Check for updates

Longcroft-Wheaton Gaius (Orcid ID: 0000-0001-9899-9948)

A Randomised Controlled Trial of EndoRings™ Assisted Colonoscopy Versus Standard Colonoscopy

Dr Sreedhari Thayalasekaran, first author [1].
Dr Rupam Bhattacharyya[1].
Dr Fergus Chedgy[2].
Dr Peter Basford[3].
Dr Sharmila Subramaniam [1].
Dr Kesavan Kandiah [1].
Dr Fergus Thursby-Pelham [1].
Dr James Brown[4].
Dr Asma Alkandari [1].
Dr Richard Ellis [1].
Dr Sergio Coda [1].
Dr Patrick Goggin [1].
Dr Mark Amos[1].
Dr Carole Fogg[1].
Dr Gaius Longcroft-Wheaton [1,4].
Professor Pradeep Bhandari, corresponding author [1,4].

Affiliations:
*1, Queen Alexandra Hospital, Portsmouth, United Kingdom.
*2, Royal Sussex County Hospital, Brighton, and Hove, United Kingdom.
*3, Western Sussex Hospitals NHS Foundation Trust, Worthing, United Kingdom.
*4, Portsmouth University, Pharmacy and Biomedical Sciences, Portsmouth, United Kingdom

Corresponding author: Professor Pradeep Bhandari. Email; deep3570@yahoo.co.uk. Mobile number: 07985442226. Postal address: Department of Gastroenterology, Queen Alexandra Hospital, Cosham, Portsmouth, PO6 3LY

First author: Dr Sreedhari Thayalasekaran. Email; sreethaya@doctors.org.uk. Mobile number:

The study was designed by S Thayalasekaran, G Longcroft-Wheaton, P Bhandari. Mark Amos performed the statistical analysis. All the authors collected data and were involved in revisions of the manuscript.

This article has been accepted for publication and undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process which may lead to differences between this version and the Version of Record. Please cite this article as doi: 10.1111/den.14432

This article is protected by copyright. All rights reserved.

Accepted Article

Accepted Article

Abstract

Endorings is a distal attachment consisting of two layers of circular flexible rings that evert mucosal folds.

Aims: Investigate if Endorings Colonoscopy (ER) improves polyp and adenoma detection compared to standard colonoscopy (SC).

Methods: Multi-centre, parallel group, randomised controlled trial.

Results: Total of 556 patients randomised to ER (275) or SC (281). Colonoscopy completed 532/556 (96%) cases. EndoRings removed in 74/275 (27%) patients. Total number of polyps in ER limb 582 vs 515 in SC limb, p=0.04. Total number of adenomas in ER limb 361 vs 343 for SC limb, p=0.49. A statistically significant difference in the mean number of polyps per patient in both the Intention to Treat (ITT) (1.84 SC vs 2.10 ER, p-value 0.027) and Per Protocol (PP) (1.84 SC vs 2.25 ER, p-value 0.004).

Conclusions: Our study shows promise for the EndoRings device to improve polyp detection.

ClinicalTrials.gov Identifier: NCT02785783

Accepted Article

Introduction

The evidence for distal attachment devices in increasing polyp detection is conflicting (1).

The EndoRings™ **(Figure 1)** is a silicone-rubber device consisting of 2 layers of flexible circular rings designed to maintain the tip of the instrument in the centre of the lumen and evert mucosal folds to allow dynamic inspection as they move back into their resting position. There are 2 sizes: one for a standard colonoscope and the other for a paediatric colonoscope. The EndoRings™ is designed to increase distal friction during withdrawal and reduce the risk of sudden backward slippage, facilitating better tip control and stability(2, 3).

Comparatively fewer studies have been performed evaluating the use of EndoRings™ colonoscopy to the other available distal attachment devices. The first tandem design RCT showed a significantly positive benefit with a 33% reduction in the adenoma miss rate with EndoRings™ colonoscopy(3). This beneficial effect was not subsequently reproduced in 2 recent RCT's (4, 5).

Aims

The aims of this study were to compare the performance of EndoRings™ assisted colonoscopy to standard colonoscopy to determine whether EndoRings™ colonoscopy increases polyp detection more than standard colonoscopy.

Accepted Article

Accepted Article

EndPoint

Primary EndPoint

To investigate whether EndoRings™ assisted colonoscopy increased the detection of number of polyps per patient and the polyp detection rate compared to standard colonoscopy.

