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VALUATING CONCENTRATION OF CEA, CA 19-9 AND SOME BIOCHEMICAL PARAMETERS IN PATIENTS WITH COLORECTAL CANCER

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ABSTRACT

Colorectal cancer has a high proportion of people infected in the world and if detected early, there is a high possibility of cure. The writing focuses on valuating markers of concentrations of CEA, CA 19-9 and some biochemical parameters in patients with colorectal cancer after surgery and treatment for colorectal cancer. Cross-sectional study is implemented on 162 patients with colorectal cancer who underwent surgeries at Vietnam - Czech Friendship Hospital, Vietnam. The results show that average age of women in the study is 64, 4±10, 6 which is higher than men (56, 7±11, 1) (p<0, 05). CEA concentration before surgery is 3,75 ng/ml which is higher than the CEA concentration after surgery for 1-3 months at 1, 93 ng/ml and after surgery for 3 to 6 months at 2, 19 ng/ml (p <0, 05). CEA concentration before surgery is 30, 96 ng/ml which is higher than the CEA concentration after surgery for 1-3 months at 23, 33 ng/ml, but being lower after surgery for 3 to 6 months at 61,0 ng/ml (p <0, 05). The concentration of CA19-9 has changes before and after the surgery, but the difference is not statistically significant. There was no differences before and after surgery between biochemical indices such as urea, creatinine, GOT and GPT; therefore, CEA in combination with CA19-9 increases the accuracy of the diagnosis, prognosis and monitoring for the colorectal cancer.

KEYWORDS

CEA, CA19-9, Cancer, Colorectal and Vietnam.

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INTRODUCTION

Colorectal cancer is a highly prevalent disease in the world and is one of the leading causes of cancer death. According to statistics, in 2012, around the world there are about 1, 360, 602 cases and 693, 933 deaths because of the colorectal cancer, especially incidence of the colorectal cancer is increasing in the community. In Vietnam, Colorectal cancer is the third most common cancer in types of gastrointestinal

cancer only after liver cancer and gastric cancer and the incidence is increasing[2].

However, according to studies of Boutard P *et al* (2004)[1], Nguyen Ba Duc *et al* (2006)[6], the patients with colorectal cancer can be cured completely (over 92%) if detected early and treated promptly. Tumour marker known as carcino embryonic antigen (CEA) is a tumour marker being specific for colorectal cancer tumors and help early diagnosis and treatment for the colorectal cancer. In the treatment of colorectal cancer, several studies have shown that CEA can valuate the effectiveness of treatment after surgery, prognosis and monitoring of recurrence and metastasis of the tumor. In fact, clinicians also use CEA being coordinate with some markers of other cancers, especially CA19-9, to increase the sensitivity and specificity of this marker and to monitor some biochemical indicators to valuate the effect of treatment after the surgery on the function of the body of the patient with colorectal cancer; therefore, we conduct this study to valuate the concentration of CEA, CA19-9 and some biochemical indices of the patient after the surgical treatment of the colorectal cancer.

Research objects and methodology

The author uses a cross-sectional descriptive research methodology. Choosing convenient samples, the medical records are selected into the study in chronological order regardless of age and gender. Sample size: n = 162.

Study time, study location: From 01/01/2013 to 01/03/2017. The location is at Vietnam - Czech Friendship Hospital, Vietnam.

Criteria for selecting the samples

(i) Patient diagnosed with colorectal cancer who has been assigned a CEA test

(ii) Patient undergoing surgery at Vietam - Czech Friendship Hospital and visiting the hospital for one to six months after surgery for re-examination

(iii) Complete medical record.

Criteria for exclusion

(i) Patient with colorectal cancer but not surgery

(ii) Patient did not tested for CEA before and after surgery

(iii) Patient has undergone surgery but not visting the hospital for re-examination or the patient has died

(iv) Patients with other cancers such as lung cancer, liver cancer, pancreatic cancer. Unless the tumor is caused by colorectal cancer cells.

Data processing method: The data are analyzed by SPSS 16.0 statistical medicine software for calculation percentage, $\overline{X}$, SD and p. In particular, do the variables compared two means by T - test follow the normal distribution rule? Non-standard distribution variables will be expressed as medians, for quadratic range of 25% - 75%, using the Mann Whitney test. The differences are statistically significant when $p < 0.05$. The T-test is used to determine statistically significant level for pa, the Mann Whitney test is used to determine statistically significant level for pb.

The ethical standards of research are

(i) This study is solely for the purpose of scientific research, not for any other purpose

(ii) Honesty with the data collected

(iii) No damage or loss of medical records and confidentiality of patient information.

