlled by a microprocessor, occurrence of IPB, and aspirin use [122, 124]. In the Munich Polypectomy Study, polyp size and the proximal location of the polyp were risk factors for adverse events such as PPB [128]. A meta-analysis has shown that the risk of PPB was significantly increased for patients using clopidogrel [190]. A cost-efficacy decision analysis of prophylactic clip placement after endoscopic removal of large polyps has shown that this strategy appears to be cost-effective for patients who receive antiplatelet or anticoagulation therapy [191]. Prophylactic endoscopic clipping may thus be considered for preventing delayed bleeding in patients receiving antiplatelet or anticoagulant medications [192].

The use of mechanical prophylaxis in certain high risk cases after standard polypectomy or EMR should be individualized on the basis of patient or polyp risk factors. A clinical risk score derived from a prospective multicenter dataset of more than 2000 colonic EMRs has recently been described. Importantly, it is simple to use and independently confirms the key risk factors identified in previous studies [193], including lesion size > 30 mm, proximal colon location, and presence of major co-morbidity. Further research regarding prophylactic therapies in this high risk group is required.

RECOMMENDATION

Patients admitted to hospital with delayed bleeding who are hemodynamically stable, without ongoing bleeding, may be initially managed conservatively. If intervention is required, ESGE recommends colonoscopy as the first-line investigation. (Moderate quality evidence, strong recommendation.)

PPB is one of the most common causes of lower gastrointestinal bleeding amenable to endotherapy [194]. Not all patients presenting with PPB need urgent colonoscopy; however a clear means of identifying those that do has not been defined. No relevant study has been conducted and only expert opinion exists. Patients responding to resuscitation should initially be observed [195]. If bleeding persists, patients should be given an adequate bowel preparation and repeat colonoscopy performed [196, 197]. Using a decision model it was calculated that a tandem colonoscopy for identification and treatment of PPB is beneficial in about 22 % of patients [198]. In a multicenter, prospective study of colonic lesions ≥ 20 mm treated by EMR, 55 % of patients avoided repeat colonoscopy because bleeding spontaneously stopped. When colonoscopy was performed, endoscopic therapy was only necessary in 21 of 27 cases (70 %). On the basis of these data, a risk-based algorithm for the management of PPB has been proposed [199].

RECOMMENDATION

When the polypectomy site is identified during colonoscopy for post-polypectomy bleeding, and active bleeding or other high risk stigmata are identified, ESGE recommends forceps coagulation or mechanical therapy, with or without the combined use of dilute adrenaline injection. (Moderate quality evidence; strong recommendation.)

The optimal technique for achieving endoscopic hemostasis in cases of active PPB or other high risk stigmata has not been determined. Technique selection is based on location and characteristics of the lesion, endoscopist preference and experience, and device availability. The most commonly used methods are clipping, or forceps coagulation with or without the combined use of adrenaline injection [124, 195, 200, 201]. Clipping, with or without adrenaline injection, may be superior to forceps coagulation therapy since it limits further tissue injury. Caution is necessary during the application of hemostatic techniques, as transmural injury from thermocoagulation and perforation during clipping have been reported among other complications [124]. Endoscopic band ligation has also been used to manage PPB in cases of pedunculated or semipedunculated polyps [202, 203].

5.2 Prevention of perforation

RECOMMENDATION

ESGE recommends careful inspection of the post-resection mucosal defect to identify features of or risk factors for impending perforation. Where these risk factors are identified, clip closure should be performed. (Moderate quality evidence; strong recommendation.)

