EGGNZ
The Endoscopy Guidance Group for New Zealand

New Zealand Society of Gastroenterology Inc

Missed Lesions at Endoscopy

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Chair Endoscopy Guidance Group for New Zealand

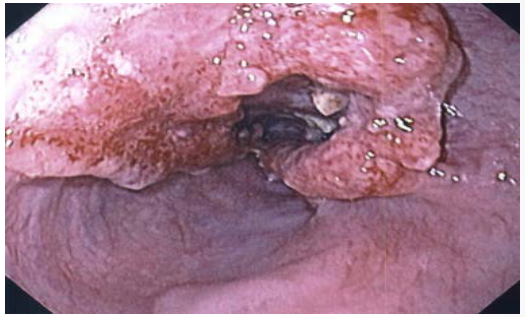
Missed Lesions at Endoscopy

- Is there a problem?
  - With Gastroscopy
  - With Colonoscopy
- How to improve?
  - Take a better look
  - Prepare the organ better
  - Specific techniques
    - Manual
    - Virtual and chromendoscopy
    - Devices
- Conclusion

Missed Lesions at Gastroscopy Is there a Problem?

Metanalysis of oesophageal adenocarcinomas in Barrett's.

- 24 studies, 820 cases
- Definition; diagnosed within 1 year of initial gastroscopy
- missed lesions in 25.4% (16.4-36,8%)
  - Gastro 2016; 150(3) 599-607



Retrospective cohort study of Gastric cancers in England

- April 2011-march 2012
- 2727 patients
- 8.3% (7.2-9.3) had Gastroscopy 6-36/12 prior
- GU seen at prior GD in 64%
- Chadwick et al . CGH 2015; 13 (7): 1264-70

Missed Lesions at Colonoscopy
Is there a problem?

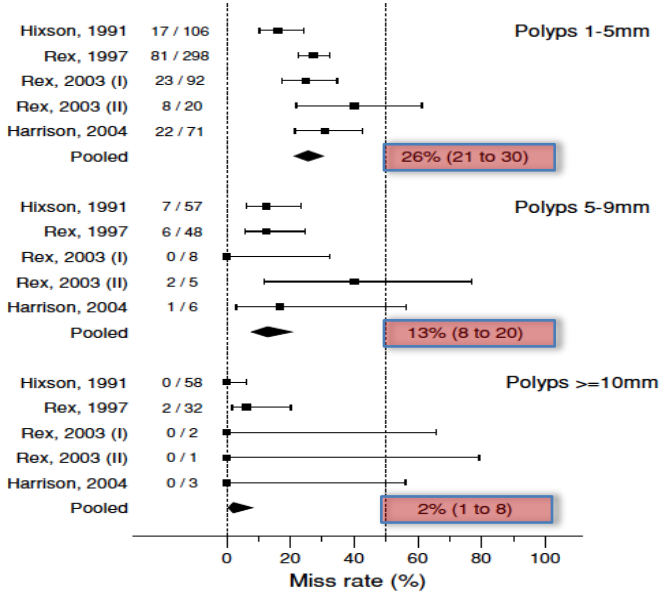


Figure 4. Adenoma miss rate by size.

Polyp Miss Rate @ Tandem Colonoscopy ; a Systematic Review
Van Rijn et al. Am J Gastro 2006

Missed Lesions at Colonoscopy
Is there a problem?

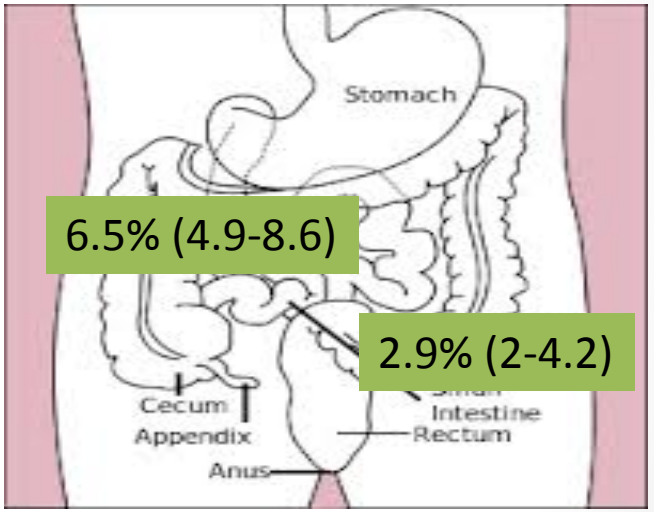
Interval Colorectal Cancer

- Definition; colonoscopy >6/12, < 36/12 of diagnosis

- 12 studies
- 7,912 interval CRCs

- ‘missed’ CRCs = 3.75% (2.8-4.9%)

