Clip artifact after closure of large colorectal EMR sites: incidence and recognition

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Background: Clip closure of large colorectal EMR defects sometimes results in bumpy scars that are normal on biopsy. We refer to these as "clip artifact." If unrecognized, clip artifact can be mistaken for residual polyp, leading to thermal treatment and potential adverse events.

Objective: To describe the incidence of and define predictors of clip artifact.

Design: Review of photographs of scars from consecutive clipped EMR defects.

Setting: University outpatient endoscopy center.

Patients: A total of 284 consecutive patients with clip closure of defects after EMR of lesions 20 mm or larger and follow-up colonoscopy.

Interventions: EMR, clip closure.

Main Outcome Measurements: Incidence of clip artifact.

Results: A total of 303 large polyps met the inclusion criteria. On review of photographs, 96 scars (31.7%) had clip artifact. Clip artifact was associated with increased numbers of clips placed (odds ratio for each additional clip, 1.2; 95% confidence interval, 1.02-1.38) but not polyp histology, size, or location. The rate of residual polyp by histology was 8.9% (27/303), with 21 of 27 scars with residual polyp evident endoscopically. The rate of residual polyp evident only by histology in scars with clip artifact (3/93; 3.2%) was not different from the rate in scars without clip artifact (3/189; 1.6%).

Limitations: Retrospective design. Sites closed primarily with 1 type of clip. Single-operator assessment of endoscopic photographs.

Conclusion: Clip artifact occurred in the scars of approximately one-third of large clipped EMR sites and increased with number of clips placed. Clip artifact could be consistently distinguished from residual polyp by its endoscopic appearance. (Gastrointest Endosc 2015;82:344-9.)

In 2006, we began to systematically close large EMR defects in the colorectum with hemostatic clips.[1] We previously reported that clipping substantially reduced the incidence of delayed hemorrhage relative to historical controls.[1]

At follow-up colonoscopy to inspect colorectal EMR scars, the scars are typically flat and smooth in the absence of residual polyp and when no clips were placed to close the EMR defect. At follow-up colonoscopy to inspect the EMR scar for residual polyp, we observed that after clipping, some scars had bumps of tissue on or adjacent to the scar. These bumps or distortions of the scars had normal pit patterns and on biopsy demonstrated normal tissue. We refer to these distortions in the scar as "clip

Abbreviations: CI, confidence interval; OR, odds ratio.

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artifact." If not recognized as normal tissue, clip artifact can be mistaken for residual polyp, which could lead to the unnecessary application of thermal injury by using snare polypectomy or ablative therapy. In this report, we describe the incidence of clip artifact and the successful differentiation of clip artifact from residual polyp.

METHODS

We performed a retrospective assessment of the appearance of clip artifact in a database of large colorectal lesions maintained for quality-control purposes. The database contains relevant information on all large ($\geq$20 mm) nonpedunculated lesions resected by D.K.R. since January 2000. This information is prospectively and periodically updated.[1] Permission to review the deidentified database was obtained from the Institutional Review Board at Indiana University Health with exempt status. To be included in the current study, the EMR defect had to be clipped, the first follow-up colonoscopy had to be performed in one of our endoscopy units, and high-quality photographs of the site at first follow-up had to be available for review.

The original EMR and the follow-up colonoscopies were performed by a single endoscopist (D.K.R.) or by a gastroenterology fellow under his direct supervision. All procedures involving clipping and the follow-up examinations were performed by using Olympus (Olympus America Corp, Center Valley, Pa) colonoscopes of the 180 or 190 series. The clips placed were largely Resolution (Boston Scientific Corp, Natick, Mass), but for some recent cases, the Instinct (Cook Medical, Inc, Bloomington, Ind) or a combination of clips was used. The first follow-up procedure was performed 4 to 6 months after the original EMR in almost all cases. At the follow-up procedure, the site was inspected on white-light and narrow-band imaging. Clean scars and clip artifact were differentiated from residual polyp by their normal pit patterns. If the scar showed either no clip artifact and no residual polyp or some area of clip artifact and no residual polyp, then cold biopsy forceps were used to take biopsy samples of the site. Samples were taken in all cases from both the clip artifact and the flat scar and placed in the same bottle for histologic analysis. The approach to biopsies of the scar was to take cold samples at closely spaced intervals from the full length of the scar. Most samples were from the scar and not from normal-appearing mucosa adjacent to the scar. If residual polyp was evident, it was resected by using snare polypectomy with electrocautery, and the tissue specimen was placed in a separate bottle from the cold biopsy specimens of the remaining flat scar and any clip artifact that was also present. The rim of the thermal injury from snaring was then treated with argon plasma coagulation in an effort to reduce the chance of residual polyp at subsequent follow-up.

The database includes information on polyp size, location, number of clips placed after the EMR, and the results of histology from the original EMR and all tissue collected at follow-up procedures. Included polyps were divided into right side of the colon (cecum, ileocecal valve, ascending), transverse colon (hepatic flexure, transverse colon, and splenic flexure), and left side of the colon (descending, sigmoid, and rectum). In this report, the histologies are referred to as conventional adenomas or serrated lesions (sessile serrated polyps and hyperplastic polyps). Photographs of the scars at follow-up were reviewed by D.K.R. to determine the presence of clip artifact or residual polyp based on the appearance of the scar. During the photographic review, D.K.R. was blinded to the procedure report of the colonoscopy performed to inspect the EMR site. Clip artifact when present was classified grade I, II, III, or IV based on the presence of a number of discrete bumps, 1, 2, 3, and 4 or more bumps, respectively. As a check on the accuracy of the photographic review, we also reviewed all procedure reports to make certain that the actions taken by D.K.R. at the follow-up procedure were consistent with the photographic review, ie, sites interpreted as residual polyp had been treated at follow-up by using snare polypectomy and argon plasma coagulation and sites interpreted as clip artifact were subjected to cold biopsy only. In all cases, the photographic interpretation and the actions at the follow-up procedure were consistent.

Statistical analysis

We report descriptive characteristics of polyps originally resected along with the number of clips used to close the EMR sites. The Fisher exact test was used to determine the difference in the occurrence of recurrent polyp tissue among clip artifact and non–clip artifact groups. The Fisher exact test and analysis of variance were used to determine the association of polyp size, location, pathology, and number of clips with the grade of clip artifact observed. By using a binary logistic regression analysis, we examined whether any of these factors predicted the occurrence of clip artifact at follow-up. We used the Hosmer-Lemeshow goodness-of-fit test to assess the model. We report odds ratios (ORs) with 95% confidence intervals (CIs). The statistical significance was set at .05. All analyses were performed by using SAS (version 9.4, SAS Institute Inc, Cary, NC).

RESULTS

There were 322 EMR sites in 284 patients that were clipped, and had the first follow-up colonoscopy at our site, of which 19 had no or inadequate photographs of the EMR scar at follow-up. These 19 were excluded from further analysis. Of the 19 excluded polyps, none were treated with thermal therapy at follow-up of the site, all had biopsy specimens taken of the scar, none had histologic evidence