Careful analysis of the post-resection mucosal defect is a critical part of polypectomy, particularly in wide-field EMR. Injury to the muscularis propria layer should be identified before it becomes a frank perforation where surgical treatment is mandatory. Full-thickness perforation needs immediate closure endoscopically or surgically [204]. Thorough inspection of the post-EMR specimen and resection defect may reveal the “target sign,” a marker of either partial- or full-thickness muscularis propria resection and imminent perforation. In these cases, immediate endoscopic clipping is indicated [5, 205]. Incorporation of a blue chromic dye into the submucosal injectate facilitates inspection of the submucosal defect which should appear as a relatively homogeneous blue mat of intersecting obliquely oriented submucosal fibres. Topical submucosal chromoendoscopy is a simple and effective technique that rapidly confirms the level of resection and may improve detection of intraprocedural perforation [157]. Endoscopic signs such as exposure of the muscularis propria layer, submucosal fibrosis, or submucosal fat should be noted and further evaluated by topical submucosal chromoendoscopy. Areas that stain poorly because of submucosal fibrosis should be treated by clip closure, since they do not allow endoscopic exclusion of muscularis propria injury and carry a risk of delayed perforation [82, 206].

Risk factors for deep mural injury include attempted en bloc snare excision for lesions ≥ 25 mm, high grade dysplasia/early cancer, and transverse colon location.

5.3 Audit of adverse events

RECOMMENDATION

ESGE recommends audit of adverse events. (Moderate quality evidence; strong recommendation.)

Methods of collecting data on adverse events following endoscopic procedures, including colorectal polypectomy, are not uniform and vary from nonsystematic self-reporting to complete registry reporting including linkage to databases other than endoscopic ones. One study revealed that the different methods of collecting data may result in up to 3.1-fold differences in reported frequency of adverse events [206]. A uniform methodology for auditing immediate and delayed (up to 30 days) adverse events is required and studies on completeness of data are needed. One such methodology of auditing polypectomy complications was described in a study from Munich

[128]. Other proposals include the creation of obligatory national databases of adverse events, as proposed in the Netherlands, together with systematic quality assurance programs. Additionally, ESGE guidelines concerning definitions and reporting of adverse events should be followed and usage should be audited [205].

However, currently no systematic audits concerning polypectomy complications are functioning outside of research studies. Optimally an audit should contain: (a) immediate self-reporting by the endoscopic service; (b) 30-day structured telephone interview or patient questionnaire followed by telephone contact, in the case of no face-to-face contact; and (c) linkage to a national hospitalizations database.

6. How is the histology specimen best managed and reported upon? Processing, analysis, and reporting (minimum reporting standards)

RECOMMENDATION

ESGE recommends that polypectomy specimens be placed in separate containers, one for each lesion. Local factors may play a role in whether this is feasible. Fixation should be by buffered 10% formalin. The pathologist should measure the size of each specimen in millimeters. (Moderate quality evidence; strong recommendation.)

RECOMMENDATION

ESGE suggests that large (≥ 20 mm) sessile lesions removed en bloc, or lesions suspicious for submucosal invasion removed piecemeal, should be pinned to cork to optimize histological assessment. (Low quality evidence; weak recommendation.)

RECOMMENDATION

ESGE recommends that specimens be sliced and totally embedded, allowing the identification of the deep and lateral margins. (Moderate quality evidence; strong recommendation.)

The pathological work-up of the resection specimens plays a central role in the management of patients undergoing colorectal polypectomy. The quality and accuracy of the histopathological diagnosis directly affect clinical management and decision-making, ranging from surveillance to further local and/or major resection. Multidisciplinary evidence-based guidelines for quality assurance in colorectal cancer screening have recently been developed by a group of experts in a project coordinated by the International Agency for Research on Cancer (IARC) and co-funded by the Public Health Programme of the European Union [207]. The guidelines' pathology content has been published in four papers in both pathological [208, 209] and clinical [210, 211] journals. These publications define the current standard of care in the pathological work-up of polypectomy specimens, in Europe and beyond. The following subsection is a brief summary.

