ISSN 2689-8268 | Volume 5

American Journal of Surgery and Clinical Case Reports

Research Article Open Access

Role of Serum Carcinoembryonic Antigen (CEA) Level in Localized Pancreatic Adenocarcinoma

Hussain M[1], Jan Y[1*], Khan S[2], Khan MY[3], Tahir I[1] and Neelma[4]

[1]Assistant Professor Surgical "A" Unit Hayatabad Medical Complex Peshawar, Pakistan

[2]Specialist Registrar Department of General Surgery Hayatabad Medical Complex Peshawar, Pakistan

[3]Consultant HPB/Liver Transplant Surgeon, Pakistan Kidney & Liver Institute and Research Centre, Pakistan

[4]2nd Fellowship Resident Hepatobilliary, Shaukat Khanum Cancer Hospital Peshawar, Pakistan

[*]Corresponding author:

Yousaf Jan,
Assistant Professor Surgical "A" Unit Hayatabad Medical Complex Peshawar, H# 89, Sec K5, Street 2, Phase 3, Hayatabad, Peshawar Pakistan,
E-mail: drmusaratkhl1984@gmail.com

Received: 18 Aug 2022
Accepted: 29 Aug 2022
Published: 03 Sep 2022
J Short Name: AJSCCR

Citation:

Jan Y. Role of Serum Carcinoembryonic Antigen (CEA) Level in Localized Pancreatic Adenocarcinoma. Ame J Surg Clin Case Rep. 2022; 5(7): 1-4

Keywords:

Carcinoembryonic antigen (CEA); Pancreatic adenocarcinoma; Prognosis

1. Abstract

1.1. Background: Even after curative surgery, the prognosis for patients with localised pancreatic cancer is still poor. The most often utilised serum-based tumour marker for the detection and monitoring of pancreatic cancer is Carcinoembryonic Antigen (CEA).

1.2. Objective: To investigate the use of Carcinoembryonic Antigen (CEA) as prognostic factors in localized pancreatic adenocarcinoma patients.

1.3. Materials and Methods: The clinicopathological data of 50 patients with localized pancreatic adenocarcinoma who were treated in General Surgery Department of Hayatabad Medical Complex between August 2016 and July 2021 were retrospectively analyzed. The relationships between serum Carcinoembryonic Antigen (CEA) levels and survival were analyzed. The cut-off values for serum CEA level was 5 ng/mL.

1.4. Results: Tumor localizations in group 1 were: 15(60%) tumors in the head of pancreas while 10(40%) in the tail of the pancreas, in group2: 14(56%) tumors found in the head & 11(44%) tumors in the tail of the pancreas respectively (P=0.671). The initial ECOG score in group 1 was 0 in 15(60%) and 1-2 in 10(40%), while in group 2 the score was 0 in 17(68%) and 1-2 in 8(32%) respectively (P=0.811). Size of tumor were larger in group 2 (3.5±1.3 cm) as compared to group1 (3.1±0.9 cm) P=0.005. The median follow-up period was 2.6 years. In total, 35(70%) patients died by the time of the final analysis. The median overall survival of the group1 was 16.1 months (range, 12.2-19.9 months) months and group2 was 10.2 months. (Range 7.5-12.9 months) respectively (P=0.003).

1.5. Conclusion: Pretreatment elevated CEA level using the standard diagnostic cutoff-value contributed significant prognostic information on localized pancreatic adenocarcinoma patients. Other potential biomarkers that could be useful for screening, diagnosing, and predicting treatment responses needs to be further investigated and compared to CEA.

2. Introduction

Pancreatic cancer is a highly malignant tumor in the digestive system, with its incidence progressively increasing in recent years [1, 2]. Due to the lack of specific clinical symptoms in its early stages, localized pancreatic cancer is often confirmed in its advanced stage. Pancreatic cancer patients have a mean survival of 6-8 months and a 5-year survival rate of less than 5% [3, 4]. Early diagnosis and appropriate therapies based on the prognosis are essential to increase the survival rate among localized pancreatic cancer patients. Some tumor related antigens can be used to diagnose localized pancreatic adenocarcinoma and reflect its possible progression [5].

