

## The Role of Histological Assessment of Distal Doughnut in Low Anterior Resection for Low Rectal Cancer

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Anterior resection (AR), especially low anterior resection (LAR), for low rectal cancer and colorectal anastomosis is a technical challenge to surgeons. But by using circular stapling devices now it is possible make more LARs technically feasible. A stapled end-to-end colorectal anastomosis is increasingly adopted following a low anterior resection for low rectal cancer. This descriptive cross-sectional study was carried out in the department of Surgery, Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh from December 2015 to December 2016. The ensuing doughnuts created from the stapling device are routinely sent for histological analysis. However, its efficacy remains debatable. This study aims to determine the role of sending distal doughnut for histological examination following a stapled end-to-end colorectal anastomosis done in low anterior resection for low rectal cancers.

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### Introduction

In the last 2 decades, there are much more improvements are seen rectal cancer surgery by using more advanced surgical techniques. Abdominoperineal resection, which was the previous gold standard treatment of rectal cancer surgery; now it is considered unnecessary in most patients with low rectal cancer and most of these patients can now be treated with sphincter saving surgery<sup>1</sup>. Anterior resection (AR), especially low anterior resection (LAR), for rectal carcinoma and colorectal anastomosis is a technical challenge to surgeons. The introduction of circular stapling devices has made more and more LARs technically feasible<sup>2</sup>.

Tumor cell deposits within the mesorectal lymph nodes have been identified up to 5cm distal to the inferior aspect of the tumor, emphasizing the need to mesorectal transection 5cm distal to the inferior border of the tumor for more proximal rectal cancers. However, for patients with low lying tumors treated with total mesorectal excision, the clinical evidence is less clear regarding what constitutes an adequate distal margin<sup>3</sup>.

Subclinical distal bowel intramural spread is present within 1cm distally from visible palpable tumor in a substantial proportion of patients. For these reasons, for patients with low-lying cancer who are undergoing anterior resection (AR), >1cm of distal bowel clearance is recommended as minimally acceptable<sup>3</sup>.

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With the advent of stapling devices and their increasing use to create low colorectal anastomosis, low anterior resection with preservation of the anal sphincter has become the preferred surgical option of choice for mid and low rectal cancer<sup>4</sup>. The double-stapled technique of anterior resection of the rectum for adenocarcinoma has enabled low anastomoses to be fashioned with proven safety and efficiency. The staple gun cuts 2 circular doughnuts of tissue from inside the anastomosis, one proximal and one distal. It is customary for the doughnuts to be examined for completeness by the operating surgeon<sup>5</sup>. However, with the popularization of FEEA, reports concerning anastomotic recurrence along the staple line after resection in patients with rectal cancer have increased<sup>6</sup>. Rectal cancer patients (5-30%) undergoing surgical resection will go on to develop a locoregional recurrence<sup>7</sup>.

The Royal College of Surgeons of England and the Association of Coloproctology of Great Britain and Ireland recommended that doughnuts should be examined histologically. The minimum dataset for colorectal cancer histopathology reports state that it is not necessary to examine doughnuts histologically if the tumour is greater than 30mm from the cut end<sup>5</sup>. Careful and accurate pathology reporting is vital. Because patients with rectal adenocarcinoma with involvement of the resection margin are at high risk of local recurrence and may receive post-operative radiotherapy +/- chemotherapy that is toxic and costly<sup>1</sup>.

In this study, we have tried to evaluate the role of routine histological study of distal doughnut following low anterior resection for low rectal cancer.

### Methods

This descriptive cross-sectional study was carried out in the department of surgery, Bangabandhu Sheikh Mujib Medical University, Dhaka from December 2015 to December 2016. Before taking informed written consent, all the procedures, benefits and risks of the study were explained to the patient. Adult 63 patients irrespective of sex were included in the study according to inclusion and exclusion criteria. It was Purposive sampling. Sample size was calculated by using one-sample comparison of proportion. All the patients had histologically proven low rectal cancer

(adenocarcinoma) underwent stapled low anterior resection. The distal doughnut was sent for histopathological study. Data was collected in a pre-designed sheet. Confidentiality of the patient was maintained properly.

### Results

The mean distance of rectal cancer from anal verge was  $5.71 \pm 1.11$ cm. Median distance of distal resection margin from tumor margin was 2cm. Most of the tumors were moderately differentiated (73.02%). Most of the lesions were T<sub>3</sub> (57.14%) followed by T<sub>2</sub> lesions. Most common N status was N<sub>1</sub> (47.5%). Distal resection margins as well as distal doughnuts were found positive in 2(3.17%) cases & both were poorly differentiated rectal cancer in young male patient. In both cases adjuvant therapy was given without further intervention. There were no statistically significant differences between per operative clinical assessment and postoperative histopathological findings of distal resection margin as well as distal doughnut.

