Digestive and Liver Disease 43 (2011) 391–394

Contents lists available at ScienceDirect

Digestive and Liver Disease

journal homepage: www.elsevier.com/locate/dld

Digestive Endoscopy

# Graduated injection needles and snares for polypectomy are useful for measuring colorectal polyp size

Yil Sik Hyun, Dong Soo Han*, Joong Ho Bae, Hye Sun Park, Chang Soo Eun

*Department of Gastroenterology, Hanyang University College of Medicine, Republic of Korea*

ARTICLE INFO

*Article history:*
Received 29 September 2010
Accepted 27 December 2010
Available online 21 February 2011

*Keywords:*
Colon
Colonic polyps
Colonoscopes
Observer variation

ABSTRACT

*Background:* Accurate measurement of polyp size during colonoscopy is important; however, visual estimation of polyp size is inaccurate, and it is cumbersome to use additional accessories to measure polyp size whenever polyps are detected.
*Aims:* To evaluate the accuracy and usefulness of graduated devices that can also be used for polypectomy.
*Methods:* The ends of the outer sheath of the injection needles and snares were marked at intervals of 5 mm (total 30 mm). Four endoscopists measured 53 polyps of 36 patients in the following manner: visual estimation, estimation with biopsy forceps, and measurement with graduated devices. Actual size of all polyps measured through a calliper was used as reference standard.
*Results:* The difference between actual size and size measured by visual estimation was statistically significant (1.27 mm, $P<0.001$), whilst the differences between actual size and size measured by biopsy forceps (0.06 mm, $P=1.00$) or graduated devices (0.15 mm, $P=0.620$) were not. The linear correlation between the estimates and the actual sizes showed that the graduated device gave the largest positive linear correlation (0.986, $P<0.001$) of the three measurement methods tested.
*Conclusions:* The graduated devices are efficient methods when measuring polyp size and performing polypectomy in a single step.


## 1. Introduction

Colorectal cancer is one of the most common cancers in Western countries and highly common cause of cancer related deaths [1,2]. The carcinogenesis of colon and rectum is generally considered as a process from benign adenoma to carcinoma, thus the most effective prevention of colorectal cancer is shown to be removal of adenomatous polyps [3,4]. Patients with adenomas, after polypectomy, are placed into a colonoscopic surveillance to reduce the risk for colorectal cancer, and a 3-year interval for the high-risk group and a 5-year interval for the low-risk group are recommended [5,6].

There is a major trend for increased risk of colorectal cancer and advanced adenomas with increasing size of adenoma [7–9]. Furthermore, advanced adenomas, i.e. those >1 cm in diameter, with high-grade dysplasia, with >25% villous histology, or with invasive cancer, have the highest malignant potential [5]. Therefore, the value of measuring polyp size during colonoscopy cannot be underestimated.

It is well documented that visual estimation of polyp size is inaccurate [10,11]. In addition, using an endoscopic ruler or a biopsy forceps to measure polyp size during colorectal polypectomy is inconvenient and time-consuming when considering the application of another device in addition to polypectomy and therefore difficult for the endoscopists. The aim of this study was to evaluate the accuracy and usefulness of employing an injection needle and a snare marked with graduations that can also be used for polypectomy, to measure polyp size.

## 2. Materials and methods

### 2.1. Patients

From February 2010 to March 2010, patients at Hanyang University Guri Hospital were examined by screening colonoscopy. Patients with previously diagnosed inflammatory bowel disease or adenomatous polyposis syndrome, and those with contraindications for colonoscopy or polypectomy were excluded. A total of 234 patients were enrolled after receiving written informed consent, 36 of whom (9 women; mean age 59.8 ± 11.57) had colorectal polyps. The study was approved by the Ethics Committee of Hanyang University Guri Hospital and by the local Institutional Review Boards.

* Corresponding author at: Department of Internal Medicine, Hanyang University Guri Hospital, 249-1 Gyomun-Dong, Guri city, Gyunggi-Do 471-710, Republic of Korea. Tel.: +82 31 560 2226; fax: +82 31 555 2998.
*E-mail address:* hands@hanyang.ac.kr (D.S. Han).

1590-8658/$36.00 
doi:10.1016/j.dld.2010.12.015

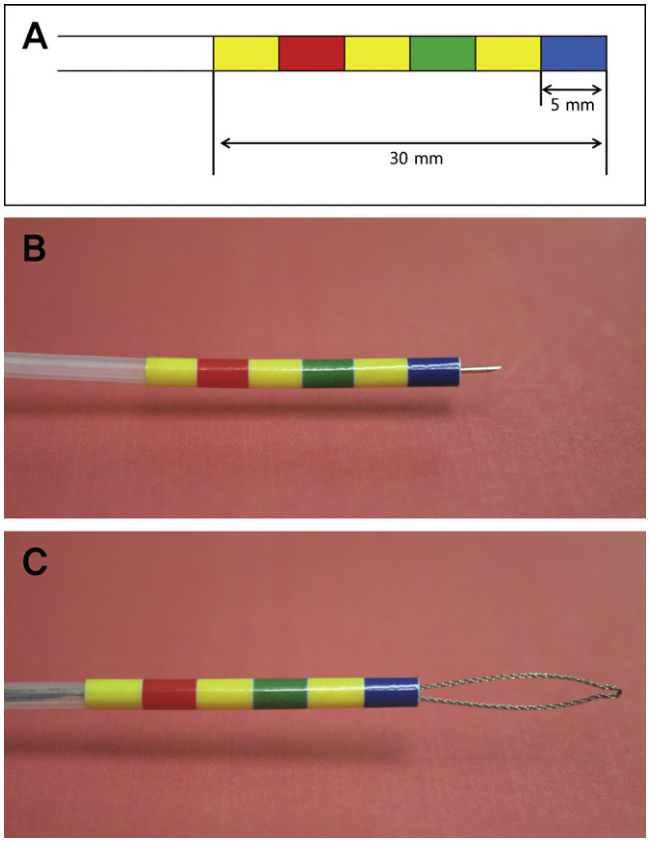


**Fig. 1.** Graduated devices for polypectomy. (A) Schematic diagram of the graduated device for polypectomy. (B) Graduated injection needle. (C) Graduated electrocautery snare.