Research results

Table No.1 shows that average age in the group studies is 61, 8 $\pm$ 10, 5 years old. Of which, average age of men is 56, 7 $\pm$ 11, 1 years old, which is lower than average age of women (64, 4 $\pm$ 10, 6 years old). The difference is statistically significant with $p < 0.05$.

CEA concentration before surgery is 3, 75 ng/ml which is higher than the CEA concentration after surgery for 1-3 months at 1,93 ng/ml and after surgery for 3 to 6 months at 2, 19 ng/ml. The difference is statistically significant with $p < 0.05$. There is no statistically significant differences at concentration of CA19-9 before and after surgery for 1-3 months with $p > 0.05$ (Table No.2).

CEA concentration before surgery is 30, 96 ng/ml which is higher than the CEA concentration after surgery for 1-3 months at 23, 33 ng/ml, but being lower after surgery for 3 to 6 months at 61, 0 ng/ml. The difference is statistically significant with $p < 0.05$. There are no statistically significant differences at concentration of CA19-9 before and after surgery for 1-3 months with $p > 0.05$ (Table No.3).

Table No.4 shows that: GOT activity and GPT activity after surgery for 3 - 6 months are 39.1 ± 15.9 and 36.1 ± 19.7 U/L, respectively, higher than those before surgery at 30.7 ± 12.3 and 26.7 ± 11.1 U/L; those after surgery for 1 - 3 months are 37.6 ± 28.7

and 33.3 ± 28.8 U/L. There are no statistically significant differences in 4 indicators of urea, creatinine, GOT and GPT with $p > 0.05$.

Table No.5 shows that: GOT activity and GPT activity after surgery for 3 - 6 months are 43.4 ±17.6 and 35.0±20.2 U/L, respectively, higher than those before surgery at 31.3 ±11.2 and 26.4 ±14.4 U/L; those after surgery for 1 - 3 months are 35.7 ± 11.5 and 26.4 ± 14.7 U/L. There are no statistically significant differences in 4 indicators of urea, creatinine, GOT and GPT with $p > 0.05$.

COMMENTS

Firstly, characteristics of age: The results show that the average age of patients getting disease at our study group ranges from 61.1 ± 10.5 years old. The youngest is 32 years old and the oldest is 85 years old. Studies by some authors also show similar results, for example the study of Mai Duc Hung (2012)[5] shows the average age of patients getting disease ranges form 61.42 ± 12.57; the highest age is 84, the lowest age is 28. According to Le Van Thieu (2013)[4], the average age ranges from 61.7 ± 12.3. The lowest age is 21 and the highest age is 81.

In this study, the results showed that the prevalence rate of patients under the age of 55 years is the highest at 32.7%, the prevalence rate over the age of 75 years is the lowest at 14.8% and the prevalence rate under the age of 75 years is 85.2%. This result correlates with a number of studies in Viet Nam, for example the study of Vo Van Minh (2013)[12] reported that the prevalence rate in the under-59 age group is 60.02%; the lowest rate in the over-70 age group is 17.54%. The study of Nguyen Cong Hoang (2008)[7] concluded that the most common age group ranges from 41 to 70 accounting for 86.7%. Another study of colorectal cancer epidemiology by Jass J.R. *et al.* (2007)[3] indicated that, in the community, this disease is rare under the age of 45 with the prevalence rate of 2/100,000 people/ year; the prevalence rate increases with age: 20/100, 000 people/ year in the age group of 45-54, 55/100,000 people/ year in the age group of 55-64, 150/100,000 people/ year in the age group of 65-74, and 250/100,000 people/ year in the age group of over 75.

From the above results, it can be easily seen that colorectal cancer is more common in the middle age group and over, and is more likely to be younger in the age group of prevalence. In the current situation, our living environment is becoming increasingly polluted; the working intensity is high (stress); the nutritional conditions have changed, especially the situation of food contamination, these have led to a growing prevalence rate of colorectal cancer.

Nowadays, the environmental factors, smoking, inadequate nutrition and food contamination account for 65% of causes of cancer. In addition, the development of medical conditions contributes to increasing the ability to diagnose early, detect early-stage cancers when there are no clear clinical symptoms, while in the past the disease usually progresses to a late stage with a poor prognosis when most patients detected. Therefore, the age of cancer detection is also reduced.

Secondly, patients with CEA < 10 ng/ml: In the group of patients with CEA concentration <10 ng/ml, the results showed a reduction of CEA concentration before surgery at 3.75 ng/ml; after surgery for 1-3 months at 1.93 ng/ml and 3-6 months at 2.19 ng/ml. It can be seen that CEA concentration does not increase again after 6 months of surgery.