Table I: Distribution of patients according to DRE report- distance from anal verge (n=63)

DRE	Cm
Range	5-6
Mean±SD	5.71±1.11

Table II: Distribution of patients according to distance of distal resection margin from tumor margin (n=63)

	Cm
Range	1.75-2.25
Median	2.00

Table III: Distribution of patients according to histopathological findings (n=63)

Histopathological findings	Number	%
Well differentiated	12	19.05
Moderately differentiated	46	73.02
Poorly differentiated	05	07.93
Total	63	100.0

*Original Contribution*

Table IV: Distribution of patients according to wall invasion (n=63)

Wall invasion	Number	%
T <sub>2</sub>	25	39.68
T <sub>3</sub>	36	57.14
T <sub>4</sub>	02	03.17
Total	63	100.0

Table V: Distribution of patients according to lymph node involvement (n=63)

N involvement	Number	%
N <sub>0</sub>	06	09.5
N <sub>1</sub>	30	47.5
N <sub>2</sub>	27	42.9
Total	63	100.0

Table VI: Distribution of patients according to histopathology report of distal resection margin (n=63)

Distal resection	Number	%
Negative	61	96.83
Positive	02	03.17
Total	63	100.0

Table VII: Distribution of patients according to histopathology report of distal doughnut (n=63)

Distal doughnut	Number	%
Negative	61	96.83
Positive	02	03.17
Total	63	100.0

Table VIII: Comparison of histopathological findings with per operative findings of distal doughnut (n=63)

Histo-pathological findings	Per operative findings		P value
	Positive	Negative	
Positive	00 (00.0)	02 (03.17)	1.000
Negative	00 (00.0)	61 (96.82)	
Total	00 (00.0)	63 (100.0)	

Fisher Exact test was done to measure the level of significance.

Table VIII shows there was no statistical significant difference between per operative and histopathological findings.

**Discussion**

According to the result of digital rectal examination the distance of palpable tumor was 5-6cm from anal verge & the Mean±SD was 5.71±1.11cm. In a study they consider tumor location of low-lying (distance between anal verge and lower edge of tumor ≤6cm), middle-third (7-11cm from anal verge) and upper-third (≥12cm from anal verge)<sup>8</sup>.

According to gross description of histopathology report the distance of distal resection margin from tumor margin was 1.75-2.25cm & the median distance was 2cm. Among 63 patients following histopathology 12(19.05%) cases were diagnosed as well differentiated, and 46(73.02%) cases were diagnosed as moderately differentiated & in 5(7.93%) cases it was diagnosed as poorly differentiated rectal cancer. In one study they found that most rectal adenocarcinomas (70%) were diagnosed as moderately differentiated. Well and poorly differentiated carcinomas account for 10% and 20% respectively<sup>9</sup>. So, our result is very close to the previous study.

After performing histopathology following surgery 25(39.68%) specimen revealed T<sub>2</sub> lesion, 36(57.14%) revealed T<sub>3</sub> lesion & 2(3.17%) lesions were detected as T<sub>4</sub>. In case of lymph node status there were no positive lymph node in 6(9.5%) specimens, lymph node status was N<sub>1</sub> in 30(47.5%) specimens, & it was N<sub>2</sub> in 27(42.9%) specimens. According to a study done in 2015 they found T<sub>1</sub> lesion in 1.0%, T<sub>2</sub> lesion in 2.4% cases, T<sub>3</sub> lesion in 37.6% cases & T<sub>4</sub> lesion in 59.0% cases. In the same way N<sub>0</sub> was found in 32.9% specimens & N<sub>1</sub> in 27.6% specimen & N<sub>2</sub> in 39.5%<sup>8</sup>. But in this study, we found no T<sub>1</sub> & in only in 2 cases it was N<sub>0</sub> lesion because most of the patient comes to us in an advanced stage. On the other hand, T<sub>4</sub> lesion is also less because locally advanced growth was advised for neoadjuvant therapy.

Among 63 patients following stapled low anterior resection for low rectal cancer distal resection margin as well as distal doughnut was positive in 2(3.17%) cases & both 2 were diagnosed as poorly differentiated rectal cancer in young male patient. In both 2 cases adjuvant therapy was given without

further intervention. There were no statistically significant differences between per operative clinical assessment and postoperative histopathological findings of distal resection margin as well as distal doughnut. In a study for the LAR specimen, the distal resection margins ranged from 1 to 55 mm (median 21mm), not including the anastomotic staple rings. In 15.1% patients, who underwent LAR had distal resection margins of <10mm. All patients had pathologically negative distal resection margins<sup>10</sup>.