1 in 27 Colorectal Cancers



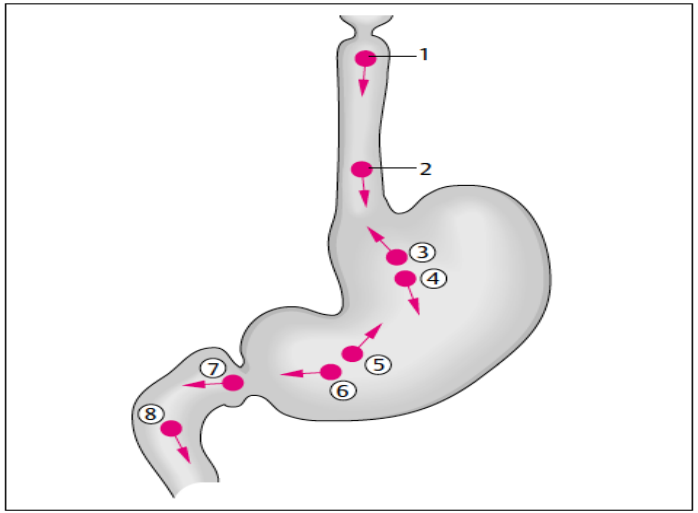
Singh et al ; AJG 2014, 109;1375-89

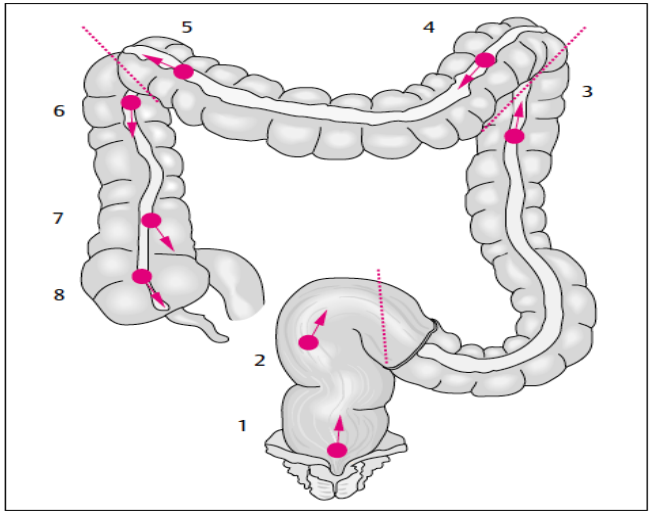
Missed Lesions at Endoscopy How to improve?

- “Just take a better look”
  - Take longer
  - Prepare better
  - Use appropriate techniques
  - +/- use devices

Missed Lesions at Endoscopy
How to improve? - Just take a better look

ESGE Recommendations for Quality Control in Gastrointestinal Endoscopy: Guidelines for Image Documentation in Upper and Lower GI Endoscopy

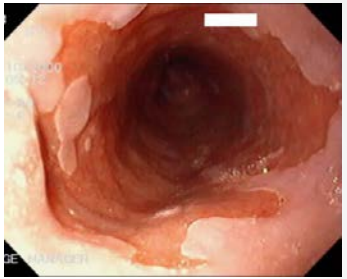


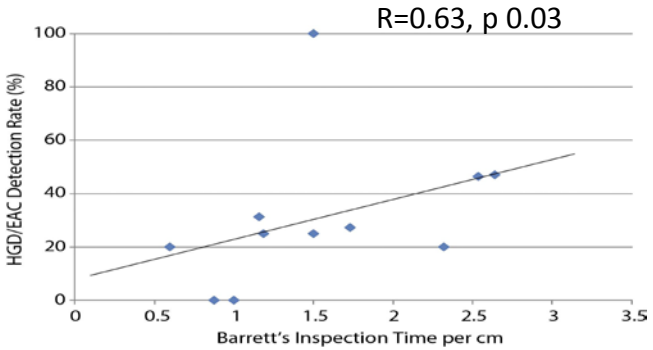


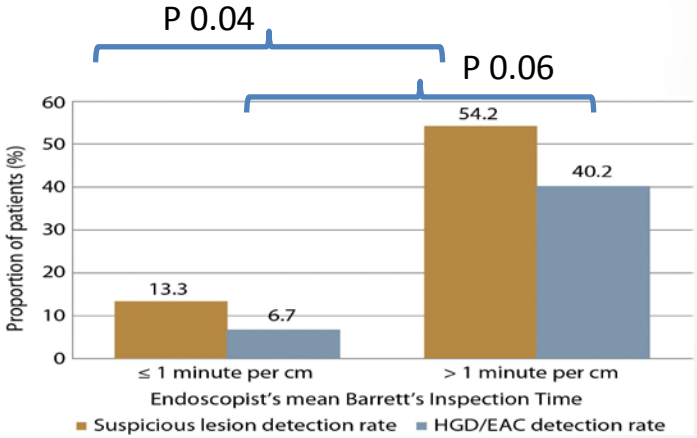
Endoscopy 2001; 33 (10): 901–903

Missed Lesions at Gastroscopy
How to improve? – Take longer

- Barrett's Oesophagus;
- 112 (94M) patients surveillance by 11 endoscopists
- Prague C 2.0 (3.1), M 3.7 (3.4)
- 33.9% HGD/EAC
- Seattle protocol +
- HD-WLE





