

## The Effect of Water Flushing Pump during Colonoscopy in Adenoma Detection Rate. (Retrospective Study)

**Assaf Moushira, Khalil Ali, Matar Rasha, Lakis Remi, Mroue Ahmad and Hallal Mahmoud\***

*Department of Gastroenterology and Hepatology, Al-Zahraa Hospital University Medical Center (ZHUMC), Beirut, Lebanon*

\*Corresponding Author: Hallal Mahmoud, Department of Gastroenterology and Hepatology, Al Zahraa Hospital University Medical Center (ZHUMC), Beirut, Lebanon.

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### Abstract

**Background/Aims:** The adenomatous colorectal polyps are known to be the precursors lesions of colorectal cancer. The aim of our study was to determinate whether the use of water pump in colonoscopy significantly improve the prevalence of polyps and rate of adenoma detection and therefore could be recommended in every endoscopy unit for potentially more effective cancer prevention.

**Methods:** All endoscopy and pathology reports of adult patients underwent colonoscopy at Zhumc between June 2017 and June 2018 were studied retrospectively. The water pump introduced in 15th December 2017. Data were compared between two groups: pre and post installation of pump with six months margin.

**Results:** 1006 eligible patients (mean age 56, male to female ratio 1:1) of which 532 in the pre-pump group and 474 in the post-pump group with similar baseline characteristics were compared concerning prevalence of polyps and rate of adenoma detection. Prevalence of polyps was 36% in the pre-pump group versus 38% in the post-pump group with no statistical significant difference between the two groups: ( $P = 0.662$ ). Rate of adenoma detection was 26.2% for the first group versus 27.1% for the second group with again no significant difference between the two groups: ( $P = 0.82$ ). Mean number of polyps of less than 5 mm were also compared between the two groups with no significant difference. The chi square test was performed for comparison between results.

**Conclusion:** The use of water pump had no effect on the detection of adenomatous lesions. On the other hand, with the use of water pump the procedure is faster, easier and therefore more effective in means saving time and effort and achieving the same results.

**Keywords:** Water Flushing Pump; Colonoscopy; Adenoma Detection Rate; Colorectal Cancer

### Introduction

Colorectal cancer is the third most common cancer worldwide and the second leading cause of death in the United States [1]; 142000 new cases and 50000 deaths of colorectal cancer were reported in 2011 in the US [2].

Most cases of Colon cancers arise from pre-existing adenomas, the time period required for the development of malignancy from those precursors is lengthy, believed to be at least 10 years [3].

Thus, colon cancer is amenable to screening which proved to reduce the incidence by 80% and mortality by 50% [4].

Colonoscopy is the gold standard screening procedure for colorectal cancer as it serves as both diagnostic and therapeutic through polyp's detection and excision. It provides detailed view of the colonic mucosa by its careful examination during scope withdrawal [5]. Nonetheless, the diagnostic accuracy of this technique depends on the quality of bowel preparation, which entails

ideally emptying of the colon of all fecal material with no gross alteration of the colonic mucosa [6]. Otherwise retained stools in an inadequately prepared bowel would interfere with the quality of screening, increase the procedure time, increase complications, impedes optimal visualization and limits the detection of polyps during colonoscopy. On the other hand a lot of bubble formed due to preparation itself lead to disturbed visualization of the colon [7].

Despite availability of multitude bowel preparation protocols and patient adherence to bowel cleansing, 10% of patients still do not achieve optimal preparation; requiring them to do repeat colonoscopies and meet some avoidable financial and psychological obligations [8]. When dealing with such situation trials of washing using manual water syringe could be attempted. This type of intra-procedural cleansing is usually time consuming, requires a lot of effort and provides minimal improvement in visualization. Developing new technologies that help improve visualization during suboptimal colonoscopies is thus of utmost importance. One such promising technology is water pump, when connected to a colonoscope it can irrigate pressurized water that washes off mucus, debris and bubbles on the colonic mucosa; providing a rapid, efficient and comfortable cleaning method with better visualization of the colon [9].