Carcinoembryonic antigen (CEA) is the most commonly used tumor marker for gastrointestinal malignancies. It was originally developed for pancreatic cancer and was used throughout 1970-1980 before the advancement of CA 19-9 [6, 7]. Considering its background and usefulness in gastrointestinal malignancies, CEA might be useful in predicting localized pancreatic cancer, but less is known about the association between pretreatment CEA level

and the prognosis of pancreatic cancer. The potential of CEA as prognostic factors has not been yet deter-mined [8].

In this study, we included patients with localized pancreatic adenocarcinoma and analyzed the factors associated with survival to determine the utility of pretreatment CEA in assessing the prognosis of patients with localized pancreatic adenocarcinoma.

3. Material and Methods

We reviewed the medical records of patients diagnosed with localized pancreatic cancer at General Surgery Department of Hayatabad Medical Complex Peshawar from August 2016 to July 2021. All patients were histologically diagnosed with localized pancreatic adenocarcinoma and underwent surgical resection. The level of CEA were evaluated before treatment. Included patients were stratified into 2 groups in regard to their preoperative CEA level. Group 1: (Normal CEA level group, CEA level <5ng/ml), Group 2: (Elevated CEA level ≥5ng/ml).

Patients referred from other hospitals after receiving treatment, refused treatment and those having other malignancies were excluded from the study. The clinical variables used in this study were sex, age, hypertension, diabetes mellitus, Eastern Cooperative Oncology Group (ECOG), stage, location of tumor, size of tumor, albumin, total bilirubin, CEA level and treatment modality.

The standard diagnostic cutoff values for CEA was used 5 ng/mL. Whipple procedure were performed in 35(70%) cases while the remaining 15(30%) cases underwent distal pancreatectomy. All tumors were classified as resectable localized pancreatic cancer. The Institutional Review Board approved this study for human research at Hayatabad Medical Complex Peshawar. Statistical analysis was done using SPSS software version 27.0. Values of P≤0.05 were considered statistically significant for all statistical analyses.

4. Results

Total 50 patients were included in this study. Included patients were stratified into 2 groups (25 patients in each group) in regard to their preoperative CEA level. Group 1: (Normal CEA level group, CEA level value <5ng/ml), Group 2: (Elevated CEA level group ≥5ng/ml)

There were 14(56%) males and 11(44%) females in group 1 and 16(64%) male & 9(36%) females in group 2. Age ranged between 30-80 years with a mean / median age of 55 years.

Tumor localizations in group 1 were: 15(60%) tumors in the head of pancreas while 10(40%) in the tail of the pancreas, in group2: 14(56%) tumors found in the head & 11(44%) tumors in the tail of the pancreas respectively (P=0.671).

The initial ECOG score in group 1 was 0 in 15(60%) and 1-2 in 10(40%), while in group 2 the score was 0 in 17(68%) and 1-2 in 8(32%) respectively (P=0.811). Size of tumor were larger in group 2 (3.5±1.3 cm) as compared to group1 (3.1±0.9 cm) P=0.005. The median follow-up period was 2.6 years. In total, 35(70%) patients died by the time of the final analysis. The median overall survival of the group1 was 16.1 months (range, 12.2-19.9 months) months and group2 was 10.2 months. (Range 7.5-12.9 months) respectively (P=0.003) (Table 1).

The association between survival and the parameters of sex, age, ECOG, location of tumor, size of tumor, level of CEA were analyzed by univariate analysis, which showed that ECOG (1 and 2), tumor stage, location of tumor (body & tail), size of tumor (>3 cm) and CEA (>5 ng/mL) were significantly associated with poor overall survival.