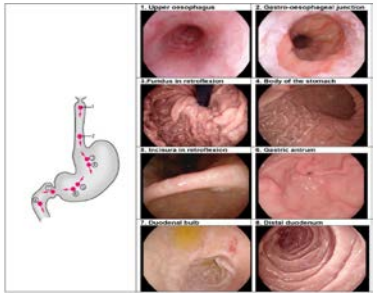


Gupta et al GIE 2012, 76(3); 531-8

Missed Lesions at Gastroscopy
How to improve? – Take longer

Gastroscopy

- 837 symptomatic first OGD,
- From 224 normal (mean 6 minutes)
- segregated into fast (5.5mins) vs slow (8.6mins)
- From 613 gastroscopies where Bx taken:
  - IM/G atrophy (8.7%), dysplasia (1%), cancer (1.3%)



- Slow vs Fast ‘scopers:
  - ‘High risk lesion’ OR 2.5 (1.52-4.12)
  - Cancer/dysplasia OR 3.42 (1.25-10.38)

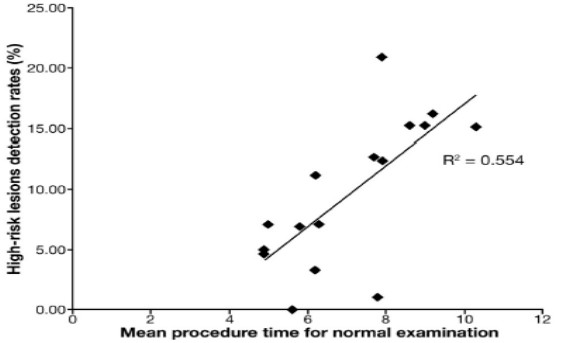


Figure 2. Percentage of EGD examinations detecting high-risk gastric lesions according to mean examination time for 16 endoscopists.

Clinical Gastroenterology and Hepatology 2015;13:480–487

Missed Lesions at Colonoscopy
How to improve? – Take longer

Withdrawal Times and Adenoma Detection

- 12 Gastroenterologists performed 7882 colonoscopies over 15 months.
- 2053 initial screening colonoscopies.
- Compared neoplastic lesion detection rate in screening colonoscopies of those with 6 minutes withdrawal with those> 6 minutes.
- Non-interventional colonoscopies.

Results:

Neoplasms in 23.5% (9.4-32.7%)

Withdrawal times 3.1-16 minutes

Mean non-interventional WT >6 minutes vs. < 6 minutes:

Neoplasm 28.3% vs 11.8% (p<0.001)

Advanced neoplasms 6.4% vs 2.6% (p 0.005)

Barclay et al NEJM 2006: 355;2533

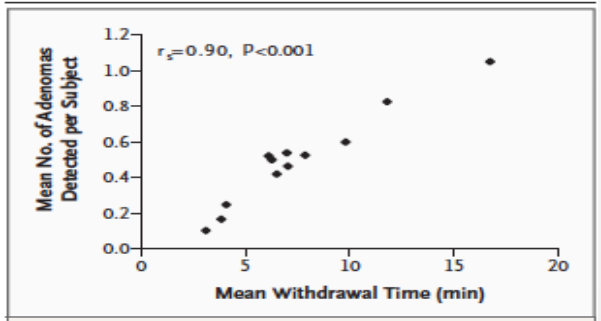


Figure 2. Mean Rates of Detection of Adenomas According to Mean Colonoscopic Withdrawal Times for 12 Endoscopists.

The values are for procedures in which no polyps were removed. The significant correlation between rates of detection of adenomas and withdrawal times was calculated with the use of the Spearman rank-correlation coefficient.

Missed Lesions at Colonoscopy
How to improve? – Take longer

EGGNZ BSP Individual Standards for Colonoscopy
Quality Standard Essential
1.2.1
Withdrawal time (in non-interventional cases only) >6min for 90% of colonoscopies.

(>100 procedures, >90% CIR, >20% ADR in last 12

WT > 9mins = 11% ↑ no. of procedures with adenomas & 25% ↑total number adenomas removed.
WT > 11 mins found 50% more Rt adenoma cf. WT <7 mins.