## Aim of the Study

Our study aim is to determine and compare polyps and adenoma detection rate before and after use of water flushing pump at Zhumc.

## Patients and Methods

A water pump installed at Zhumc on December 15, 2017. Data from endoscopic and histological reports of all adult patients (aged 21 and older) who underwent colonoscopy in the endoscopy unit during the six months before and after introduction of the water pump (between 5<sup>th</sup> June 2017 and 5<sup>th</sup> June 2018) are retrospectively collected and studied for comparison.

Patients' age, gender, medical number, colonoscopy preparation, indication for colonoscopy, extent of colonoscopy, number of the polyps discovered and polyps' characteristics (shape, size, location, and histology) were retrieved and analyzed. Patients with incomplete colonoscopy for any reason, prior CRC or colon cancer diagnosed during the colonoscopy, IBD patient, familial polyposis, active gastrointestinal bleeding were excluded.

## Study procedures

Five qualified gastroenterologists using Olympus CFH180AL scope performed the colonoscopies. Once the location and size of all visible polyps were identified, they were removed and the local pathology lab did standard histologic assessment. An experienced pathologist reviewed specimens.

## Ethical consideration

The Scientific Research Ethic Committee (SREC) and Institutional Review Board (IRB) approved this study.

## Statistical analysis

Excel table was used for analysis of data. Categorical variables were expressed as number's and percentages. Chi-square test was used for analysis of categorical variables. Differences in means were compared using student t test.

A P value < 0.05 was considered statistically significant.

## Results

Total 1280 patients who had underwent a colonoscopy recruited in the study. Of which 662 patients underwent the colonoscopy before installation of the water pump, and the remaining 618 after its installation.

A sum of 274 patients were excluded from the study, 10 were below 21, 62 because of the incompleteness of the procedure, 182 because of the indication (inflammatory bowel diseases, prior colorectal cancer, active lower gastrointestinal bleed, family history of hereditary polyposis). Four patients had missing information about the primary outcome and 16 were diagnosed with cancer during the procedure. The remaining 1006 patients had each undergone one colonoscopy. Five qualified gastroenterologists with a standard withdrawal time of at least 7 minutes performed 1006 colonoscopies.

Patients' demographics, colonoscopy preparation, indication and gastroenterologist before and after water pump installation status are described in table 1.

1006 patients were eligible (532 in the pre-pump group and 474 in the post-pump group), baseline characteristics were similar between those two groups. Mean age was 56.01 +- 14.65 before and 56.64 +- 14.45 after pump installation ( $P = 0.628$ ), 43% of patient before pump and 51% post pump installation were males.

	Pre-pump installation	Post- pump installation	p-value
Age	56.01 ± 14.65	56.64 ± 14.45	0.628
<b>Gender</b>			
Males	42.9%	50.6%	0.081
Females	57.1%	49.4%	
<b>Preparation</b>			
Excellent	2.7%	1.3%	
Good	73.1%	75.8%	0.122
Fair	15.0%	18.2%	
Bad	9.2%	4.7%	
<b>Indication</b>			
Non specific	27.8%	28.3%	
Fresh blood	27.1%	30.4%	0.291
Anemia	5.3%	8.9%	
Diarrhea or constipation	19.2%	14.3%	
Other	20.7%	18.1%	
<b>Gastroenterologist</b>			
1	21.1%	20.2%	
2	24.8%	12.7%	
3	18.3%	14.8%	0.214
4	30.5%	31.6%	
5	5.3%	20.7%	

**Table 1:** Baseline characteristics of two groups showed no significant difference.

No significant difference was noted concerning the preparation ( $P = 0.122$ ), the indication ( $P = 0.291$ ) or performing gastroenterologists between the two groups.

