Endoscopic tattooing for colorectal lesions: impact on quality of care and patient outcomes

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ABSTRACT

INTRODUCTION The National Bowel Cancer Screening Programme guidelines advocate the use of endoscopic tattooing for suspected malignant lesions to assist identification and to facilitate laparoscopic resections. However, endoscopic tattooing practices are variable in endoscopic units, resulting in repeat endoscopy and delay in patient management. The aim of this study was to assess the adherence to tattoo protocol for significant colonic lesions at an endoscopy unit in a large district general hospital.

MATERIALS AND METHODS Prospectively collected data were analysed for 252 patients with significant colonic lesions between January 2017 and December 2018. Data were collected through reviewing patient's notes, histopathology findings and endoscopy reports. Data on lesions, complications, number and site of tattoo placed, and any repeat endoscopy for a tattoo were collected.

RESULTS Of the 252 patients, 88% ($n = 222$) had malignant and 12% ($n = 30$) had benign lesions. Only 58.7% ($n = 148$) of those patients who had colonoscopy had tattoo placement reported. Of these 148 cases, the report stated the distance of tattoo in relation to the lesion in only 46% ($n = 68$) of patients. Unfortunately, 14.3% ($n = 36$) of patients required repeat endoscopy to tattoo the lesions prior to surgery.

CONCLUSIONS Our study highlights the lack of uniformity of tattoo practice among endoscopists. Despite the National Bowel Cancer Screening Programme guidelines, a significant proportion of colorectal lesions are still not tattooed during their first endoscopy. Some patients had to have repeat endoscopy just for the purpose of tattooing. Active involvement and participation of all endoscopists in the colorectal and the complex polyp multidisciplinary teams may help to improve the tattoo service.

KEYWORDS

Endoscopic tattooing – Colorectal lesions – Laparoscopic surgery – India ink

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Introduction

Colorectal cancer is the second most common cause of cancer related death in UK.¹ However, significant improvement in the survival has been noticed with early diagnosis, adjuvant therapies and excellent outcomes from surgeries. Laparoscopic surgery has become standard for surgical treatment of colorectal cancer because of its benefits in reducing perioperative complications and length of hospital stay, which lead to more rapid recovery postoperatively.²

Owing to a lack of tactile sensation, very early lesions are difficult to identify during surgery. Accurate localisation of the colorectal lesions during laparoscopic and robotic surgery is crucial.³ With the success of bowel screening, more colorectal lesions are being identified at early stages. Identification of these early lesions is challenging, even during open surgery, in the absence of any markers.^{4,5} The preoperative marking of colorectal lesions also assists to ensure adequate margins for resection.

The lack of accurate lesion identification during surgery may have an impact on oncological clearance.⁶ Endoscopic tattooing of colorectal lesions not only assists in identification during surgery but also enables subsequent endoscopic identification of the polypectomy site during surveillance colonoscopy. Endoscopic tattooing is a reliable method of localisation and has been widely practised.^{4–8}

The aim of the study was to assess adherence to the tattoo protocol published by the British Society of Gastroenterologist in our endoscopy unit.⁹

Materials and methods

Prospectively collected data between January 2017 to December 2018 were retrospectively analysed for significant colonic lesions referred to colorectal multidisciplinary team in a large district general hospital. During this 24-month period, 252 patients were found to have significant colorectal lesions during colonoscopy examination. All

normal colonoscopic examinations were excluded from the study. Data were collected and analysed through reviewing patient's notes, indication for endoscopy, histopathology reports, endoscopic and surgical findings. Data on the lesions found included number and site of tattoo placed, complications and any repeat endoscopy for tattooing.

Technique

Endoscopic tattooing is the gold standard for localisation of the colorectal lesions. The National Bowel Cancer Screening Programme guidelines advocate the use of endoscopic tattooing for suspected malignant lesions to assist in identification and facilitate laparoscopic resections.⁹ Endoscopic tattooing practices are variable in endoscopic units. A lack of tattooing of lesions and documentation results in repeat endoscopy and at times delay in patient management.