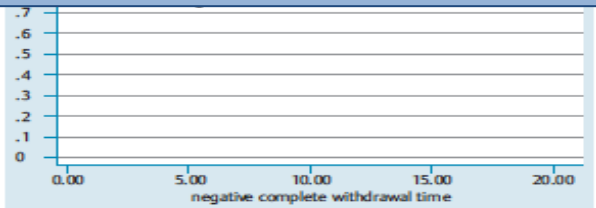


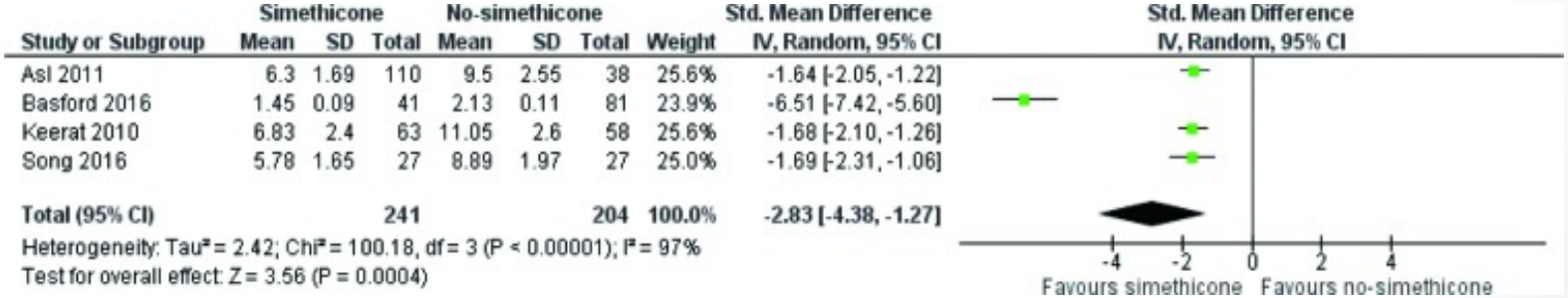
Fig. 2 Adenomas detected per procedure against mean withdrawal time in complete colonoscopies with negative findings (nc-CWT). Logistic regression model using data on 147 colonoscopists who performed 31 088 colonoscopies in the National Health Service (NHS) Bowel Cancer Screening Programme (BCSP) in England.

For each 1% increase in ADR = 3% decrease in CRC risk
NEJM, 2014;370:14:1298

Missed Lesions at Gastroscopy
How to improve? – prepare better

Semithecone in Gastroscopy

- 50mls
- 10-30 mins before
- 4 RCTs, 364 patients



Study or Subgroup	Simethicone Mean	SD	Total	No-simethicone Mean	SD	Total	Weight	Std. Mean Difference IV, Random, 95% CI
Asl 2011	6.3	1.69	110	9.5	2.55	38	25.6%	-1.64 [-2.05, -1.22]
Basford 2016	1.45	0.09	41	2.13	0.11	81	23.9%	-6.51 [-7.42, -5.60]
Keerat 2010	6.83	2.4	63	11.05	2.6	58	25.6%	-1.68 [-2.10, -1.26]
Song 2016	5.78	1.65	27	8.89	1.97	27	25.0%	-1.69 [-2.31, -1.06]
Total (95% CI)			**241**			**204**	**100.0%**	**-2.83 [-4.38, -1.27]**

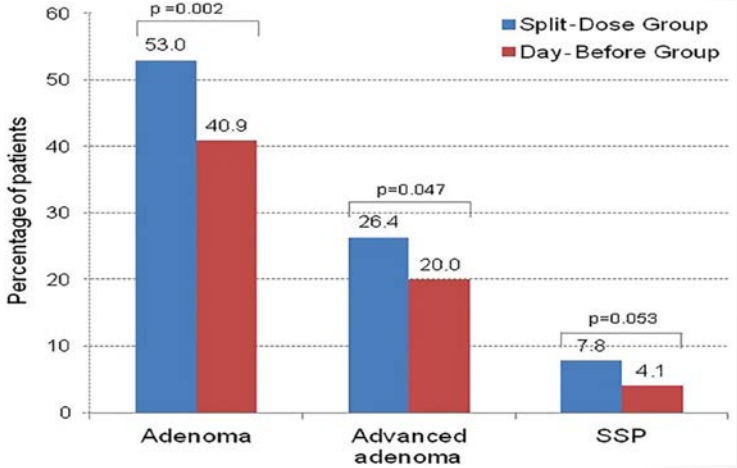
Heterogeneity: Tau² = 2.42; Chi² = 100.18, df = 3 (P < 0.00001); I² = 97%
Test for overall effect: Z = 3.56 (P = 0.0004)

Transl Gastro Hepatol 2018;3;29

Missed Lesions at Colonoscopy
How to improve? – prepare better

Split-dose preparation for colonoscopy increases ADR: an RCT in a Screening programme

- Multicentre
- 690 screening intact colons
- 2 Litre PEG prep
- Split-Dose = 20.00 day before then next day 4 hours before procedure
- Day before = 18.00 then 21.00



Proportion of subjects with at least one adenoma, advanced adenoma and sessile serrated polyps (per-patient analysis).