37% of patients had at least one polyp ( $n = 186$ ), with prevalence of polyps being 36% before pump installation and 38% after pump introduction with non-significant difference between the

two groups ( $P = 0.662$ ). 28.6% of patients had at least one adenoma ( $n = 144$ ). However the percentages did not significantly differ between the pre and post pump installation groups (Table 2) and the rate of adenoma detection was similar in the two groups (28.2% in pre-pump installation group versus 29.1% in post pump installation group,  $p$ -value = 0.82).

	Pre-pump installation	Post-pump installation	p-value
Patients with at least one polyp	192 (36.1%)	180 (38.0%)	0.662
Patients with at least one adenoma	150 (28.2%)	138 (29.1%)	0.820
Mean polyps number	1.8 ± 1.64	1.62 ± 1.32	0.471
Mean adenomas number	1.24 ± 1.32	0.98 ± 0.94	0.185
Mean Polyps of less than 5 mm number	1.46 ± 1.27	1.24 ± 1.28	0.913

**Table 2:** Comparison of the pre- pump group with the post pump group in means of polyp prevalence, rate of adenoma detection and mean number of polyps and adenomas.

The total number of adenoma detected was 282 of which 93% ( $n = 262$ ) were tubulous; 6% ( $n = 17$ ) were tubule-villous and only 1% were villous.

96% of adenomas were of low-grade dysplasia.

T-tests showed no statistically significant differences in the mean number of polyps, adenomas and polyps of size less than 5 mm between the two groups. Results are showed in table 2.

## Discussion

By facilitating the early detection and removal of polyps, colonoscopy provides the opportunity of cancer prevention. The most important factor affecting the quality of colonoscopy is the degree of bowel cleansing where suboptimal preparation is a major impediment to the effectiveness of the procedure [10]; such preparations may eventually mandate procedure repetition increasing psychological and economical burden on the patient. Despite the availability of a myriad of bowel preparations protocols, optimal preparation can't be reached in significant percentage of patients. A new endoscopic device, the flushing pump which is a high performance peristaltic pump which is designed to allow forced irrigation with adjustable flow rate, facilitating direct washing of colonic mucosa during endoscopy removing debris from the field of view; thus enabling improved visualization, diagnosis and therapy. While fluid can be fed manually through a manual syringe connected to the scope; the use of this pump provides simple, effective and rapid means of cleansing. After reviewing the literature no study was found that compares the effectiveness of this pump to the old means of intra-procedural cleansing in polyps detection.

That's why we proceed with this retrospective study with the aim of comparing the rate of adenoma and prevalence of polyps detected before and after use of pump. More than 1000 patients underwent colonoscopy at Zhumc endoscopy unit between June 2017 and June 2018 were included and divided into two groups: before and after use of pump. Those two groups are found to have similar baseline characteristics. 95% of procedures were complete. The prevalence of polyps was relatively high (37%). It was higher (38%) in the group underwent colonoscopy after pump introduction versus 36% for patients underwent colonoscopy before its introduction but no significant statistical difference was detected. Same results were seen concerning rate of adenoma detection where it was 29.1% in the second group versus 28.2% in the first group with no significant difference between the two groups.

Those numbers reflects the high rate of adenoma detection, which is the proportion of average-risk patients in whom a physician identifies adenomas during colonoscopy. ADR is nowadays the most important and critical measure of quality of colonoscopy [12]. where the endoscopist rate of adenoma detection during colonoscopy was significantly associated with the risk of interval cancers: patients underwent colonoscopy performed by an endoscopist with a detection rate of more than 20% had a significantly lower risk of interval cancers compared with patients whose endoscopist had a detection rate of less than 20% [11]. There was also no significant difference between the two groups concerning the mean number of polyps, mean number of adenoma and mean number of adenoma of less than 5 mm.

## Conclusion

The results of the study can reflect the high rate of cecal intubation and the ability to complete the exam. as well as the high rate of adenoma detection (up to 27.6%), both of them considered as important measure of colonoscopy quality, although no significant difference was found concerning prevalence of polyps and rate of adenoma detection with the use of water pump, this device can prevent wasting time and effort.

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