The tattoo agent and method have been well described in the literature.^{7,10–13} At our unit, we recommend that the tattoo agent (Spot Ink[®]) is injected into the raised submucosal saline bleb at four quadrants within 5cm distal to the lesion. This should be clearly documented in the report with photographic evidence.

Results

The median age of the 252 patients was 72 years, with an age range of 50–88 years. In 88% ($n = 222$) the colorectal lesions were malignant and in 12% ($n = 30$) they were benign.

Indications for endoscopy were predominantly rectal bleeding (25%), change in bowel habit (16.3%), abnormal imaging (15.9%), iron deficiency anaemia (18.2%), bowel screening programme (12.3%), previous colonic polyps or cancer (9.5%) and palpable mass (2.7%; Table 1). Most pathology was located in the left side of the colon (60%; Table 2).

Of the 252 patients 59.5% ($n = 150$) had colorectal cancer, 25.4% ($n = 64$) had both colorectal cancer and polyps, 11.9% ($n = 30$) had colorectal benign-looking polyps and 8 had malignant strictures. In 58.7% ($n = 148$) of patients, the colonoscopy report stated that a tattoo had been placed (Table 3). Of these 148 patients, only 46% ($n = 68$) of the reports mentioned the site of tattoo in relation to the lesion. In 144 (97%) patients, tattoos were placed distal to the lesion. However, in two patients (1.5%), the tattoo was at the site of the lesion and two patients (1.5%) were tattooed both proximally and distally.

Endoscopies were performed by gastroenterologists 25.8% ($n = 60$), colorectal surgeons 34.1% ($n = 86$), non-substantive endoscopists 41.2% ($n = 104$) and nurse endoscopist 1% ($n = 2$). In 104 patients where a tattoo was not placed, this was because of because the lesion was benign, poor bowel preparation or planned for a rescope for tattooing (Table 3). However, in 30.5% ($n = 77$) cases no information

Table 1 Indications for endoscopy

Indications for endoscopy	Patients ($n = 252$)	
	(n)	(%)
Rectal bleeding	63	25
Change in bowel habit	41	16.3
Abnormal imaging	40	15.9
Iron deficiency anaemia	46	18.2
Bowel screening programme	31	12.3
Previous polyps or cancer	24	9.5
Palpable mass	7	2.7

Table 2 Endoscopic location of the lesions

Endoscopic location of the lesion	Patients ($n = 252$)	
	(n)	(%)
Sigmoid	64	25.39
Rectum	56	22.22
Caecum	36	14.28
Ascending colon	33	13.09
Descending colon	8	3.17
Hepatic flexure	18	7.14
Splenic flexure	3	1.19
Transverse colon	13	5.16
Rectosigmoid junction	21	8.33

Table 3 Anatomical location of the lesions

Anatomical location	Tattooed ($n = 148$)		Not tattooed ($n = 104$)	
	(n)	(%)	(n)	(%)
Sigmoid	43	67	21	33
Rectum	25	45	31	55
Caecum	16	44	20	56
Ascending colon	17	51	16	49
Descending colon	5	63	3	37
Hepatic flexure	17	94	1	6
Splenic flexure	2	67	1	33
Transverse colon	11	85	2	15
Rectosigmoid junction	12	57	9	43

was provided regarding endoscopic tattooing. Some 14.3% ($n = 36$) of patients required repeat endoscopy to tattoo the malignant lesions prior to surgery because they were not tattooed at their initial endoscopies (procedures done by 4 surgeons, 7 gastroenterologists and 25 non-substantive endoscopists). One of these patients had an endoscopic

polypectomy and according to report the site was tattooed; subsequent histology of the lesion was malignant. However, during immediate surveillance colonoscopy failed to identify any tattoo mark, so the patient was referred to the tertiary centre for chromoendoscopy. Two patients underwent intraoperative colonoscopy to identify the site of the lesion as they were difficult to identify during laparoscopic procedure.