### 2.2. Graduated devices for polypectomy

The graduated injection needles and snares were made by study investigators before the start of the study; the ends of the outer sheath of the injection needles (CI-U2304-23; Taewoong Medical Co., Ltd, Gimpo, Korea) and snares (00711120; US Endoscopy, Mentor, USA) were marked with various colours at intervals of 5 mm (total 30 mm) using a sticky tape printed by a laser printer (Fig. 1A–C).

### 2.3. Measurements of polyp size

Two experienced (D.S. Han, C.S Eun) and two inexperienced (J.H. Bae, H.S. Park) endoscopists measured polyps in the following stepwise randomized manner; visual estimation, estimation with biopsy forceps, and measurement with graduated devices. The size of a polyp was simply defined as its largest diameter. When making visual estimations, the polyp was measured carefully first from close-up, and then from a greater distance, making sure to take enough time to estimate the size of the polyp (Fig. 2A). For estimations using biopsy forceps, a forceps with a maximum length of 7 mm when fully opened (061512104; MTW Endoskopie Co., Ltd, Wesel, Germany) was placed right next to the polyp (Fig. 2B). For measurements using a graduated device, the end of the device was placed at the end of the major axis of the polyp, whilst making sure the needle or snare was retained inside its sheath (Fig. 2C). The order of measurement by each method was randomized according to the sequence of patient enrollment using the randomization generator at http://www.randomization.com. After the polyps had been retrieved with a net retrieval device, a vernier calliper (160-133; Mitutoyo Co., Ltd, Kawasaki, Japan), reading to 0.05 mm, was used to measure their actual size. However, given the fact that retraction on the surface of resected polyp may affect the actual size of the polyp, polyp size measured with a calliper may have a limitation not to reflect a real polyp size in vivo. The latter measurements were carried out by a single individual (Y.S. Hyun), and the results were not known to the endoscopists until the end of the study.

### 2.4. Statistics

Various methods of measuring polyp size were compared using Repeated measures ANOVA (Friedman's nonparametric test) and Pearson's correlation analysis (Spearman's nonparametric correlation test) using SPSS for Windows. The optimal sample size for analyzing the accuracy amongst four methods of measurement was calculated with ANOVA model. The study group should comprise at least 20 polyps, with a 0.85 inter-rater reliability, a 5% $\alpha$ value, and statistical power of 80% [12]. If the visual size estimation of the polyp was greater than 10 mm, Kolmogorov–Smirnov test was utilized to confirm the presence of normal distribution [13]. In addition, *Z*-test was used to compare correlation coefficients [14]. For all tests, *P* values of <0.05 were considered statistically significant.

## 3. Results

A total of 53 polyps were found in 36 patients (Table 1). The average size of all polyps was 8.26 mm by visual estimation, 7.05 mm using biopsy forceps, 7.14 mm using the graduated device, and 6.99 mm by actual measurement with vernier callipers. The difference between actual size and visually estimated size was 1.27 mm ($P < 0.001$); it was 0.06 mm by comparison with biopsy forceps ($P = 1.00$), and 0.15 mm using the graduated device ($P = 0.620$). There was a statistically significant difference between the actual size and the size measured by visual estimation, but not between actual size and size measured by the other two procedures. A similar trend was observed when the measurements were compared after classifying the polyps into those larger than 10 mm and a 5–10 mm group by visual estimation. In the over 10 mm group and the 5–10 mm group, the differences between actual sizes and visually estimated sizes were 2.82 mm ($P < 0.001$) and 0.96 mm

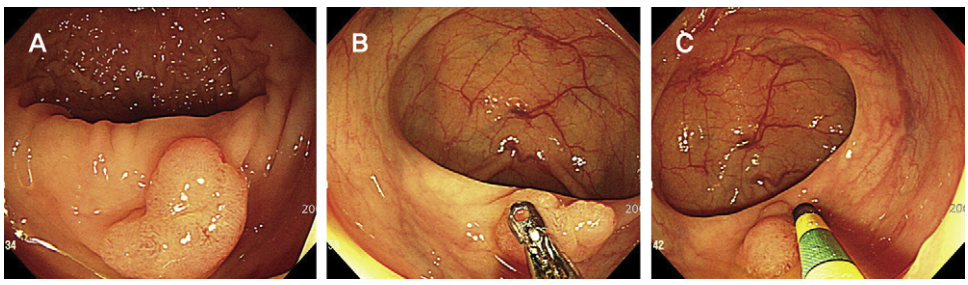


**Fig. 2.** Endoscopic view of polyp size measurement by various methods. (A) Visual estimation. (B) An open biopsy forceps. (C) The graduated device.