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Cap-assisted endoscopy: Do we have enough evidence?

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ABSTRACT

So, is there enough evidence to incorporate CC in clinical practice? If we interpret the literature and the meta-analysis by Nutalapati et al., the answer for the clinically-focused endoscopist, with regard to adenoma detection rate (ADR), at present, may be "no". Significant differences do not necessarily imply clinical benefits and translation into clinical practice. The answer for the improvement of cecal intubation frequency and intubation time by the cap depends on the focus of training commitment, because these effects of the cap may be beneficial, especially for unexperienced endoscopists. It is obvious that further studies are needed. In this line, it is interesting to know, that in a recent meta-analysis of prospective studies, the length of the transparent cap had opposite effects on investigation time and polyp detection rate. Whereas, the anal to cecal time was significantly shortened by a cap length of >7 mm and a polyp detection rate was significantly improved by a cap length of <4 mm.

It seems to be important that future studies on the clinical benefit of cap-assisted colonoscopy must also control for other factors affecting ADR, such as indication for colonoscopy, the experience of the investigator, the presence of diverticulosis, the quality of bowel cleansing, the forward and withdrawal time, the polyp/adenoma size, and the location of mucosal lesions as well as the sedative medication applied during colonoscopy. Just elaborating the literature does not solve the problem.

In this issue of *Endoscopy*, Nutalapati et al. [1] present a meta-analysis on the performance of cap-assisted colonoscopy (CC) for adenoma detection rate (ADR) during standard colonoscopy (SC). By extensive literature search (Medline, Embase, Scopus, Cochrane and Web of Science databases, abstracts published at national meetings), they analyzed and included only high-quality studies with Jadad score ≥3. The use of cap significantly improved the ADR (odds ratio [OR] 1.18, 95 % confidence interval [CI] 1.03 – 1.33), detection of 0.16 (0.02 – 0.30) additional adenomas per positive participant (APP), improved cecal intubation (OR 1.61, 95 % CI 1.33 – 1.95), and decreased the cecal intubation time (95 % CI 0.37 – 1.39).

What is the rationale for CC?

To date, colonoscopy is the best available method to detect and to remove colorectal neoplasia and to decrease the rate of colorectal cancer-related death [2, 3]. Nationwide screening colonoscopy programs indicate that the ADR of conventional colonoscopy varies between 15 and 30 % [4]. It is obvious that a significant number of small adenomas and also some advanced lesions are missed even by experienced endoscopists during SC. This has been shown both in back-to-back colonoscopy studies and in evaluations comparing virtual and optical colonoscopy in the same patients. In these reports, the miss rate of colonoscopy has been reported to be up to 48 % [5 – 16]. Particular problems may occur with blind spots behind the semilunar folds or near the anal verge and with lesions located in the right colon [9 – 11] that are easily overlooked. In addition, the small but significant number of carcinomas detected within 3 – 5 y after an apparently normal screening colonoscopy indicates that the visualization of mucosal lesions is limited [2, 17 – 19].

Besides CC, extension of visual field by wide-angle endoscopy, retrograde viewing device ("third eye"), transparent retractable extension device, or the newly designed full-spectrum colonoscope, the EWAVE system and the endocuff device,

are potential options for improving the detection rate of mucosal lesions. The rational for this assumption is that only part of the whole colonic surface can be visualized during routine colonoscopy. This has been shown in a recent study [20] evaluating the visible surface of a soft resin colon by back-to-back colonoscopies in a colonic training model. Here, the inner surface was stained by a raster of dots, and the number of dots counted during colonoscopy served as an estimate for the visible surface area of each segment of the colon. Overall, 60 % of the maximal countable dots were visualized by 5 experienced investigators leading to the assumption that only 60 % of the inner surface was seen. In this model, extension of visual field by CC was up to 40 % compared to SC, but only significant for the right colon [20]. However, this potential advantage of CC for the right colon may have significant clinical impact because localization of tumors in the cecum or ascending colon is an independent risk factor for interval cancers after negative colonoscopy [21].