F Radaelli et al. Gut 2017;66:270-277

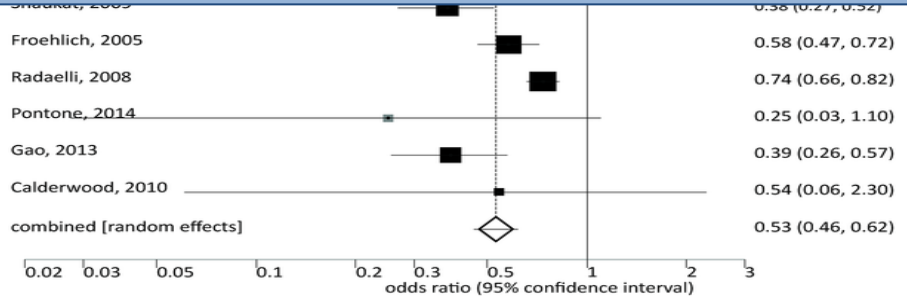
GUT

Missed Lesions at Colonoscopy
How to improve? – prepare better

EGGNZ BSP Unit Standard 13; Audit

13.6 Quality of bowel prep using the Boston Bowel Prep Score;

- KPI target; excellent/adequate in ≥90% or
- Boston Bowel Prep Score (BBPS) on withdrawal of ≥6, with no single segment score <2, in ≥90%



Sulz MC, et al. (2016). PLOS ONE 11(6): e0154149. https://doi.org/10.1371/journal.pone.0154149
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0154149

Missed Lesions at Endoscopy
How to improve? – use appropriate techniques

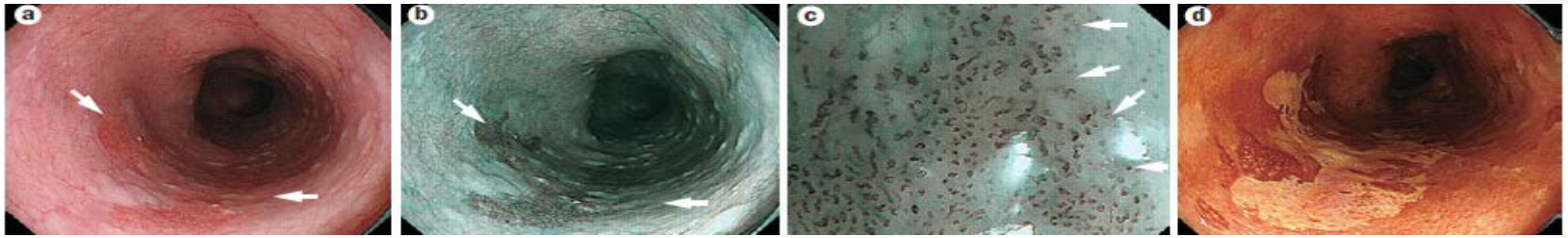
TABLE 2. Results of the meta-analysis

Technology	Total no. of studies	Sensitivity	95% CI	NPV	95% CI	Specificity	95% CI	Meets ASGE PIVI thresholds
Chromoendoscopy	7	91.9	89.4-93.8	95.5	90.8-97.9	89.9	80.1-95.2	No
Acetic acid	4	96.6	95.2-97.7	98.3	94.8-99.4	84.6	68.5-93.2	Yes
Methylene blue	2	64.2	36.2-84.7	69.8	30.6-92.3	95.9	76.5-99.4	No
NBI	9	94.2	82.6-98.2	97.5	95.1-98.7	94.4	80.5-98.6	Yes
NBI AFI	4	80.6	62.0-91.3	88.7	41.5-98.9	46	31.7-61.0	No
CLE	5	90.4	75.7-96.6	96.2	93.1-97.9	89.9	83.8-93.9	No
eCLE	2	90.4	71.9-97.2	98.3	94.2-99.5	92.7	87.0-96.0	Yes
pCLE	3	90.3	54.1-98.7	95.1	90.7-97.5	77.3	54.3-90.7	No

CI, Confidence interval; *NPV*, negative predictive value; *ASGE*, American Society for Gastrointestinal Endoscopy; *PIVI*, ASGE Preservation and Incorporation of Valuable Endoscopic Innovations; *NBI*, narrow-band imaging; *AFI*, autofluorescence imaging; *CLE*, confocal laser endomicroscopy; *eCLE*, endoscope-based CLE; *pCLE*, probe-based CLE.

ASGE Technology Committee systematic review and meta-analysis assessing the ASGE Preservation and Incorporation of Valuable Endoscopic Innovations thresholds for adopting real-time imaging–assisted endoscopic targeted biopsy during endoscopic surveillance of Barrett's esophagus. GIE Volume 83, No. 4 : 2016

Missed Lesions at Gastroscopy
How to improve? – use appropriate techniques



a. HD WLE
b. b. NBI
c. c. darker mucosa, demarcation line, dilated capilliary loops = IEC/HGD (squamous)
d. Lugols Iodine

Veitch, A. M. *et al. Nat. Rev. Gastroenterol. Hepatol.* **12**, 660–667 (2015)

Oesophageal Inlet patch (NBI)