Secondary EndPoint

To investigate whether EndoRings™ assisted colonoscopy increased the number of adenomas per patient and the adenoma detection rate.

Methods

The study was approved by the local research and ethics committee and registered at clinical trials.gov (NCT 02785783). The study was a multi-centre, single-blinded randomized controlled trial performed at 3 hospitals in the UK. The study period was from 23rd May 2016 to 2nd August 2018. High definition colonoscopes from Pentax, Olympus and Fujinon were used in the study. Colonoscopy was performed using a combination of intravenous midazolam, fentanyl and/or nitrous oxide. The colonoscopies were performed by 15 endoscopists across 3 centres. 7/15 endoscopists were considered expert colonoscopists who had undergone bowel cancer screening programme (BCSP) accreditation in the United Kingdom (UK). To achieve accreditation, endoscopists must perform a minimum of 1000 colonoscopies, have key performance indicators greater than accepted standards and pass a theoretical and practical examination. 8/15 endoscopists were not considered experts and performed <1000 colonoscopies, without undergoing BCSP accreditation. All the endoscopists were trained in the use of EndoRings™ during colonoscopy before recruitment into the study and had performed 10 colonoscopies with the use of EndoRings™.

Accepted Article

Caecal intubation was confirmed via photo documentation of the ileo-caecal valve, terminal ileum and appendiceal orifice. Intubation and withdrawal times were recorded by a member of the research team. Polypectomy was only performed on withdrawal. Only withdrawal times where polypectomy was not performed were used in the final statistical analysis for withdrawal times.

One EndoRings™ per participant was used in the ER arm and disposed after single use. If the EndoRings™ was removed the reason was recorded and the colonoscopy continued without the attachment of the EndoRings™. If the procedure could not be completed the reason was recorded and reflected in the caecal intubation rates. No more trial data was collected if caecal intubation was not achieved.

Accredited GI pathologists were blinded to whether the EndoRings™ was used or not, when reporting on the polypectomy specimens. Proximal locations were defined as polyps proximal to the splenic flexure. Advanced adenoma was defined as >10mm in size and with high-grade dysplasia. The 5-point nurse-reported comfort level score used for UK national BCSP colonoscopy procedures, ranging from no discomfort to severe discomfort was used(6).

Accepted Article

Statistics & Sample Size Calculation

The data in our institution showed a mean of 1.6 polyps per patient (SD: 2.05) in individuals with a positive FOB. It was postulated that the EndoRings™ would show an increase in the mean level of polyps to 2.1 polyps per patient as clinically important. To detect a difference in means with 80% power with a 5% significance level (alpha) would require 252 subjects in each treatment group. 504 patients in total. Furthermore, an increase in the sample size by 10% to a minimum of 554 patients to account for 'failed colonoscopy' when no outcomes could be recorded (i.e., poor bowel preparation and withdrawal of consent), leading to removal from the trial.

A Mann Whitney U test was used to compare the primary outcome (mean number of polyps) between groups. Similarly, a Mann Whitney U test was used to compare the mean number of adenomas between groups. A chi-squared test was used to compare the following secondary objectives; polyp detection rate; and adenoma detection rate. Both intentions to treat and per-protocol analysis were performed.

Randomization

Randomization was performed by random sequence generation in permuted blocks of varying sizes by an independent statistician. Allocations were placed in sealed envelopes to be opened just before the colonoscopy by the research staff. Randomization was stratified according to whether patients attending for colonoscopy were symptomatic or screening/surveillance. Endoscopists and research nurses were not blinded to the randomization arm, but the patients were blinded.

Inclusion Criteria

Patients attending for colonoscopy aged ≥ 55 years with lower GI symptoms, positive FOB and surveillance colonoscopy were recruited.