What is the clinical benefit of CC?

Data from the literature with regard to CC are controversial. In 15 randomized studies [22 – 36] including 2 back-to-back studies [23, 26], 1 retrospective study [37], and 1 nonrandomized study [38], 9 studies showed significant improved polyp/adenoma detection rates with CC [22, 23, 26, 29, 30, 34 – 37] whereas 7 other studies revealed no significant differences [24, 27, 28, 31 – 33, 38] and 1 study showed a significant disadvantage of CC [25]. The parameters that were significantly superior for CC in these studies included overall polyp detection rate, polyp miss rate, total number of adenoma, polyp size (<5 mm), flat adenoma, and right colon. Some of these benefits were related to the experience of the investigators or difficult cases [28].

One reason for these heterogeneous findings in the literature might be that other factors that have influence on ADR, such as the indication for colonoscopy, the experience of the investigator, the presence of diverticulosis, the quality of bowel cleansing, the forward and withdrawal time, the polyp/adenoma size, and location of mucosal lesions as well as the sedative medication applied during colonoscopy, were not controlled for in most of the studies. This appears to be of clinical relevance because bowel cleansing and withdrawal time significantly affect the detection rate of mucosal lesions during colonoscopy.

In this issue of *Endoscopy*, Nutalapati et al. [1] try to overcome this dilemma by selecting only papers of high quality for their meta-analysis. Criteria for the "high quality" was a Jadad score ≥ 3 [39]. However, it must be emphasized that the Jadad score is not a perfect instrument for selecting high-quality studies because it places greater emphasis on the quality of reporting as opposed to the actual methodological quality of a trial. In addition, it does not assess allocation concealment [40]. Nevertheless, even with this selection bias, the difference between CC and SC was, though significant, only minor. Whereas an initial pooled analysis of 8 randomized controlled trials (RCTs) showed no significant differences, 7 high-quality RCT revealed a significant difference (OR 1.18, 95 % CI 1.03 – 1.33). However, the significance was only reached by removing 1 study [26] with a Jadad score of 1 from the initial 8 RCTs [1] (**Fig. 2a** and **Fig. 2b**). This significant finding is also modified by the fact that the authors excluded 3 high-quality studies [28, 30, 33]. Out of them, at least in 1 study ADR/APP could be easily calculated by the reported data and was not significant between CC and SC [33].

Nutalapati et al. [1] further analyzed the benefit of the cap on cecal intubation rate and cecal intubation time.

Therefore, they selected additional "low-quality" paper for analysis of cecal intubation rate and cecal intubation time. According to their meta-analysis, CC significantly improved cecal intubation (OR 1.61, 95 % CI 1.33 – 1.95) and decreased cecal intubation time by an average of 53 s (95 % CI 0.37 – 1.39).

Thus, is there enough evidence to incorporate CC in clinical practice? Interpreting the literature and the meta-analysis by Nutalapati et al. [1], the answer for the clinically focussed endoscopist with regard to ADR at present may be no. Significant differences do not necessarily imply clinical benefits and translation into clinical practice. The answer for the improvement of cecal intubation frequency and intubation time by the cap is depending on the focus of training commitment because these effects of the cap may be beneficial especially for unexperienced endoscopists [27, 41]. It is obvious that further studies are needed. In this line, it is interesting to know that in a recent meta-analysis of prospective studies, the length of the transparent cap had opposite effects on investigation time and polyp detection rate [42]. Whereas the anal to cecal time was significantly shortened by a cap length of > 7 mm, polyp detection rate was significantly improved by a cap length of < 4 mm [42].

It seems to be important that future studies on the clinical benefit of CC must also control for other factors affecting ADR, such as indication for colonoscopy, the experience of the investigator, the presence of diverticulosis, the quality of bowel cleansing, the forward and withdrawal time, the polyp/adenoma size, and the location of mucosal lesions as well as the sedative medication applied during colonoscopy. Just elaborating the literature does not solve the problem.

Competing interests

None

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