Missed Lesions at Gastroscopy
How to improve? – Summary

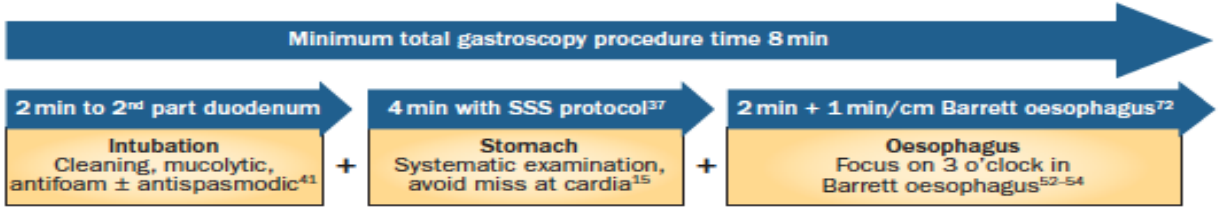
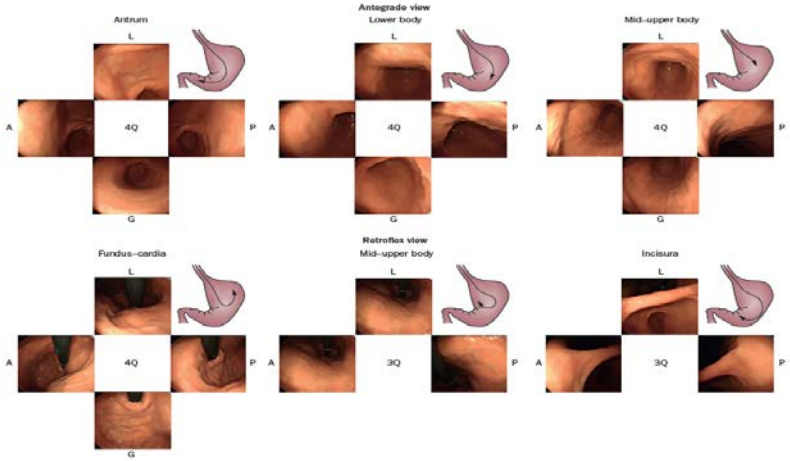


Figure 4 | Algorithm for the systematic examination of the upper gastrointestinal tract at endoscopy. Abbreviation: SSS, systematic screening protocol for the stomach.



Veitch, A. M. *et al. Nat. Rev. Gastroenterol. Hepatol.* **12**, 660–667 (2015)

Missed Lesions at Colonoscopy
How to improve? – use appropriate techniques

EGGNZ BSP Individual Standards for Colonoscopy
Practice Guideline Essential

3.1

Retroflexion in the rectum should be atempted

Retroflexion in the right colon should be attempted where comfortable

Favors [SFV] Favors [RF]

Figure 2. Adenoma miss rate of second forward view compared with a retroflexion examination after a standard colonoscopy. *CI*, Confidence interval; *M-H*, Mantel-Haenszel; *SFV*, second forward view; *RF*, retroflexion.

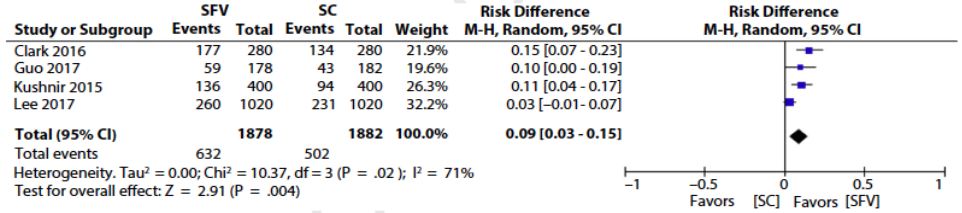


Figure 3. Forest plot of right-sided adenoma detection rate with standard colonelcy versus second forward view examination. *CI*, Confidence interval; *M-H*, Mantel-Haenszel; SC, standard colonoscopy; *SFV*, second forward view.

https://doi.org/10.1016/j.gie.2018.09.006

Missed Lesions at Colonoscopy
How to improve? – use appropriate techniques

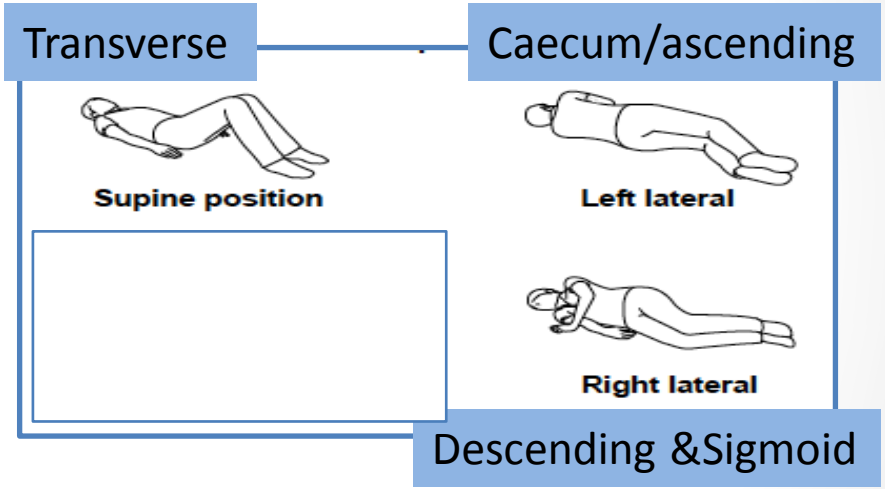
A simple method to improve adenoma detection rate during colonoscopy: Altering patient position.