Exclusion Criteria

History of inflammatory bowel disease

History of colonic polyposis syndrome

Known colonic strictures

Figure 2 Study Flowchart in Accordance with CONSORT Reporting Guidelines

Accepted Article

Accepted Article

Results

A total of 703 patients were invited to participate in the trial; 140 patients declined to participate. A total of 563 were randomised to receive either standard colonoscopy (SC) or EndoRings™ assisted colonoscopy (ER). 7 patients were excluded: 2 due to a new diagnosis of IBD and 5 due to technical reasons. 1/5 patient did not have the EndoRings™ attached to the colonoscope, and the remaining 4/5 patients could not be recruited due to the EndoRings™ not being compatible with the colonoscope. A total of 556 patients were then allocated to an intervention; 275 allocated to ER colonoscopy and 281 allocated to SC as outlined in figure 2. Fifteen Endoscopists from three major UK centres were involved. 7/15 Endoscopists were classed as experts and 8/15 as non-experts. 286/556 (51.4%) colonoscopies were performed by experts and 270/556 (48.6%) by non-experts. Colonoscopy was completed in 532/556 (96%) patients. 10/281 (3.55%) colonoscopies in the standard limb and 14/275 (5%) colonoscopies in the EndoRings™ limb, p=0.49 were incomplete.

The EndoRings™ were removed in 74/275 (27%) of cases. In 66/74 (89%) cases removal was performed due to technical difficulties with sigmoid intubation. The endoscopists found it bulky and difficult to navigate through the sigmoid colon. In 8/74 (11%) cases EndoRings™ was removed due to difficulty during retroflexion. Of the 74 EndoRings™ removed 30/74 (41%) were removed by expert endoscopists and 44/74 (59%) were removed by non-experts. 42/74 removed EndoRings™ were in females and 32/74 were in males.

A total of 16/556 cancers were found: 9 in the ER arm and 7 in the SC arm. 4 polyp cancers; HGD were found; 2 in SC versus 2 in ER.

Accepted Article

Mean Polyps Per Patient (MPP)

Our study showed that EndoRings™ significantly increased the mean polyp detection per patient. The mean number of polyps per patient in both the Intention to Treat (ITT) (1.84 SC vs 2.10 ER, p-value 0.027) and Per Protocol (PP) (1.84 SC vs 2.25 ER, p-value 0.004).

Polyp size-based analysis

There was a statistically significant increase in the number of diminutive polyps (<5mm) found with the EndoRings assisted colonoscopy (70.9%) versus standard colonoscopy (61.9%) (p=0.025). There was no statistically significant difference in the detection of polyps 6-10mm or large >10mm in size between the two arms.

Endoscopist-based analysis

The mean PDR of endoscopists was 60% in the 3 months before the start of the trial. There was an increase in the PDR in the standard limb to 67.5% during the study. We performed a subgroup analysis comparing the PDR between experts and non-experts. There were 7 experts and 8 non-experts participating in the study. The experts performed 286/556 (51.4%) colonoscopies. 145/286 colonoscopies performed by the experts were standard colonoscopy and 141/286 were EndoRings™ colonoscopy. The non-experts performed 270/556 (48.6%) colonoscopies. 136/270 colonoscopies performed by the non-experts were standard colonoscopy and 134/270 were EndoRings™ colonoscopy. We found that experts detected a greater number of polyps than the non-experts; MPP 2.76 in ER limb versus 2.01 in the SC limb, p=0.0006. There was no statistically significant difference between the mean number of polyps detected in the EndoRings™ limb (1.61) versus standard colonoscopy (1.64) in the non-expert group, p=0.57. The study was not powered to detect a difference between each individual endoscopist.

Accepted Article

Withdrawal and Intubation Times

There was no statistically significant difference in the median withdrawal time between EndoRings™ assisted colonoscopy (17 minutes) versus Standard colonoscopy (16 minutes), p=0.31. Caecal intubation time in the EndoRings limb was 12 minutes versus 11 minutes in the standard colonoscopy limb, p =0.03. There was no significant difference in the total procedure time between the EndoRings limb (29 minutes) and standard colonoscopy (29 minutes), p=0.69.

Comfort Scores

A 5-point comfort scale was used to record patient comfort during the procedure, with no discomfort being scored as 0 and severe discomfort scored as 4. A Mann Whitney U test demonstrated no significant difference in comfort scores between the standard (1.92) and EndoRings arm (1.99), (p=0.33).

Bowel Preparation Scores

Bowel preparation scores were graded as good, adequate, or poor. 6% were poor and 94% were graded as adequate to good.

Complications

There was 1 significant complication in the standard limb with a patient requiring a clip and use of a coagulation grasper due to bleeding after polypectomy.

