Reporting of lymphovascular invasion and non-nodal tumor deposits as prognostic risk factors in colorectal cancer patients

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Received: 18 March 2020
Revised: 9 April 2020
Accepted: 12 April 2020
Published: 28 August 2020

The Egyptian Journal of Surgery 2020, 39:745–747

Background and purpose
Both lymphovascular invasion (LVI) and non-nodal tumor deposits (TDs) are essential prognostic risk factors for colorectal cancer that many oncologists may not be aware of. This study aimed to detect the incidence of reporting of the state of the LVI and non-nodal TDs with operable colorectal malignancy, which are very important prognostic risk factors.
Patients and methods
Reporting of LVI and non-nodal TDs were traced in 900 patients (818 retrospective and 82 prospective individuals) with cancer of the colon and the rectum. The ability of improving the incidence of reporting was estimated by comparison of incidence of reporting in both groups.
Results
Percentage of reporting of LVI was 39% in the retrospective group and 49.9% in the prospective group, while reporting of non-nodal TDs was 7.228% in the retrospective group and 24.24% in the prospective group. There was a statistically significant difference between reporting of non-nodal TDs, prospective patients over retrospective patients ($P<0.0001$); while there was no statistically significant difference between reporting in retrospective and prospective patients in the LVI with P value of 0.865.
Conclusion
There were inadequate reporting of both non-nodal TDs and LVI in retrospective patients with improvement in prospective patients although statistically nonsignificant in the LVI, which may necessitate a new staging system that could accommodate all this prognostic risk factors.

Keywords:
colorectal cancer, lymphovascular invasion, non-nodal tumor deposits, prognosis, staging

Egyptian J Surgery 39:745–747

1110-1121

Introduction

Colorectal carcinoma is one of the most common malignancies worldwide and the most common cancer of the alimentary tract [1]. Several risk factors may be involved in the development of colorectal cancer including age, high-fat diet, and excessive alcohol consumption [2]. Also, many gene mutations have been described in the development of such cancer as the K-ras gene [3]. Other risk factors include polyps, familial adenomatous polyposis, and inflammatory bowel disease [4].

Different staging systems of cancers are used to predict the prognosis and plan the management. TNM staging system is now the most used staging system in colorectal cancer worldwide, which can be detected preoperatively by computed tomographic scan, MRI, or by endorectal ultrasound [5]. However, it has no place to accommodate all prognostic risk factors such as preoperative carcinoembryonic antigen and circumferential tumor margins [6]. From the first staging systems used in the management and prediction of prognosis of colorectal cancer is the Dukes system, which is widely used throughout the world till nowadays [7].

There are many prognostic risk factors which are very important in putting the plan of management and predicting the prognosis after surgery. Tumor grade and differentiation, histological tumor type [8,9], circumferential margins status, and lymphovascular invasion (LVI) [10,11] are examples of those factors.

One of the most important factors in determining the prognosis and management of colorectal cancer is the status of resected lymph nodes as in Al Sahaf *et al.* [12]. The extramural nodules in the T-category was classified in the sixth edition of the TNM and then considered as tumor deposits (TDs) in the seventh edition. Extracapsular lymph node metastasis is an

 DOI: 10.4103/ejs.ejs_65_20

established poor prognostic indicator in many cancers including colorectal cancer [12].

Aim

The first end point is to detect the incidence of reporting of the state of the LVI and non-nodal TDs with operable colorectal malignancy, which are very important prognostic risk factors. The second end point is the ability of improving the incidence of reporting in both.

Patients and methods

Population of study

Both men and women from any age group presenting with colon or rectal cancer were included in the study. This study was approved from the scientific committee of General surgery department faculty of medicine Cairo University. A written consent was signed by the prospective group of patients.

Inclusion criteria

(1) Patients with respectable colon and rectal cancer.
(2) Adenocarcinoma pathology with all its variants.

Exclusion criteria

(1) Primary anal canal carcinoma.
(2) Melanoma or squamous cell carcinoma pathology.
(3) Patients who were not subjected to primary resection.