120 pts, 57 yrs (40-82), 51 M

18 excluded (poor prep, MMS problems, long caecal intubation, colitis, withdrawal of consent)

Randomised to;

- all of withdrawal in Left Lateral
- Dynamic positioning for each segment



Position	PDR	ADR	P
Left Lateral	30.3%	23.5%	0.001
Dynamic	43.1%	33.3% **	0.002

**Increase is in Transverse, Desc. Sigmoid Colon

9.8% increase in ADR

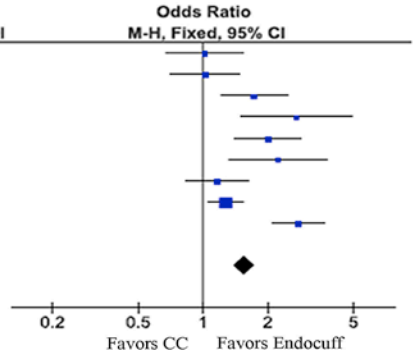
Can J Gastroenterol 2013;27(9):509-512

Missed Lesions at Colonoscopy
How to improve? – use of devices

New technologies improve adenoma detection rate, adenoma miss rate, and polyp detection rate: a systematic review and meta-analysis GIE. 2018 88, Issue 2, Pages 209-222.

Study or Subgroup	Endocuff Events	Endocuff Total	CC Events	CC Total	Weight	Odds Ratio M-H, Fixed, 95% CI
Baek, 2017	158	217	163	225	8.1%	1.02 [0.67-1.55]
Bhattacharyya, 2017	187	266	185	265	10.2%	1.02 [0.71-1.48]
Biecker, 2015	137	245	107	253	8.6%	1.73 [1.21-2.47]
Chin, 2015	73	93	82	143	2.6%	2.72 [1.50-4.92]
Floer, 2014	138	249	93	243	7.8%	2.01 [1.40-2.87]
Garcia, 2016	49	163	28	174	3.5%	2.24 [1.33-3.79]
Hass, 2016	177	281	167	281	11.5%	1.16 [0.83-1.63]
Ngu, 2017	479	886	425	886	36.2%	1.28 [1.06-1.54]
Patel, 2016	357	452	343	597	11.5%	2.78 [2.11-3.68]
Total (95% CI)		**2852**		**3067**	**100.0%**	**1.56 [1.40-1.73]**
Total events	1755		1593			

Heterogeneity: Chi² = 40.21, df = 8 (P < .00001); I² = 80%
Test for overall effect: Z = 8.10 (P < .00001)

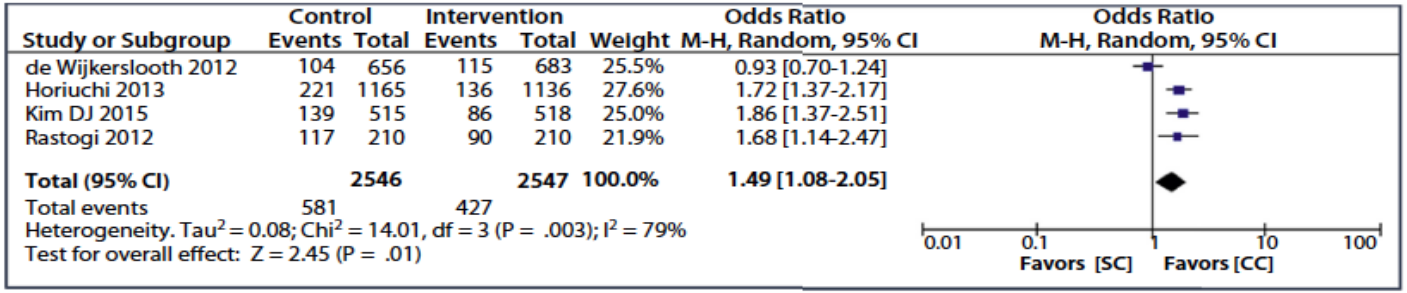


Polyp detection rate with Endocuff

Missed Lesions at Colonoscopy
How to improve? – use of devices

Impact of cap-assisted colonoscopy on detection of proximal colon adenomas: systematic review and meta-analysis.

GIE 2017 Aug;86(2):274-281.



Study or Subgroup	Control Events	Control Total	Intervention Events	Intervention Total	Weight	Odds Ratio M-H, Random, 95% CI
de Wijkerslooth 2012	104	656	115	683	25.5%	0.93 [0.70-1.24]
Horiuchi 2013	221	1165	136	1136	27.6%	1.72 [1.37-2.17]
Kim DJ 2015	139	515	86	518	25.0%	1.86 [1.37-2.51]
Rastogi 2012	117	210	90	210	21.9%	1.68 [1.14-2.47]
Total (95% CI)		**2546**		**2547**	**100.0%**	**1.49 [1.08-2.05]**
Total events	581		427			

Heterogeneity. $Tau^2 = 0.08$; $Chi^2 = 14.01$, df = 3 (P = .003); $I^2 = 79\%$
Test for overall effect: Z = 2.45 (P = .01)

Figure 2. Forest plot of right-sided adenoma detection rate using cap-assisted colonoscopy versus standard colonoscopy. *CI*, Confidence interval.