6.1 Technical considerations

Specimen handling is an important issue, as poor handling and dissection procedures can impair diagnostic accuracy. Specimen handling starts with the endoscopic removal and ends with the histopathological diagnosis and report [208, 210]. It is recommended that specimens be placed in separate containers, one for each lesion. This helps to avoid confusion about the exact location of the lesion(s), and also increases the accuracy of histopathological diagnosis by avoiding false-positive diagnoses of mixed lesions, e. g. sessile serrated adenomas with dysplasia. Biopsies from the same lesion can be placed in the same container. Fixation should be by buffered 10% formalin. Specimens can shrink due to formalin fixation, therefore measurements taken after fixation can differ from those prior to fixation [208, 210].

Size is an important objective measurement, best performed by the pathologist. Pathology measurements are auditable, accurate, and simple to perform [210]. Lesion size should be given in millimeters. If possible, the maximum size should be measured from the histological slide, and only measured from the formalin-fixed gross specimen if the lesion is disrupted or too large [211].

Polypoid lesions must be sliced and totally embedded. While smaller lesions may be bisected through the stalk, larger lesions should be trimmed to generate a central section containing the intact stalk for further analysis. As the pathology report should verify the complete removal of a neoplastic lesion, special attention needs to be paid to the evaluation of the resection margin, which should be identified and described (broad, stalked, etc.) and either dissected tangentially into an extra cassette or sliced in a way that allows complete assessment [208, 210].

It is recommended that the resections of sessile or flat lesions be pinned out (mucosal surface upwards), e. g. on a piece of cork or other suitable material, by inserting pins through the periphery of the specimens. Needles should not be placed directly through a lesion. After fixation, the specimens are described and sectioned transversely into 3-mm slices (submitted for histological evaluation in sequentially labelled cassettes), thereby allowing the identification of involvement of the deep and lateral margins. Particular attention should be paid to any areas of ulceration or induration for signs of invasion [208, 210].

Piecemeal resection precludes a reliable assessment of completeness of resection. Whenever possible, the entire lesion should be embedded to allow exclusion of invasive malignancy.

Inking of margins is recommended. The distance to the excisional margin should be reported in millimeters. The European guidelines recommend that clearance of 1 mm or less indicates margin involvement [208, 210]. Cases of incomplete removal should be highlighted, which is most important for advanced adenomas and early cancer. Three or more levels should be cut through each block and stained with hematoxylin and eosin [208, 210].

6.2 Adenoma grading, and reporting of cytological dysplasia

RECOMMENDATION
ESGE recommends the grading of adenomas/neoplasia as low grade or high grade according to the World Health Organization (WHO) classification. (High quality evidence; strong recommendation.)

RECOMMENDATION
ESGE recommends that sessile serrated adenomas/polyps should be reported as containing cytological dysplasia when it is present. (Moderate quality evidence; strong recommendation.)

7. Diagnosis of lesions in the adenoma–carcinoma sequence

7.1 Lesion types

Colorectal adenoma is defined as a lesion in the colon or rectum containing unequivocal (intra)epithelial neoplasia (dysplasia) [212]. Classification of adenomas should include grading of neoplasia according to the revised Vienna classification to apply a two-tiered categorization of low grade and high grade neoplasia. This system aims to minimize intraobserver and interobserver variation and to facilitate the management of endoscopically detected lesions by improving correlation between the histopathology of biopsy and resection specimens.

Most adenomas measure less than 10 mm in size and have tubular architecture. Villous architecture is defined as leaflike or fingerlike projections of epithelium overlying a small amount of lamina propria. Tubulovillous adenomas are defined by a mixture of tubular and villous structures, with arbitrary percentages in different studies, typically with between 25 % and 75 % villous component. Grading of neoplasia is performed by assessing the degree of architectural complexity, the extent of nuclear stratification, and the severity of abnormal nuclear morphology [213].

Approximately one third of colorectal cancers develop from serrated lesions, a heterogeneous group of lesions characterized morphologically by a serrated (sawtoothed or stellate) architecture of the epithelial compartment. Hyperplastic polyps, sessile serrated adenomas/polyps, and traditional serrated adenomas are the lesions included in this group [213].