Accepted Article

Discussion

This study demonstrated that EndoRings™ increased polyp detection. There was a statistically significant increase in the mean number of polyps per patient (MPP) and the polyp detection rate (PDR) in the EndoRings™ limb compared to standard colonoscopy. Although there was a trend towards increased adenoma detection in the EndoRings™ limb as the mean number of adenomas per patient (MAP) and the adenoma detection rate (ADR) were higher than in the standard colonoscopy limb, but this did not reach statistical significance. The study was only powered for improvement in MPP and not MAP as this device is designed to improve detection of all polyps and not just adenomatous polyps.

This study also found a high removal rate of the device (27%). Sigmoid diverticulosis was one of the common reasons for removal of the EndoRing™. There were no safety concerns, and the device did not increase patient discomfort, nor did it prolong the procedure time. The caecal intubation rates did not differ significantly between the two limbs. A significant limitation of our study was the high removal rate of the single-use EndoRings™ device 74/275, which was wasted in one quarter of the patients. 1/7 of the experts removed 13/74 (18%) of the EndoRings and 1/8 non-experts removed 17/74 (23%) EndoRings. Due to the high removal rate, a per-protocol analysis was performed, which showed an even higher increase in the polyp detection rate with EndoRings™ compared to standard colonoscopy 67.5% vs 78.5%, p-value of 0.008. The removal rate in this study was significantly higher than in 2 studies both by Rex et al: 6/295(2%) in one and 9% in the other (5, 7). This could be due to operator bias of the participating endoscopists or lack of confidence / experience in the use of the device. The removal rate of 27% in this study far outweighs the removal

rate of the EndoCuff device reported in 2 studies of 6.4% (8) and 4.2% (9).

The EndoRings™ has an advantage to the traditional transparent cap, in that it sits behind the tip of the colonoscope, with a larger, bulkier diameter than both the cap and EndoCuff. Theoretically, the EndoRings™ should flatten folds, providing a wider field of view and exposing polyps behind folds. This is reflected in our results. The endoscopists involved were a combination of experts and non-experts. The overall average baseline PDR 3 months before the trial was 60%. During the trial, the PDR in the standard colonoscopy limb rose to 67.9%. The Hawthorne effect could be a plausible explanation for the greater polyp detection rate in the standard limb during the study.

An unexpected finding on subgroup analysis in our study showed that only the expert endoscopists detected a greater number of polyps compared to non-expert endoscopists; MPP 2.76 in ER limb versus 2.01 in SC limb, p=0.0006. There was no statistically significant difference between the mean number of polyps detected in the EndoRings™ (1.61) versus standard colonoscopy (1.64) in the non-expert group, p=0.57. We were expecting a bigger benefit in the non-expert endoscopist group, due to previous data concluding that expert endoscopists technique is so good that adjuncts would not further enhance their performance. A possible explanation for this could be that experts adapted to the use of EndoRings™ much better than the non-experts. Non-expert endoscopists may tend to overinflate the bowel. Maximum benefit from the EndoRings™ occurs when insufflation is sufficient to allow the ring flaps to be in full contact with the mucosal folds so that they can be easily flattened to provide greater mucosal exposure. We feel that this is an area that would benefit from further evaluation.

Accepted Article

Accepted Article

Significantly more diminutive polyps (1-5mm) were found in the ER limb (70.9%) versus standard colonoscopy (61.9%), p=0.03. This is not a surprising finding as more diminutive polyps are missed at colonoscopy than larger polyps(10). It also mirrors data on greater detection of diminutive polyps from a similar device the EndoCuff(11, 12). The clinical significance of this finding can be debated as most (but not all) of these diminutive polyps run a very benign course. On further subgroup analysis, there was a trend towards greater polyp detection in the ER limb in the screening population (MPP 2.25 ER vs 1.88 SC, p=0.07) compared to symptomatic individuals (MPP 1.86 ER vs 1.54 SC, p=0.32). We feel that future trials should focus on this group.

An important finding is that more polyps were found in the EndoRings™ limb than standard limb with no significant difference in withdrawal times, making colonoscopy more efficient.

