

# Does polyp size matter?



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submitted 24.5.2017

accepted 31.5.2017

## Bibliography

DOI <https://doi.org/10.1055/s-0043-112853> |

Endoscopy International Open 2017; 05: E746–E748

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ISSN 2364-3722

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In recent years, considerable effort has been made to reduce morbidity and mortality of colorectal cancer (CRC) by implementing screening programs [1, 2]. Besides early detection, colonoscopy could also reduce the incidence and long-term mortality of CRC because of removal precancerous polyps during the procedure [3]. Furthermore, previous research has shown that individuals who undergo adenoma-removal are at increased risk of developing future CRC [4, 5].

In CRC prevention, size matters because polyp characteristics that contribute to estimated risk of future CRC relate to histology, multiplicity and also size of polyps at index colonoscopy [6]. For example, most current international guidelines advise a 3-year surveillance interval for individuals diagnosed with adenomatous and serrated polyps  $\geq 10$  mm and 5-year intervals for smaller polyps [7, 8]. Thus, endoscopic polyp size measurement contributes importantly to the assigned surveillance interval. Besides this important 10-mm cut-off, polyp size is also correlated with the chance that a lesion harbors invasive growth [9], and therefore is important in decision-making on treatment options. Last but not least, polyp size is also crucial for safe implementation of an optical diagnosis strategy, in which 1- to 5-mm polyps are characterized during endoscopy and resected and discarded without histopathological analysis [10].

Although polyp size measurement is crucial for clinical decision-making, no reference standard is available. In current clinical practice, both endoscopists and pathologists estimate polyp size and their measurements are subject to variability. Endoscopists rely on their “carpenters’ eye” for estimating polyp size prior to endoscopic treatment. In a retrospective analysis of endoscopic size measurements of more than 90,000 polyps, endoscopists performing colonoscopies in the UK bowel cancer screening program clustered their measurements of

polyps at 5 mm, 10 mm and 15 mm endings, thereby having a preference for “pleasing” numbers [11]. Furthermore, the fish eye lenses of colonoscopes distort the displayed polyp images. Objects located at the center of the displayed view appear magnified compared to objects located at the periphery, leading to overestimation and underestimation of polyp size. Previous studies using artificial colon models with polyps have reported rates accuracy for endoscopic polyp size measurements ranging between 25% and 60% [12, 13]. In studies of real-time endoscopy, polyp size measurement has a great interobserver variability, which was not reduced by placing a ruler or biopsy forceps adjacent to the polyp [14, 15].

Pathologists measure polyp size after resection and use a ruler. Because this measurement is not influenced by image distortion or endoscopist preferences, this method may seem more reproducible and objective. However, there are also several reasons for inaccuracy of pathologists’ size measurements. Coagulation during polypectomy may lead to specimen shrinkage, as may the fixing method in formalin. Besides, suctioning a polyp through the working channel of the endoscope might distort and disintegrate it. Also, a polyp may have been lifted with submucosal fluid before resection or resected including a rim of normal tissue, both of which could potentially lead to overestimation of its original size. Lastly, resection may have been incomplete or performed in a piecemeal fashion, making size measurement by the pathologist clearly impossible.

In this issue of *Endoscopy International Open*, Elwir and colleagues aimed to identify patient- and physician-related factors associated with endoscopic size measurement in a large community-based endoscopy practice [16]. In more than 16,000 colonoscopies performed between January 2013 and December 2013, the endoscopic size was recorded for 1 or more

polyps. These polyp size measurements were subsequently categorized into 2 groups: 1- to 4-mm polyps and those >5 mm. After applying a sophisticated logistic regression model to the data, some interesting results were seen. Both male gender of the endoscopist (OR 1.92, 95% confidence interval (CI) 1.26–2.94) and older patient age (OR 1.08, 95% CI 1.06–1.11) were associated with increased odds of an endoscopist estimating larger size of polyps. In addition, surveillance as the indication for colonoscopy was also associated with increased odds compared to screening and diagnostic colonoscopy. Unfortunately, the proportion of polyps  $\geq 10$  mm was too small to allow analyses of predictive factors influencing this important cut-off.

One of the interesting findings in the study by Elwir et al. is that male gender of the endoscopist is associated with larger endoscopic size measurements. Because this gender difference was not further explored in this study, the reasons for the finding remain speculative. Interestingly, in an image-based size estimation study of traumatic wounds, male doctors across several specialties also were more likely to overestimate the size of wounds compared to their female colleagues [17]. Thus, there might be a gender-related tendency to consistently overestimate size in medicine.

In the study by Elwir et al., another reason for increased likelihood of larger sizing of polyps on endoscopy was older patient age. This seems to be explained by the gradual progression of polyps over time, and thus by increasing age. However, to closely evaluate that, it would be necessary to know whether the patients previously had undergone colonoscopies. Remarkably, surveillance as an indication for colonoscopy also was related to larger polyp size. Although the authors suggest that this indication itself is the reason for more large adenomas in this patient group, another potential explanation may be a financial incentive. In endoscopy practices in which doctors receive a fee-for-service payment, doctors may be more inclined to classify smaller polyps as large so that patients will come back for more frequent surveillance colonoscopies based on surveillance guidelines.

Considering the important clinical consequences of endoscopic size measurement, studies evaluating endoscopic tools that may lead to a reduction in interobserver variability in endoscopic sizing are welcome. With this objective in mind, a recent proof-of-concept simulation study using a visual grid cue during endoscopy showed promising results [15]. The technique involves a  $1 \times 1$ -mm measurement grid that is implemented in the endoscopic view. In an ex vivo study with 50 expert endoscopists, 40 simulated lesions from 1 mm to 10 mm were evaluated against this visual grid cue and endoscopic sizing was accurate in 90% of cases. For clinically relevant size categories (including the 10-mm cutoff) and high-confidence predictions, endoscopists were accurate in 99.8% of cases. This technique deserves further clinical evaluation in real-time endoscopy and might be suitable for implementation in new endoscopy software.

In current daily practice however, real-time endoscopic polyp size measurement is still done by the endoscopist and we suggest the following structured approach. First, endoscopists should be aware of their preference of sizing polyps at

a 5-mm or 10-mm digit and we suggest sizing polyps up to 15 mm by the exact millimeter. We also recommend placing the tool by which the polyp is to be resected adjacent to the polyp. An open snare of a known diameter or a biopsy forceps should have a known size, therefore showing a relationship to polyp size. Estimating the size structurally in this way and saving and storing the endoscopic images of a lesion with the snare or biopsy forceps adjacent to it may further improve accuracy. Photographing a lesion enables the endoscopist to compare the endoscopic size with the size described by the pathologist and critically evaluate his or her own measurement.

For decision-making during and after endoscopy, reliable methods of endoscopic size measurement are eagerly awaited. Because size matters, we hope that automated software incorporated in endoscopic equipment will lead to more accurate endoscopic sizing in daily practice.

## Competing interests

ED received a consultant fee from Tillots and unrestricted research grants and equipment on loan from FujiFilm Europe and Olympus.

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