Hyperplastic polyps are very common, accounting for 70 % to 95 % of all serrated lesions, or 25 % – 30 % of resected polyps [214, 215]. They occur as usually small (< 5 mm) nondysplastic polyps in the left colon, particularly the sigmoid colon and rectum, and only rarely in the right colon [213 – 215].

Sessile serrated adenomas/polyps are more likely to be located in the right colon (75 %), accounting for approximately 5 % – 25 % of all serrated lesions [213, 216]. Their size is larger than that of hyperplastic polyps: More than half of the lesions measure > 5 mm and 15 % – 20 % of the lesions > 10 mm, respectively. They may develop de novo or from pre-existing hyperplastic polyps. Upon histological examination, sessile serrated adenomas/polyps show distorted crypt architecture, with hyperserration, often at the base of the crypts, and with dilated, mucus-filled, L-shaped (“boot”) and T-shaped (“anchor”) crypts [214 – 219]. Uncomplicated sessile serrated adenomas/polyps are nondysplastic, but they may acquire overt dysplasia during tumor progression, often in conjunction with methylation of the *hMLH1* gene promoter [213 – 215, 217].

Traditional serrated adenomas are rare, accounting for only about 1 % of colorectal polyps. They prevail in the left colon. They are often polypoid or pedunculated, but sessile lesions do also occur, predominantly in the right colon [220, 221].

Early colorectal cancer is defined as invasive adenocarcinoma invading into but not beyond the submucosa [212]. The term ‘malignant polyp’ refers to an adenoma that appears benign endoscopically, but which shows invasion through the muscularis mucosa into the submucosa upon histological assessment. A malignant polyp is therefore an early carcinoma. Malignant polyps account for 0.75 % to 5.6 % of large-bowel polyps removed in general diagnostic colonoscopy practice [102].

Patient management following endoscopic removal of a malignant polyp is difficult because of the potential risk of residual cancer tissue within the bowel wall and/or metastatic cancer spread to regional lymph nodes. The depth of invasion into the submucosal layer, assessed according to the Haggitt classification [17, 102] (for pedunculated lesions), the Kikuchi classification [222] (for nonpolypoid lesions), or by direct measurement (in microns from the bottom line of the muscularis mucosae), has been associated with regional lymph node spread. Angioinvasion, in particular lymphatic invasion, poor tumor differentiation or grade, and resection margin status have been identified as additional risk factors [223, 224]. The combined assessment of these features increases the accuracy of risk prediction [102, 225, 226] and allows the stratification of patients into low risk and high risk groups [102, 227, 228].

7.2 Histological findings that require further action

RECOMMENDATION
ESGE recommends that where submucosal invasion is present, the depth of invasion should be measured and reported, in addition to other risk factors, such as poor differentiation, lymphovascular invasion and tumor budding. The distance to the deep/vertical and to the lateral/horizontal resection margin should be measured and reported. (Moderate quality evidence; strong recommendation.)

RECOMMENDATION
The opinion of a second histopathologist may be warranted when reviewing high risk features. (Low quality evidence; weak recommendation)

Endoscopic resection is an effective cure for colorectal lesions confined to the mucosa. Invasion across the muscularis mucosa into the submucosa constitutes T1 disease. Complete resection of a T1 lesion is often readily achievable; however even if completely resected, T1 tumors are associated with a risk of lymph node metastasis (LNM) which, if present, has a significant impact on survival and cure. The 5-year survival for a T1 lesion without LNM (stage 1) is >95%, whereas T1 disease with any LNM (stage III) reduces overall 5 year survival to 68.4%–87.6% [229]. Surgery and lymph node dissection is essential in those with suspected LNM to completely stage the disease and improve outcomes.

LNM is present with a minority of T1 cancers (6.3%–17.6%) (see Table 14, **Appendix 2**; available online in Supplementary material); thus the majority of patients may be cured by endoscopic resection alone. Although definitive, surgery for colorectal cancer is costly, invasive, and can be associated with significant morbidity and mortality [66, 230]. Risk stratification of T1 lesions is therefore important to identify patients at low risk of LNM who may safely avoid surgery.