According to the author, in the group of patients with CEA concentration <10 ng/ml before surgery, radical surgery is more effective. The study of Nguyen Cong Hoang (2008)[7], Dao Van Luu (2014)[2], Nguyen Quang Thai (2003)[10] indicated that, CEA concentration is directly proportional to the size of the tumor and the stage of disease. In this group of patients, when colorectal cancer is at early stage, the size of tumor is small, it only localizes where it arises without metastasis to other organs, so the surgery can cut off the entire tumor. Because of loss of fertility, CEA decreased and did not increase again after 6 months.

In another study, Nguyen Viet Nguyet (2008)[9] conducted in 119 patients with colorectal cancer at the stage of Dukes A at K hospital, Vietnam, and showed in 119 patients surrveyed, only 3 cases (2.5%) with CEA concentration ≥10 ng/ml and 116 cases with CEA <10 ng/ml, corresponding to 97.5%. This means that in 119 patients with colorectal cancer in the earliest stage, the majority of patients have CEA concentration <10 ng/ml.

Thirdly, patients with CEA ≥10 ng/ml: The result of this study indicates that there was a decrease in pre-

surgery CEA levels of 30.96 ng/ml and 1-3.3 months after surgery of 23.33 ng/ ml. However, there is an increase in CEA concentrations after 3-6 months of surgery, even higher than the initial concentration of 61.0 ng/ml.

In patients with a CEA concentration ≥10 ng / ml, it appears that the surgery is less effective. CEA concentration only temporarily decreases and then increases again. It is possible that at this stage the tumor is enlarged, in addition to the adjacent lymph nodes, they metastasize to the distal nodes and tissues, the most common of which are the liver, lung, brain, and ovaries. Surgery can not eliminate radical cancer. Surgery at this stage may be temporary surgery, which is intended to relieve the symptoms, complications or adverse effects of cancer, and to relieve the pain of the patient. Because all the cancer cells are not removed, a sufficiently large time after surgery the metastatic cancer cells that have not been removed will continue to develop and produce CEA in the blood that causes increased CEA levels with the pre-surgery stage.

The study by author Nguyen Quang Thai (2003)[10] reported that pre-surgery CEA concentrations increased above 10 ng/ ml, the rate of lymph node metastasis and metastasis clearly increased while the chances of surgery decreased. The study also showed that CEA levels ≥ 10 ng/ ml, Dukes C - D was 73.5% higher than CEA <10 ng/ml, Dukes C - D accounted for 53.7%. At the CEA level of ≥10 ng/ml, the likelihood that the patient is at a later stage is higher.

In another study, author Nguyen Danh Thanh *et al* (2010)[8] conducted a study of 34 radical patients (30 CEA ≤10 and 4 CEA patients> 10) and 19 non-radical operated patients, indicating a marked difference in CEA concentrations after surgery. There were 25/34 patients with negative CEA levels (<5 ng / ml) in the radical radical operated patient group, while the non-radical group had only 2-19 patients. According to author Nguyen Quang Thai (2003)[10], preoperative CEA levels in patients undergoing radicalization surgery were 10.4 ± 2.9 ng / mL after surgery were 4.3 ± 1.5 ng/ml. However, the temporary surgical group change in CEA concentration is not statistically significant.

Fourthly, the concentration of some biological indicators before and after surgery. According to the author, there is a slight increase in the concentration of biochemical parameters after surgery, especially the activity of GOT and GPT enzymes. However, the mean values of the urea, creatinine, GOT and GPT biochemistry indices are either near the lower or upper bound of the normal range. This may be because colorectal cancer does not affect the whole body, progressing slowly and the body can react to offset biochemical disorders for quite a long time before the tumor develops too strongly or and treatment after surgery has affected the liver and kidney function of the patient but not enough to significantly change the concentration level of this index.

The study by author Dao Van Luu (2014)[2] carried out a number of enzymes that evaluated GOT, GPT, and ureteric and creatinine levels in patients with Dukes C, D, indicating a change in concentration of biochemical indices is statistically significant at p <0.05 but the values are within the normal range. A slight difference in this finding may be because the above incidence of colorectal cancer patients and later colon cancer patients and medium-aged stage is higher (colorectal cancer group 70.68 ± 7, 409, colon cancer is 71.42 ± 5, 895), the change in the index concentration is clearer but within the normal range. In another study, author Nguyen Thi Thu Hanh (2003)[11] reviewed biochemical indices in patients on chemotherapy for breast cancer reported GOT, GPT, urea and creatinine indexes, found that there is no significant change in treatment duration, and the valuesare within the normal range. However, the author has not drawn many conclusions from the finding as the above variable indexes are due to the influence of the patient's condition, or some other diseases can also affect these indexes.