In a study Conducted among 125 patients with doughnut histology, 121 sets of doughnuts were normal. Two doughnuts showed non-specific inflammation consistent with diverticular disease, one had a metaplastic polyp with no evidence of malignancy, and one contained adenocarcinoma. This distal doughnut, which was involved by carcinoma, came from a patient with a poorly differentiated Dukes Stage C tumor. The circumferential and distal resection margins of the main operative specimen were also positive for carcinoma. The operating surgeon described the high likelihood of locally residual tumour at the end of the procedure. The fact that the distal doughnut was involved did not influence the management since the pathology of the main specimen dictated that it was already a pathologically non-curative procedure. This result correlates with our result<sup>5</sup>.

In a study conducted on 336 patients who underwent a stapled end-to-end anastomosis following proctectomy for rectal cancer & the specimen margins and doughnuts were all negative for malignancy. He concluded that there appears to be no additional oncological or cost benefits in sending doughnuts after a stapled end-to-end colorectal anastomosis following low anterior resection for rectal cancers except in selected clinico-pathological conditions whereby the risk of a positive margin is deemed higher<sup>11</sup>.

In a study conducted in 2007 in case of histopathological assessment of 'doughnuts' after anterior resection in total 127 cases. No doughnuts or distal resection margin was found positive for malignancy<sup>12</sup>.

#### *Conclusion*

Histological examination of distal doughnut does not play a vital role in further management

following low anterior resection. On the other hand, the distal doughnut does not contain the whole circumference of distal segment & normal doughnut histology is not a proof of absence of residual disease. Moreover this process is labor intensive and requires additional cost. Most of the case distal doughnut is negative for malignancy, & the result does not influence the management protocol. Moreover, there appears to be no additional oncological or cost benefit. So, the role of histological examination of distal doughnut in low anterior resection for low rectal cancer is questionable.

#### **References**

1. Law WL, Chu KW. Anterior Resection for Rectal Cancer with Mesorectal Excision-A Prospective Evaluation of 622 Patients. *Ann Surg.* 2004;240:260-8.
2. Kumar A, Daga R, Vijayaragavan P, Prakash A, Singh RS, Behari A, Kapoor VK, Saxena R. Anterior resection for rectal carcinoma - risk factors for anastomotic leaks and strictures. *World J Gastroenterol.* 2011;17(11):1475-9.
3. Bujko K, Rutkowski A, Chang GJ, Michalski W, Chmielik E, Kusnierz J. Is the 1-cm Rule of Distal Bowel Resection Margin in Rectal Cancer Based on Clinical Evidence? A Systematic Review. *Ann Surg Oncol.* 2012;19:801-8.
4. Saúl E, Ramírez R, Uribe A, Betzabé E, García R, Labastida S, Pérez PL. Risk factors for anastomotic leakage after preoperative chemoradiation therapy and low anterior resection with total mesorectal excision for locally advanced rectal cancer. *Revista de Investigación Clínica.* 2006;58:204-10.
5. Speake WJ, Abercrombie JF. Should doughnut histology be routinely performed following anterior resection for rectal cancer? *Ann R Coll Surg Engl.* 2003;85:26-7.
6. Hasegawa J, Nishimura J, Yamamoto S, Yoshida Y, Iwase K, Kawano K, Nezu R. Exfoliated malignant cells at the anastomosis site in colon cancer surgery: the impact of surgical bowel occlusion and intraluminal cleaning. *Int J Colorectal Dis.* 2011;26:875-80.
7. Czito BG, Willett CG. Rectal Cancer-International Perspectives on Multimodality

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*Original Contribution*

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- Management. Available at: [www.springer.com/series/7631](http://www.springer.com/series/7631);1-315.
8. Wen B, Zhang L, Wang C, Huang R, Peng H, Zhang T, Dong J. Prognostic significance of clinical and pathological stages on locally advanced rectal carcinoma after neoadjuvant chemoradiotherapy. *Radiation Oncology*. 2015;10:124.
  9. Fleming M, Ravula S, Tatischev SF, Wang HL. Colorectal carcinoma: Pathologic aspects. *Gastrointest Oncol*. 2012;3(3):153-73.
  10. Tsutsumi S, Tabe Y, Fijii T, Yamaguchi S, Suto T, Yajima R, Morita H, Cato T, Shiya M, Saito J, Asao T, Nakano T, Kuwano H. Tumor Response & Negative Distal Resection Margins Of Rectal Cancer After Hyperthermo Chemoradiation Therapy. *Anticancer Research*. 2011;31:3963-8.
  11. Celene W, Lieske NB, Tan KK. Routine histological sampling of doughnuts post oncologic anterior resection is not necessary. *International*. 2014;29:843-5.
  12. Mason MC, Przybyl K, Brelsford K. Histopathological assessment of “doughnuts” after anterior resection-a regional survey & single institution audit. *Guidelines for the management of colorectal cancer (3<sup>rd</sup> Edition)*. 2007.