Some potential limitations of our study need to be acknowledged. One potential criticism of our study could be that the primary endpoint was polyp, rather than adenoma detection. However, it must be emphasized that the EndoRings™ device is designed to find polyps, rather than predict and differentiate histology between adenomatous and non-adenomatous polyps. Restricting the primary endpoint to purely the ADR, was felt as an unfair measure to assess the effectiveness of the device. Notwithstanding, there was a trend towards a greater detection of adenoma with the EndoRings™, but the study was probably not powered enough to detect a difference. Another limitation of our study, which is commonly found in similar trials of devices, is that due to the nature of the device studied, it is impossible to make it a double blinded study; thus, investigator related bias could have contributed favorably to the ER device. However, we feel this is unlikely as the

endoscopist performance (PDR) improved in both arms of the study, compared to their baseline PDR.

In one EndoRings™ trial where endoscopists with a baseline ADR $\geq$ 40% performed colonic withdrawal, no benefit of ER colonoscopy was demonstrated compared to SC(5).Another large Italian study (both a parallel and crossover design) performed by experienced endoscopists, who had performed >5000 colonoscopies showed no statistically significant difference in diagnostic yield and miss rate between EndoRings™ and standard colonoscopy. In this study, the population cohort were all individuals with a FIT positive test result(4), therefore constituting a population intrinsically enriched with polyps. Conversely, in our study, the population were also symptomatic, reflecting a more realistic portrayal of daily hospital practice. Further work is required on more heterogenous populations before definitive conclusions can be drawn on which population group it will benefit the most. The most recent RCT by Rex et al showed that ER colonoscopy was superior to standard colonoscopy in the mean number of adenomas per patient (1.46 vs 1.06, p=0.025), but there was no statistically significant increase in the ADR. Removal rate of the device in this study was 9%(7)Polyp detection is a surrogate marker of an increase in the adenoma detection. This study that was powered for MAP, supports the findings of our study, showing increased polyp detection.

We believe that this study has the following strengths: 1) it is a large multi-centre, randomized controlled trial; 2) both expert and non-expert endoscopists were involved, mimicking "real-life" routine clinical practice. 3) the population cohort consisted of average risk symptomatic patients. This aspect also reinforces the genuine and reproducible nature

Accepted Article

of our results; 4) the baseline performance of the study endoscopists was excellent, yet the device still managed to show an improvement. However, it may not have an equally beneficial effect in non-expert endoscopists, who may require increased training on device handling and scope manoeuvrability.

Conclusions

Our large, multicentre randomized controlled trial, demonstrated that EndoRings™ has the potential to increase the PDR and MPP compared to conventional colonoscopy if the endoscopists can manage to complete the procedure with the EndoRings ™ attached to the endoscope. However, we found that the endoscopists had to remove the EndoRings ™ in a quarter of the patients. This does remain a significant handicap of the EndoRings ™ which needs further evaluation.

Accepted Article

Accepted Article

References

1. Williet N, Tournier Q, Vernet C, et al. Effect of Endocuff-assisted colonoscopy on adenoma detection rate: meta-analysis of randomized controlled trials. Endoscopy 2018; 50:846-60.

2. Thayalasekaran S, Alkandari A, Varytimiadis L, et al. To cap/cuff or ring: do distal attachment devices improve the adenoma detection? Expert Rev Gastroenterol Hepatol. 2019;13:119-27.

3. Dik VK, Gralnek IM, Segol O, et al. Multicenter, randomized, tandem evaluation of EndoRings colonoscopy--results of the CLEVER study. Endoscopy. 2015;47:1151-8.

4. Hassan C, Senore C, Manes G, et al. Diagnostic yield and miss rate of EndoRings in an organized colorectal cancer screening program: the SMART (Study Methodology for ADR-Related Technology) trial. Gastrointest Endosc. 2019;89:583-90.

5. Rex DK, Repici A, Gross SA, et al. High-definition colonoscopy versus Endocuff versus EndoRings versus full-spectrum endoscopy for adenoma detection at colonoscopy: a multicenter randomized trial. Gastrointest endoscopy. 2018;88:335-44.

6. Ekkelenkamp VE, Dowler K, Valori RM, Dunckley P. Patient comfort and quality in colonoscopy. World J Gastroenterol. 2013;19:2355-61.

7. Rex DK, Kessler WR, Sagi SV, et al. Impact of a ring-fitted cap on insertion time and adenoma detection: a randomized controlled trial. Gastrointest Endosc. 2020;91:115-20.

8. Bhattacharyya R, Chedgy F, Kandiah K, et al. Endocuff-assisted vs. standard colonoscopy in the fecal occult blood test-based UK Bowel Cancer Screening Programme (E-cap study): a randomized trial. Endoscopy. 2017;49:1043-50.

