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# Doughnut bother! Histopathological examination of anastomotic doughnuts following colorectal anastomosis does not change patient management

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## Abstract

**Introduction:** The use of a circular stapling device to create an anastomosis following colonic or rectal resection is common practice in the United Kingdom. Histopathological analysis of the anastomotic doughnuts produced takes time and resources, but does it ever change patient management?

The aim of this study was to review the examination of doughnuts and whether patient treatment was altered by the findings.

**Method:** A retrospective case note review of all cases involving anastomotic doughnuts in a single trust between December 2010 and January 2018, was performed.

**Results:** There were 435 cases identified, male to female ratio was 2.0:1, age range 20–86 years and a median age of 66 years. 376 Doughnut samples were received by the pathology department (86.4%) and 354 were examined (81.4%). The disease processes involved were adenocarcinoma ( $n = 352$ , 80.9%), diverticular disease ( $n = 47$ , 10.8%), no residual disease/complete response ( $n = 22$ , 5.1%), adenoma ( $n = 7$ , 1.6%), mucinous ( $n = 5$ , 1.1%), Crohn's disease ( $n = 1$ , 0.2%) and neuroendocrine ( $n = 1$ , 0.2%). Benign adenomatous change was identified in 4 cases (0.9%). No doughnuts examined contained dysplastic or malignant changes.

**Conclusion:** The histological examination of anastomotic doughnuts is extremely unlikely to identify malignant change and subsequently does not change patient management. Pathology departments could save time and resources by not routinely examining doughnuts.

## Introduction

Historically, routine histological examination of tissue doughnuts following primary colorectal anastomosis using a circular stapling device was undertaken. Multiple studies have questioned the yield of this practice and the influence on patient management, given the time and resources required to analyse each specimen (Morlote and Alexis 2016; Ng et al. 2014; Morgan et al. 2006; Pullyblank et al. 2001; Speake and Abercrombie 2003; Cross et al. 1989; Sugrue et al. 2017). National guidance from the Royal College of Pathology suggests this is required in certain circumstances where the distal resection

margin is < 30 mm from the lesion or in particularly aggressive forms of disease (Royal College of Pathologists 2018) (Fig. 1).

Examining doughnut integrity in theatre occurs routinely to aid assessment of anastomosis success and risk of leak (Cauchy et al. 2017). The decision to examine doughnuts microscopically then lies jointly between the surgeon and pathologist given the specimen can be discarded either before or after it arrives in the pathology department.

The aim of this study was to assess the current practice of histological doughnut analysis and determine the impact this had on patient management.

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## Materials and methods

All cases of left colonic or rectal resection which may have involved the use of a circular stapling device were identified via the coding department in a single trust between 2010 and 2017. Case notes were retrospectively reviewed and pathology reports interrogated for:

- Demographics
- Consultant surgeon
- Underlying disease and site
- Doughnuts received and examined
- Distance to distal margin
- TNM stage (if applicable)

## Results

A total of 435 cases were identified, 376 specimens were received by the pathology department (86.4%). Of the specimens received, 354 were microscopically examined (94.1%). The site of disease is demonstrated in Table 1. Table 2 depicts cases analysed by disease process.

The disease process involved was most commonly adenocarcinoma as demonstrated in Fig. 2.

Doughnuts were not sent to the pathology department in 59 cases, the disease process in these cases were adenocarcinoma (39), diverticular disease (16), adenoma (Ng et al. 2014), Crohns (Morlote and Alexis 2016) and mucinous adenocarcinoma (Morlote and Alexis 2016). 66.0% of diverticular cases had doughnuts sent to the pathology department, all of which were analysed.

Individual surgeon practice is demonstrated in Table 3.

The lesion of interest was documented as < 30 mm to the distal margin on histological analysis in 154 cases (35.4%). Of these, 141 doughnut specimens were received by the pathology department (91.6%) and 137 were examined (89.0%).

223 specimen lesions were > 30 mm to distal margin (51.3%). 195 of these patients had doughnuts sent to the laboratory (87.4%) with 181 examined (81.2%).

No lesion was identified in 22 cases (5.0%). Where no lesion was identified, doughnuts were sent to the

**Table 1** Site of pathology

Site	Number of specimens	% of total
Rectum	136	31.3
Rectosigmoid	80	18.4
Sigmoid	188	43.2
Descending colon	20	4.6
Splenic flexure	2	0.5
Not recorded	9	2.0
Total	435	

**Table 2** Disease process involved and specimens analysed

Disease process	Number	Sent	Analysed	Malignant change present
Adenocarcinoma	352	313	292	0
Diverticular	47	31	31	0
No residual disease	22	20	19	0
Adenoma	7	5	3	0
Mucinous adenocarcinoma	5	4	2	0
Neuroendocrine tumour	1	1	1	0
Crohn's disease	1	0	0	0

pathology department in 20 cases (90.1%) and examined in 19 cases (86.4%).