No tattoo related complications were noted. Local protocol was maintained in cases of benign lesions apart from two cases where polyps greater than 20mm were removed but not tattooed.

Discussion

In this study, despite the strong recommendation from the National Bowel Cancer Screening Programme in collaboration with the Joint Advisory Group on Gastrointestinal Endoscopy, a significant number of lesions were not tattooed at first examination and approximately 14.3% required repeat endoscopy for the sole purpose of tattooing, which also had an impact on the management pathway. Moreover, a significant number of the patients had lesions tattooed but not enough information was provided in the reports. It is also worth noting that for a significant number of patients who missed being tattooed in their first endoscopy, the procedure was performed by non-substantive endoscopist (Fig 3). Our study also reflects that majority of the right-sided significant colonic lesions and rectal lesions were not tattooed according to protocols (Table 3).

Several methods of preoperative localisation of the colorectal lesions have been described to facilitate the identification of lesions during surgery, including barium enema, computed tomography colonography, placement of mucosal clips, and intraoperative colonoscopy. However, endoscopic tattooing seems to be more reliable.^{8,14,15} Measuring the distance of lesions from the anal verge and location with barium enemas may be unreliable.¹⁵ This is a good method for localising exophytic and stenosing lesions, but less effective for localising early or flat tumours.⁶ On the other hand, computed tomography colonography is useful for detecting the primary tumour but it also provides information about synchronous and metachronous lesions, with a considerable radiation index, but it is not as effective as optical colonoscopy.^{6,16} Metal clips may dislodge, it can be expensive and may require special equipment to identify lesions during laparoscopic surgery. Intraoperative colonoscopy is time consuming, expensive and troublesome to carry out, and may distend the bowel, thereby increasing the risk of contamination.⁶

Endoscopic tattooing with India ink (Spot Ink[®]) has become the standard of care as a marker to assist in the intraoperative identification of colonic lesions and prospective follow-up of colonic polyps.⁷ Endoscopic tattooing of colorectal was first described by Saunty and Knudtson in 1958, when they used blue dye to track the rectal polypectomy site.¹⁷ A case report was published in

Figure 1 Types of colorectal lesions

Figure 2 Location of tattoo placed in relation to the lesions

Figure 3 Total tattoo missed by different specialty required repeat endoscopy

1975 by Ponsky and King, describing a patient in whom they used India ink to localise a sigmoid polyp prior to polypectomy.¹⁸ The safety and efficacy of endoscopic tattooing have been reported in many studies, but its routine use has still not been achieved.^{4,5,8,15} The lack of endoscopic tattooing may result in significant difficulty in identifying the lesion of interest and may ultimately result in inadequate oncological clearances, perioperative difficulties and an increase in the rate of conversion of open surgeries.^{4,5} In spite of such concerns, the real incidence of not tattooing by the endoscopist when lesions suspicious for malignancy are identified remains unclear.

Limitations

Our study was limited by its retrospective design and single-institution experience. The decision to tattoo or not tattoo the lesion was at the discretion of the endoscopist, which introduces potential selection bias. Additionally, the absence of standardised endoscopy reporting on tattooing may have resulted in missing or incomplete data.

Conclusions

In conclusion, all colonic lesions that appear to be malignant should be tattooed during endoscopy to improve surgical localisation.^{5,16,19} Tattoo endoscopy is a safe and effective method for preoperative tumour localisation.^{4-8,11} A need for improvement and uniformity of tattoo practice among endoscopists despite the National Bowel Cancer Screening Programme guidelines is important. Active involvement and participation of all endoscopists in the colorectal and the complex polyp multidisciplinary teams are also necessary. There is a need for further education to standardise the technique for endoscopic tattooing and for further multicentric studies to evaluate the endoscopic tattooing practice and its impact on patient management pathways.

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