Table No.1: Ages of patients

S.No			n	$\bar{X}$ ± SD	p[a]
1	Ages	Women	63	64, 4 ± 10, 6	< 0, 05
		Men	99	56, 7 ± 11, 1	
		Total	162	61, 8 ± 10, 5	

(Source: Authors' calculation from SPSS 16.0)

Table No.2: Markers in the group of CEA <10 ng / ml before and after surgery for 1-3 months and 3-6 months

S.No		Period	n	Median	Quartile	p[b]
1	CEA	After surgery	126	3,75	1, 88 – 4, 89	< 0, 05
		After surgery for 1-3 months	116	1,93	1, 24 – 3, 11	
		After surgery for 3-6 months	88	2,19	2, 03 – 3, 89	
2	CA19-9	After surgery	86	20,77	6, 85 – 24, 47	> 0, 05
		After surgery for 1-3 months	50	17,72	10, 59 – 27, 14	
		After surgery for 3-6 months	48	18,37	8, 40 – 33, 74	

(Source: Authors's calculation from SPSS 16.0)

Table No.3: Markers in the group of CEA ≥ 10 ng/ml before and after surgery for 1-3 months and 3-6 months

S.No		Period	n	Median	Quartile	p[b]
1	CEA	After surgery	36	30, 96	13, 75 -177, 0	< 0,05
		After surgery for 1-3 months	32	23, 33	15, 84 – 117, 08	
		After surgery for 3-6 months	30	61, 0	15, 49 – 131,13	
2	CA 19-9	After surgery	29	55, 28	17, 27 – 154,14	> 0,05
		After surgery for 1-3 months	22	43, 07	11, 70 – 1855, 4	
		After surgery for 3-6 months	20	58, 44	36, 93 – 185, 27	

(Source: Authors' calculation from SPSS 16.0)

Table No.4: Some biochemical indicators in the group of CEA <10 before and after surgery for 1-3 months and 3-6 months

S.No	Indicator	Time	n	$\bar{X}$ ± SD	p[b]
1	Urea	Before surgery	126	4.9 ± 1.8	> 0.05
		After surgery 1 – 3 months	116	4.8 ± 1.5	
		After surgery 3 – 6 months	88	5.4 ± 1.9	
2	Creatinine	Before surgery	126	79.9 ± 16.6	> 0.05
		After surgery 1 – 3 months	116	77.8 ± 16.5	
		After surgery 3 – 6 months	88	77.9 ± 16.6	
3	GOT	Before surgery	126	30.7 ± 12.3	> 0.05
		After surgery 1 – 3 months	116	37.6 ± 28.7	
		After surgery 3 – 6 months	88	39.1 ± 15.9	
4	GPT	Before surgery	126	26.7 ± 11.1	> 0.05
		After surgery 1 – 3 months	116	33.3 ± 28.8	
		After surgery 3 – 6 months	88	36.1 ± 19.7	

(Source: Authors' calculation from SPSS 16.0)

Table No.5: Some biochemical indicators in the group of CEA ≥ 10 before and after surgery for 1-3 months and 3-6 months

S.No	Indicator	Time	n	$\overline{X} \pm$ SD	p[b]
1	Urea	Before surgery	36	4.4 ± 1.9	> 0.05
		After surgery 1 – 3 months	32	5.4 ± 2.5	
		After surgery 3 – 6 months	30	5.3 ± 1.3	
2	Creatinine	Before surgery	36	79.5 ± 12.9	> 0.05
		After surgery 1 – 3 months	32	83.3 ± 21.0	
		After surgery 3 – 6 months	30	84.6 ± 17.3	
3	GOT	Before surgery	36	31.3 ± 11.2	> 0.05
		After surgery 1 – 3 months	32	35.7 ± 11.5	
		After surgery 3 – 6 months	30	43.4 ± 17.6	
4	GPT	Before surgery	36	26.4 ± 14.4	> 0.05
		After surgery 1 – 3 months	32	26.4 ± 14.7	
		After surgery 3 – 6 months	30	35.0 ± 20.2	

(Source: Authors' calculation from SPSS 16.0)

CONCLUSION

In summary, CEA concentration is different before and after surgery for colorectal cancer. On the other hand, CA19-9 concentration does not significantly change before and after surgery. However, the combination of CEA and CA19-9 is significant in the diagnosis and prognosis of postoperative patients.

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CONFLICT OF INTEREST

We declare that we have no conflict of interest.

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