Table 1: Comparison between Both Groups

	Group 1	Group 2	P value
Gender			
Male	14 (56%)	16 (64%)	0.851
Female	11 (44%)	9 (36%)	
Tumor location			
Head of pancreas	15 (60%)	14 (56%)	0.922
Tail of pancreas	10 (40%)	11 (44%)	
ECOG			
0	15(60%)	17 (68%)	0.811
2-Jan	10 (40%)	8 (32%)	
Size of tumor			
Median tumor size	3.0±0.9 cm	3.5±1.3 cm	0.005
	Overall survival rate		
Median survival	16.1 months	10.2 months	0.003

5. Discussion

Carcinoembryonic antigen (CEA) was first isolated from human colorectal cancer (CRC) tissue in 1965 by Gold and Freedman [9]. CEA has also been used in pancreatic cancer, but its sensitivity and specificity are too low to be used as a diagnostic biomarker. Instead, a preoperative combination of CEA and CA 19-9 has been used to predict the resectability of localized pancreatic cancer [10, 11]. Moreover, a few studies suggested that pretreatment CEA was associated with poor treatment outcomes [12-14]. However, these studies included a small number of patients, a specific tumor stage, a specific treatment modality, or applied a wide range of cut-off values. To determine whether CEA can be generally applicable prognostic markers of localized pancreatic cancer, the use of this biomarker should be tested in a large number of patients with various stages of pancreatic cancer [15]. Pancreatic adenocarcinoma is an aggressive tumor with a poor prognosis. In addition, patients

with pancreatic cancer are often diagnosed with metastatic disease or are at an in-operable status. Even though treatment plans are devised based on the stage of the tumor, the patient's condition, and several other clinical factors, not all patients benefit from conventional anti-cancer treatment. Studies have evaluated the efficacy of various tumor markers for improved prediction of treatment responses, risk of cancer progression, and medical costs in pancreatic cancer. The most widely used tumor markers for pancreatic cancer are CA 19-9 and CEA [16, 17].

In this study, we analyzed 50 patients diagnosed with localized pancreatic adenocarcinoma. The standard diagnostic cutoff values of CEA was used. All patients received surgery. In the elevated CEA level group, tumor size was larger than that of the normal CEA level group, and CEA level showed a positive correlation with tumor stages. In addition, our results showed that pretreatment CEA level was significantly associated with overall survival regardless of stages.

Association between CEA and colon cancer is well known, but CEA has also been reported as a prognostic marker in variety of other cancers such as breast cancer, cervix cancer and lung cancer [18]. In our study, CEA proved to be a potential prognostic marker of localized pancreatic adenocarcinoma. A few other studies showed an association between CEA and metastasis ability. CEA is expressed on the cell surface and functions in cellular adhesion.19 Therefore, malignant cells may aggravate and metastasize with increased CEA expressions. Recently, several cancer vaccines targeting CEA have been developed and they may improve treatment outcomes in localized pancreatic cancer patients with elevated CEA [20].

6. Conclusion

Patients with localised pancreatic adenocarcinoma who had pretreatment increased CEA levels using the conventional diagnostic cutoff value had significant prognostic information. Further research and comparisons with other possible biomarkers that could be helpful for diagnosing, screening, and predicting treatment outcomes are required.

7. Limitations

One of our main limitation is a single center tertiary care hospital, and a small cohort of patients. Further studies are needed with a larger cohort and multiple tertiary care centers to establish whether CEA has a predictive value in regards to treatment modalities.