There are a large number of studies that aim to address risk factors for LNM; however the majority are small and retrospective. Many studies are restricted to surgically resected tumors, potentially producing a bias towards larger and higher grade lesions. The most commonly identified risk factors for LNM are deep vertical penetration (submucosal invasion >1000 µm for flat or sessile lesions and Haggitt level 4 for pedunculated lesions), lymphovascular invasion, poor tumor differentiation, tumor budding, and a positive resection margin. There are no identified clinical or patient features which are reliably associated with LNM, aside from rectal location [224].

7.3 Submucosal invasion depth

Methods for classifying the extent of submucosal invasion vary depending on the morphology of the polyp, and are prone to interobserver variation. The most established classification methods are Haggitt levels [102] for pedunculated lesions and Kikuchi levels [222] for flat or sessile lesions.

The Haggitt classification divides the polyp into five zones. Level 0 is noninvasive disease which does not cross the muscularis mucosa. Levels 1–4 describe progressive involvement of head, stalk, and submucosa below the stalk. In a small series (n=129), Haggitt et al. showed that the deepest level of invasion (level 4) was associated with LNM or death from colorectal cancer [102]. The system is widely adopted, and endoscopically resected level 1–3 disease has been shown to be associated with a low risk of LNM [103, 231]. Despite this, studies have described LNM with 6.2%–8.0% of polyps with level 3 invasion [232]. Pathological assessment of Haggitt levels may be hampered by endoscopic trauma and cautery artefact during removal, by shrinkage after fixation, and by suboptimal tissue orientation due to the plane of sectioning.

For nonpolypoid lesions, depth of submucosal invasion can be classified using the Kikuchi level system. Kikuchi et al. adapted an existing schema whereby sm1, sm2, and sm3 denote the upper, middle, and lower thirds of the submucosa respectively [14]. Reported risks of LNM are 0–3% for sm1 invasion, 8%–10% for sm2, and 23%–25% for sm3 [222, 233]. The classification cannot be applied when lesions have been resected endoscopically, as the muscularis propria is not included. As a result, some authors have proposed using a measurement of the distance of invasion from the muscularis mucosa. Ueno et al. described an elevated risk of LNM when invasion extends deeper than 2000 µm beyond the muscularis mucosa (2.5% vs. 18.2%) or when the invasion width is >4000 µm (3.9% vs. 17.1%) [225]. In a retrospective UK study, invasion width (>11.5 mm) and area were also found to be risk factors for LNM after multivariable adjustment for other significant risk factors (grade of differentiation, lymphatic and vascular invasion) [234]. Four meta-analyses have shown that invasion >1000 µm is a risk factor for LNM, although all four studies comment on the small sizes, heterogeneity, and retrospective nature of the included papers [104, 224, 235, 236].

7.4 Lymphovascular invasion

The majority of studies examining histological risk factors for LNM report on lymphatic or vascular invasion. Five meta-analyses have all demonstrated that lymphatic or lymphovascular invasion is one of the stronger risks for LNM [104, 224, 235–237]. In patients undergoing surgery for T1 lesions, lymphatic invasion is reported in 27%–31% and approximately 27% of these patients have LNM. Vascular invasion, when separately reported, is seen in 19% with LNM in 21%–24% [224, 235].

It may be difficult to detect lymphatic invasion by standard light microscopy because of retraction artifact, which can result in an artificial space surrounding tumor nests that mimics a lymphatic channel. The use of immunohistochemistry with an antihuman podoplanin antibody such as D2–40 may improve the ability to detect and characterize lymphoid invasion [238]. A meta-analysis of histopathological predictive factors showed that the strongest predictive factors for LNM were lymphatic vessel invasion identified by an antihuman podoplanin antibody (OR 5.19, 95%CI 3.31–8.15; $P=0.01$) or tumor budding (OR 7.45, 95%CI 4.27–13.02; $P=0.0077$) [237]. Immunohistochemical markers such as D2–40 are not in widespread use.