Accepted Article

9. van Doorn SC, van der Vlugt M, Depla A, et al. Adenoma detection with Endocuff colonoscopy versus conventional colonoscopy: a multicentre randomised controlled trial. Gut. 2017;66:438-45.

10. van Rijn JC, Reitsma JB, Stoker J, Bossuyt PM, van Deventer SJ, Dekker E. Polyp miss rate determined by tandem colonoscopy: a systematic review. Am J Gastroenterol. 2006;101:343-50.

11. Floer M, Biecker E, Fitzlaff R, et al. Higher adenoma detection rates with endocuff-assisted colonoscopy - a randomized controlled multicenter trial. PLoS One. 2014;9:e114267.

12. Biecker E, Floer M, Heinecke A, et al. Novel endocuff-assisted colonoscopy significantly increases the polyp detection rate: a randomized controlled trial. J Clin Gastroenterol. 2015;49:413-8.

Table 1 Demographics and Colonoscopy Indication for participants

	Standard Colonoscopy SC (n=281)	EndoRing Colonoscopy ER (n=275)	P-value
Male (n=342)	166	176	0.58
Female (n=214)	115	99	0.26
Age; mean (SD) 67 (7.5)	66.4 (7.48)	66.6 (7.46)	0.48
Screening (n=123)	60	63	0.83
Surveillance (n=233)	121	112	0.83
Symptomatic (n=200)	100	100	0.83
Procedures where device removed	N/A	74/275	N/A

Table 2 Primary Outcome; Mean Number of Polyps Per Patient (MPP)

Analysis	SC (n) %	ER (n) %	P-value
Polyp total (n=1097)	515 (46.9%)	582 (53.1%)	0.04
Mean Polyp Per Patient *Intention to Treat* (ITT)	1.84	2.10	0.027
Mean Polyp Per	1.84	2.25	0.004

Patient *Per Protocol (PP)*			

Table 3 Secondary Outcomes (ITT analysis)

	SC (n) %	ER (n) %	P-value
Polyp Detection Rate (PDR)	67.5%	74.80%	0.057
Total Adenomas	343	361	0.490
Mean no adenoma per patient (MAP)	1.22	1.32	0.384
ADR (Adenoma Detection Rate)	56.95%	61.45%	0.279
Cancer detection rate	1.81%	2.55%	0.575
Polyp Size 1-5mm	61.9%	70.9%	0.025
Polyp Size 6-10mm	13.2%	14.2%	0.728
Polyp Size >10mm	7.12%	7.27%	0.944
Proximal (Right sided) polyps	263/515 (51%)	315/582 (54%)	0.080

Due to the high removal rate of the EndoRings™ device, a per protocol analysis was conducted.

Accepted Article

Table 4 Secondary Outcomes (PP Analysis)

Analysis	SC (n) %	ER (n) %	P-value
PDR	67.5%	78.5%	0.008
Mean no adenoma per patient	1.22	1.38	0.213
ADR (Adenoma Detection Rate)	56.9%	64.2%	0.11
Cancer Detection Rate	1.81%	3%	0.54
Polyp Size 1-5mm	61.9%	76.1%	0.001
Polyp Size 6-10mm	13.2%	12.9%	0.941
Polyp size >10mm	7.12%	7.96%	0.729
Proximal (Right sided polyps)	263/515 (51%)	250/455 (54%)	0.184

Table 5 Mean Number of Polyps Per Patient (Per Protocol Analysis)

Analysis (MPP)	SC	ER	P-value
Screening (n=123)	1.88	2.25	0.07
Surveillance (n=233)	2.07	2.58	0.05
Symptomatic (n=200)	1.54	1.86	0.32

Table 6 Endoscopist Based Mean Number of Polyps Per Patient (Per Protocol Analysis)

Analysis	SC	ER	P-value
MPP			
Expert	2.01	2.76	0.0006
Non-Expert	1.64	1.61	0.567
MAP			
Expert	1.38	1.65	0.05
Non-Expert	1.04	1.04	0.66

Accepted Article

Figure 1 EndoRings. Reproduced from Thayalasekaran et al, with permission Taylor & Francis (3).

Figure 2 Study Flowchart in Accordance with CONSORT Reporting Guidelines