References

1. Grunnet M, Sorensen JB. Carcinoembryonic antigen (CEA) as tumor marker in lung cancer. Lung Cancer. 2012; 76: 138-43.
2. Hess V, Glimelius B, Grawe P, Dietrich D, Bodoky G, Ruhstaller T, et al. CA 19-9 tumour-marker response to chemotherapy in patients with advanced pancreatic cancer enrolled in a randomised controlled trial. Lancet Oncol. 2008; 9: 132-8.
3. Koom WS, Seong J, Kim YB, Pyun HO, Song SY. CA 19-9 as a predictor for response and survival in advanced pancreatic cancer patients treated with chemoradiotherapy. Int J Radiat Oncol Biol Phys. 2009; 73: 1148-54.
4. Kim YC, Kim HJ, Park JH, Park DI, Cho YK, Sohn CI, et al. Can preoperative CA 19-9 and CEA levels predict the resectability of patients with pancreatic adenocarcinoma? J Gastroenterol Hepatol. 2009; 24: 1869-75.
5. Bünger S, Laubert T, Roblick UJ, Habermann JK. Serum bio-markers for improved diagnostic of pancreatic cancer: a current overview. J Cancer Res Clin Oncol. 2011; 137: 375-89.
6. Siegel R, Ward E, Brawley O, Jemal A. Cancer statistics, 2011: the impact of eliminating socioeconomic and racial disparities on premature cancer deaths. CA Cancer J Clin. 2011; 61: 212-36.
7. Saad ED, Machado MC, Wajsbrot D, Abramoff R, Hoff PM, Tabacof J, et al. Pretreatment CA 19-9 level as a prognostic factor in patients with advanced pancreatic cancer treated with gemcitabi-ne. Int J Gastrointest Cancer. 2002; 32: 35-41.
8. Halloran CM, Ghaneh P, Connor S, Sutton R, Neoptolemos JP, Raraty MG. Carbohydrate antigen 19.9 accurately selects patients for laparoscopic assessment to determine resectability of pancreat-ic malignancy. Br J Surg. 2008; 95: 453-9.
9. Gold P, Freedman SO. Demonstration of tumor-specific antigens in human colonic carcinomata by immunological tolerance and absorption techniques. J Exp Med. 1965; 121: 439-62.
10. Mehta J, Prabhu R, Eshpuniyani P, Kantharia C, Supe A. Evaluat-ing the efficacy of tumor markers CA 19-9 and CEA to predict op-erability and survival in pancreatic malignancies. Trop Gastroen-terol. 2010; 31: 190-4.
11. Berger AC, Garcia M Jr, Hoffman JP, Regine WF, Abrams RA, Safran H, et al. Postresection CA 19-9 predicts overall survival in patients with pancreatic cancer treated with adjuvant chemoradia-tion: a prospective validation by RTOG 9704. J Clin Oncol. 2008; 26:5918-22.
12. Kalser MH, Barkin JS, Redlhammer D, Heal A. Circulating car-cinoembryonic antigen in pancreatic carcinoma. Cancer. 1978; 42(3 Suppl): 1468-71.
13. Taylor OM, Cooper EH, Benson EA, McMahon MJ. The prog-nostic value of the tumour markers CA 195 and CEA in patients with adenocarcinoma of the pancreas. Eur J Surg Oncol. 1992; 18: 508-13.
14. Tempero MA, Uchida E, Takasaki H, Burnett DA, Steplewski Z, Pour PM. Relationship of carbohydrate antigen 19-9 and Lewis antigens in pancreatic cancer. Cancer Res. 1987; 47: 5501-3.
15. Kaufman HL, Lenz HJ, Marshall J, Singh D, Garett C, Cripps C, et al. Combination chemotherapy and ALVAC-CEA/B7.1 vaccine in patients with metastatic colorectal cancer. Clin Cancer Res. 2008; 14: 4843-9.
16. Gulley JL, Madan RA, Tsang KY, Arlen PM, Camphausen K, Mohebtash M, et al. A pilot safety trial investigating a vector-based vaccine targeting carcinoembryonic antigen in combination with ra-

diotherapy in patients with gastrointestinal malignancies metastatic to the liver. Expert Opin Biol Ther. 2011; 11: 1409-18.

17. Goonetilleke KS, Siriwardena AK. Systematic review of carbo-hy-drate antigen (CA 19-9) as a biochemical marker in the diagnosis of pancreatic cancer. Eur J Surg Oncol. 2007; 33: 266-70.
18. Molina R, Augé JM, Escudero JM, Filella X, Zanon G, Pahisa J, et al. Evaluation of tumor markers (HER-2/neu oncoprotein, CEA, and CA 15.3) in patients with locoregional breast cancer: prognos-tic value. Tumour Biol. 2010; 31: 171-80.
19. Ni XG, Bai XF, Mao YL, Shao YF, Wu JX, Shan Y, et al. The clinical value of serum CEA, CA 19-9, and CA242 in the diagno-sis and prognosis of pancreatic cancer. Eur J Surg Oncol. 2005; 31: 164-9.
20. Peterli R, Meyer-Wyss B, Herzog U, Tondelli P. [CA 19-9 has no value as a tumor marker in obstructive jaundice]. Schweiz Med Wochenschr. 1999; 129: 77-9.