7.5 Tumor differentiation

Grading of colorectal carcinomas should be performed according to the WHO classification, and tumors are graded as well-differentiated (>95% gland formation), moderately differentiated (50%–95% gland formation), or poorly differentiated (<50% gland formation). Carcinomas may be heterogeneous, so the tumor should be graded according to the least differentiated component. The interobserver agreement between pathologists when grading colorectal adenocarcinoma specimen is fair at best, and it has been suggested that use of the high grade and low grade categories should be standardized [239].

High grade, or poorly differentiated tumors are associated with LNM and residual disease following endoscopic resection. In a pooled analysis of retrospective studies, Hassan et al. reported poor differentiation in 116/1612 polyps (7.2%) [227]. In patients with poor differentiation LNM was apparent in 23%

compared to 7 % with low grade changes. Poor differentiation was also associated with hematogenous metastases and mortality. A meta-analysis of sessile early colorectal cancer showed an RR of 8.19 (95 % CI 4.65 – 14.43) for LNM in poorly compared to well-differentiated tumors and of 3.48 (95 %CI 2.08 – 5.81) for poor compared to moderate differentiation [236]. Two other meta-analyses of more heterogeneous studies also confirmed this association of LNM with poor differentiation with RRs of 5.60 (95 %CI 2.90 – 10.82; $P < 0.001$) [104] and 4.8 (95 % CI 3.3 – 6.9; $P < 0.001$) [224].

7.6 Tumor budding

Budding refers to the presence of single cells or small groups of tumor cells scattered within the stroma at the leading edge of invasion. Several studies have identified this feature as a risk factor for LNM [240, 241], and it is associated with venous and lymphatic invasion [242] as well as with poorer outcome in colorectal cancer [243]. In early colorectal cancer, tumor budding has been reported primarily in Japanese studies. Its assessment suffers from a lack of standardized international criteria. Usually, budding is either described as present or absent, or it is graded. Despite this lack of conformity (high grade) budding has been associated reliably with LNM and has hence been identified as a strong and independent predictor of LNM in five meta-analyses [104, 224, 235 – 237]. Prospective studies, and a consensus definition for the reporting of tumor budding are required for the inclusion of this characteristic in standard histopathological reporting of T1 cancer.

7.7 Resection margin

Involvement of the deep resection margin is associated with residual tumor, hematogenous metastasis, and mortality [225, 227, 244]. Margin involvement should be reported routinely by the pathologist and clearance from the resection margin should be described and measured in millimeters.

There is no generally accepted consensus definition, and a positive margin has been defined variably as cancer within the diathermy margin, within one high power field of the margin [225, 245, 246], 0.1 mm or less from the margin [247], 1 mm or less from the margin [248, 249], or 2 mm or less from the margin [250, 251]. Residual tumor or recurrence is < 2 % where the margin of resection is > 1 mm and in the absence of other unfavorable histological features [223, 247, 252, 253]. Cunningham et al. reported that in the absence of unfavorable factors, 16.6 % of polyps with a margin clearance ≤ 1 mm had residual disease at surgery [254]. Cooper et al. showed in a retrospective single-center study that in patients without risk factors but where margin clearance was ≤ 1 mm, an adverse outcome (endoscopic recurrence, tumor in the surgical specimen, or LNM) was present in 19.4 %. By contrast, there were no adverse outcomes in low risk patients with margins > 1 mm [249]. Resection margins of > 2 mm are associated with very low rates of recurrence [251]. However the inclusion of a < 2 mm margin as an unfavorable risk factor may result in overtreatment of lesions without other risk factors [255]. Unequivocal deep margin involvement is certainly an unfavorable risk factor and further resection is required, with the modality (surgical resection or transanal endoscopic microsurgery [TEMS]) based on tumor location and patient co-morbidities. Clearance of ≤ 1 mm is associated with similar outcomes to definite margin involvement, and clearance > 1 mm appears to be helpful in defining low risk patients. Other European guidelines currently recommend a level of ≤ 1 mm as equivalent to margin involvement [256, 257].