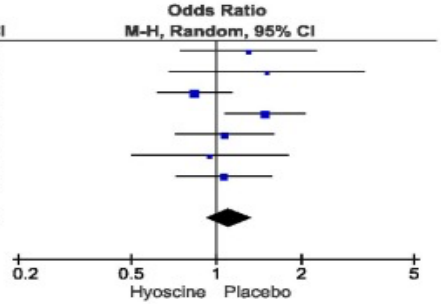
Missed Lesions at Colonoscopy
How to improve? – use appropriate techniques

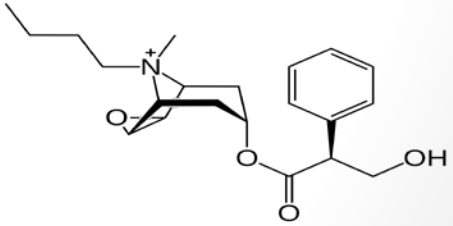
Impact of Hyoscine on PDR in Colonoscopy

- Gastro Res 2018; 11(4):2950304

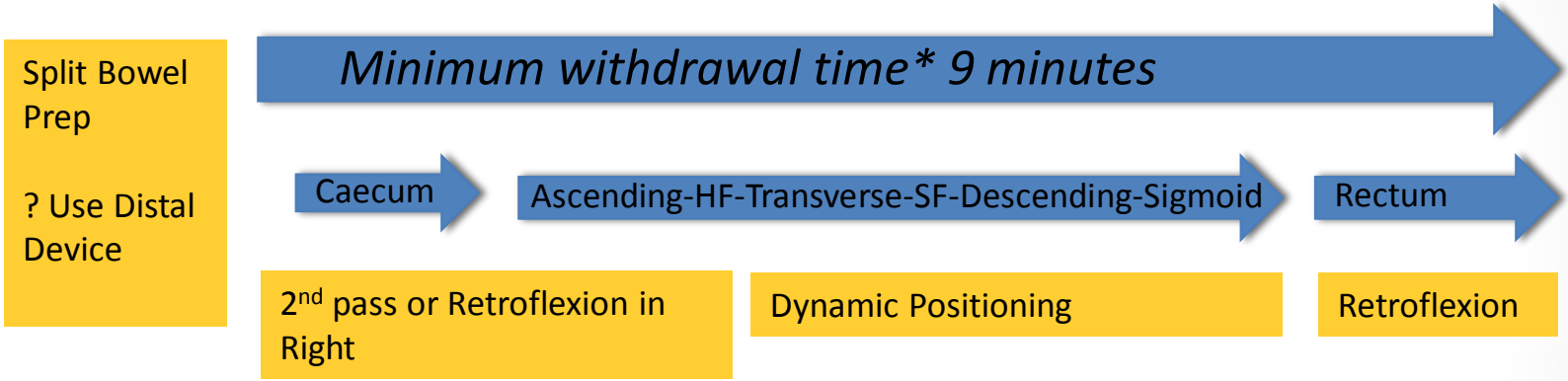
Study or Subgroup	Hyoscine Events	Hyoscine Total	Placebo Events	Placebo Total	Weight	Odds Ratio M-H, Random, 95% CI
2009 Byun et al.	47	103	40	102	9.5%	1.30 [0.75, 2.27]
2010 Lee at al.	20	58	15	58	4.9%	1.51 [0.68, 3.35]
2012 Brouwer et al.	190	340	201	334	23.8%	0.84 [0.62, 1.14]
2012 Corte et al.	140	303	109	298	21.8%	1.49 [1.07, 2.06]
2013 Rondonotti et al.	78	202	74	200	16.0%	1.07 [0.72, 1.60]
2016 Ristnikankare et al.	34	75	35	75	7.3%	0.95 [0.50, 1.80]
2017 Santos et al.	145	220	142	220	16.7%	1.06 [0.72, 1.57]
Total (95% CI)		1301		1287	100.0%	1.11 [0.93, 1.34]
Total events	654		616			

Heterogeneity: $Tau^2 = 0.01$; $Chi^2 = 7.54$, df = 6 (P = 0.27); $I^2 = 20\%$
Test for overall effect: Z = 1.14 (P = 0.25)





Missed Lesions at Colonoscopy
How to improve? – Summary



*if no intervention

Missed Lesions at Endoscopy Conclusion

- Is there a problem ?
  - Yes
- How to improve ?
  - take a better look
    - Take longer
    - Prepare better
    - Use appropriate techniques
    - +/- use devices