## Discussion

Once doughnuts have arrived in the pathology department they require a period of 12 h in formalin, 24–36 h preparation where samples are embedded into paraffin and stained by the laboratory technicians. The histopathologist will then require 1–2 min to analyse a pair of doughnuts at a cost of approximately £8. Pathology services are under immense workload pressure, therefore avoiding unnecessary or fruitless analysis can prove beneficial from an economic and efficiency perspective.

After analysing 376 specimens over a seven year period, treatment pathways were not altered in a single case. Therefore, this study demonstrates that analysis of resection doughnuts is not required and results in wasted time and resources.

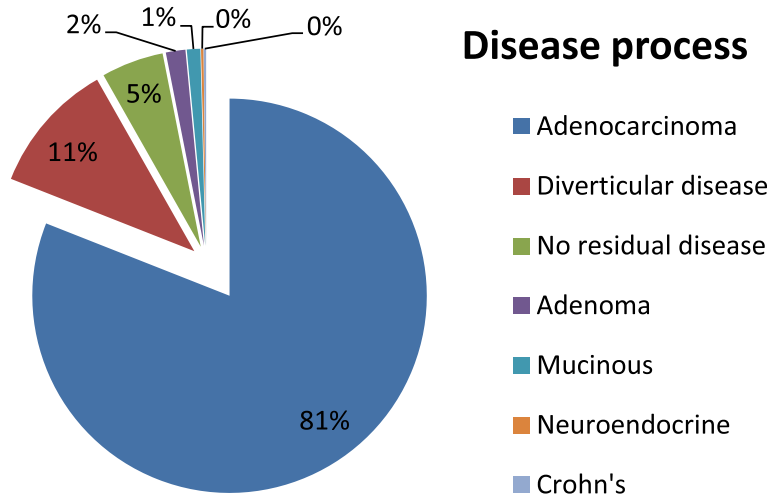
The responsibility of doughnut analysis lies jointly with the operating surgeon and the histopathology team. The operating surgeon can dictate whether specimens are sent to the pathology department or not. The pathology department can then determine which specimens are prepared and analysed. We would suggest that as a multidisciplinary team a consensus policy was met on reviewing the evidence that doughnut analysis does not alter patient management and is therefore obsolete and doughnuts should be sent for analysis. Although minor differences were identified by consultant surgeon practice, this did not reach statistical significance. Co.

There was no significant difference between outcomes of patients with a < 30 mm to distal margin than a > 30 mm to distal margin, despite the guidance from the RCPATH dataset.

This is the first study to review the outcomes of doughnut specimens received in the setting of no lesion of interest identified, subsequent to neoadjuvant treatment in the form of neoadjuvant chemo-radiotherapy or local treatment with endoscopic or trans-anal resection. With an increasing subset of patients undergoing neoadjuvant or local treatment this study suggests that analysis of doughnuts in these cases is also unnecessary.

It is usually not necessary to examine doughnuts from stapling devices histologically if the main tumour is >30 mm from the longitudinal margin of the main specimen, except in rare cases of aggressive cancers  
 -RCPATH Dataset for histopathological reporting of colorectal cancers

**Fig. 1** National Guidelines for reporting of Colorectal Cancer from the Royal College of Pathology



**Fig. 2** Graph depicting disease processes found on pathological examination

**Table 3** Variation in individual surgeon practice

Surgeon	Total cases	Rate sent (%)	Rate analysed (%)
A	128	84.4 (n = 108)	77.3 (n = 99)
B	94	88.3 (n = 83)	81.9 (n = 77)
C	14	57.1 (n = 8)	57.1 (n = 8)
D	106	83.9 (n = 89)	78.3 (n = 83)
E	93	93.5 (n = 87)	89.2 (n = 83)

However the numbers in this group were small ( $n = 22$ ), therefore more research is required in this group of patients.

This study supports the growing evidence that histological doughnut analysis should be abandoned, surgeons should no longer send doughnut specimens for analysis unless there are specific intra operative concerns. This would allow more efficient use of the pathology department's time and resources.

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None.

#### Authors' contributions

All authors have agreed to submission.

#### Competing interests

The authors declare that they have no competing interests.

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