Interventions

Reporting of the state of the LVI and non-nodal TDs was traced in the postoperative pathology reports of resected colorectal cancer.

This took place in both groups of patients:

(1) Retrospective patients (n=818) from the registry of colorectal cancer patients from January 2010 to January 2019 at Cairo University Hospitals.
(2) Prospective group of colorectal cancer patients (n=82) presenting to our colorectal unit in the period between June 2015 and March 2019. This group represented an intervention group to detect the difference in reporting between both groups.

Total number of patients was 900: retrospective group (n=818) and prospective group (n=82).

Statistical analysis

Statistically, the information obtained were described as number of patients and percentages when appropriate. χ^2 test were used for comparison between both groups. P value less than 0.05 was considered statistically significant. All statistical calculations were done using computer program SPSS (Statistical analysis was done using IBM SPSS statistics for windows, Armonk, NY: IBM Corp).

Results

Reporting of the lymphovascular invasion

Reporting of LVI in both retrospective and prospective groups is shown in Table 1.

Reporting of the non-nodal tumor deposits

Table 2 shows the reporting in both retrospective and prospective groups.

Comparison between both groups

There was a statistically significant difference in reporting of non-nodal TDs between both groups to the benefit of prospective one in which the P value was less than 0.0001. This is shown in Table 3.

Table 1 Number and percentage of reporting of lymphovascular invasion

	Retrospective cases (N=818) [n (%)]	Prospective cases (N=82) [n (%)]
Reported cases	320 (39)	34 (41)
Nonreported cases	498 (61)	48 (59)

Table 2 Number and percentage of reporting of non-nodal tumor deposits

	Retrospective cases (N=818) [n (%)]	Prospective cases (N=82) [n (%)]
Reported cases	59 (7.212)	20 (24.4)
Nonreported cases	759 (92.78)	62 (75.6)

Table 3 Statistical analysis of reporting of lymphovascular invasion between both groups

χ^2	21.725
P (DF=1)	0.000
χ^2 (Yates)	19.650
P (Yates)	0.000

Table 4 Statistical analysis of reporting of non-nodal tumor deposits between both groups

χ^2	0.091
P (DF=1)	0.763
χ^2 (Yates)	0.029
P (Yates)	0.865

On the other hand, there was insignificant statistical difference in reporting of LVI between both groups in which the *P* value was 0.865. This is shown in Table 4.

Discussion

Data gathered from the registry of retrospective group of patients shows that the reporting of LVI increased in the prospective group although there was statistically insignificant difference (P=0.865). On the other hand, reporting of the non-nodal TDs dramatically improved in the prospective group of patients which was statistically significant (P<0.0001). This occurs usually due to the fact that many of the oncologists, colorectal surgeons, and pathologists are unaware of the way those risk factors may affect the course of the disease as it is not included in the staging systems used, either the TNM or the Dukes staging systems [13].

In some countries, it is recommended to combine the Dukes staging system and TNM staging system in planning management and predicting prognosis. TNM staging module can be applied to all types of cancers and has been frequently subjected to different modifications [7].

Minimal changes had been applied to the TNM staging system of colorectal cancer throughout the last two decades despite their great effect on the course of the disease [14]. Despite the fact that the TNM staging system gives the main needed information required in planning the management of colorectal cancer such as lymph node status and distant metastasis, it does not include any data on other essential risk factors [15]. Moreover, NCCN guidelines state many factors other than that of TNM should be reported such as circumferential resection margin and LVI [16].In a previous study, other risk factors like circumferential tumor margins and preoperative levels of carcinoembryonic antigen were also underreported in the management of colorectal cancer [6]. In 2016, the authors participated in a study suggesting adding category 'F' to the TNM staging system to be TNMF, this category can accommodate all risk factors which have no place in the TNM such as the LVI and non-nodal TDs [17].

Conclusion and recommendations

There is inadequate reporting of LVI and non-nodal TDs, which can be improved if the medical team is aware of their importance in the management and prognosis in colorectal cancer especially those that are not included in the TNM staging system.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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