7.8 Combined risk assessment

Several risk factors have been established as high risk features for the prediction of LNM or residual disease in endoscopically resected lesions containing a malignant focus. These factors include deep submucosal invasion (> 1000 µm for flat or sessile lesions and Haggitt level 4 for pedunculated lesions), lymphovascular invasion, poor tumor differentiation, tumor budding, and a positive resection margin. Consequently, all these factors should be addressed in the pathology report in order to provide clinicians with a risk estimate for discussing further management in a multidisciplinary setting and with the patient [256]. The combination of risk factors is important, as an absence of defined high risk features has been shown to identify a "low risk group" of patients. Patients in this low risk group may still have a small risk of LNM and they should be followed as such.

8. Conclusion

This ESGE Guideline comprehensively addresses critical areas in the assessment and management of colorectal polyps. Polypectomy is among the most important colonoscopy skills. The ability to perform complete and safe polypectomy enables us to significantly benefit our patients. Mastery of basic polypectomy, and an understanding of the issues involved in advanced polypectomy, should be goals of all colonoscopists.

The diverse topics covered in this polypectomy and EMR Guideline include the classification of colorectal polyps, the optimal evidence-based approaches to polypectomy for polyps of all sizes and morphologies, colonic tattooing, a guide to effective and safe EMR for large sessile polyps, the role of advanced imaging in polypectomy, and which lesions require the involvement of expert centers or more complex interventions such as ESD or surgery. Technical aspects such as equipment and auxiliary devices to optimize polypectomy are also discussed. The Guideline defines the key adverse events during and following polypectomy, the recommended management of adverse events, and the need for audit of outcomes to monitor quality and safety of polypectomy and EMR. Finally, guidelines for the histological evaluation of resected polypectomy specimens and practice recommendations for high risk histological features are discussed. Throughout this Guideline, areas where further research is required to answer critical questions are highlighted, providing direction for researchers to design further studies. We look forward to the opportunity to incorporate the results of such studies into updates of this Guideline in the years to come.

ESGE guidelines represent a consensus of best practice based on the available evidence at the time of preparation. They may not apply in all situations and should be interpreted in the light of specific clinical situations and resource availability. Further controlled clinical studies may be needed to clarify aspects of the statements, and revision may be necessary as new data appear. Clinical consideration may justify a course of action at variance to these recommendations. ESGE guidelines are intended to be an educational device to provide information that may assist endoscopists in providing care to patients. They are not a set of rules and should not be construed as establishing a legal standard of care or as encouraging, advocating, requiring, or discouraging any particular treatment.

Competing interests

P. Bhandari has served on Advisory Boards for Fujifilm, Pentax, and Boston Scientific (1 Nov 2015 – 31 Dec 2016, for all); he has participated in preparation of similar guidelines for the British Society of Gastroenterology (BSG). P. Fockens provides ongoing consultancy to Cook, Olympus, Medtronic, and Fujifilm. L. Moons' department has received a grant from Boston Scientific (1 Jan 2016 – 1 January 2017. J. Pohl provides consultancy to Karl Storz (Jan 2016 –). T. Ponchon has provided consultancy to Olympus, Boston Scientific, and Cook Medical (2007 – 2016, for all); his department has received financial support for clinical research from Boston Scientific. M. Rutter's department received an unrestricted grant for a trial (non-polypectomy) from Olympus (2013 – 2016); he is a member of the BSG (2000 –). The following authors have no competing interests: M. Bronzwaer, M. Bourke, N. Burgess, J.-M. Dumonceau, M. Ferlitsch, I. Gralnek, M. Gschwantler, C. Hassan, R. Hazzan, D. Heresbach, P. Jeschek, R. Jover, C. Langner, A. Lemmers, A. Moss, K. Nalankilli, K. Paraskeva, G. Paspatis, D. Penz, J. Regula, A. Repici, E. Waldmann.

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