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Association of Pancreatic Carcinoma with Chronic Pancreatitis - A 6-Year Observational Study

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ABSTRACT

Chronic pancreatitis, though a relatively uncommon condition, is a significant risk factor for the development of pancreatic cancer. The interplay between persistent inflammation and oncogene activation plays a critical role in driving this malignancy along with tobacco use contributing as a co-factor. In cases of alcohol-induced chronic pancreatitis, the cumulative risk of cancer is estimated to be around 4% after 15 to 20 years.

Diagnosing pancreatic cancer in these patients is challenging due to overlapping symptoms between the two conditions and structural changes in the pancreas that complicate imaging interpretation. So, the clinicians should maintain a high index of suspicion for cancer when patients present with symptoms such as persistent back pain, unexplained weight loss, poorly controlled diabetes, or jaundice.

Imaging studies must be carefully examined, and in cases of uncertainty, endoscopic ultrasound-guided fine-needle biopsy may help by targeting the areas of concern. Close monitoring through both clinical evaluations and diagnostic testing is essential to detect cancer at early stage where surgical intervention remains a viable option. When uncertainty persists, surgical exploration of the pancreas may be warranted.

Keywords: Pancreatic Carcinoma, Chronic Pancreatitis, Acute Pancreatitis, Auto-immune Pancreatitis, Pancreatic Ductal Adenocarcinoma.

INTRODUCTION

Pancreatic Carcinoma is a highly fatal cancer, and its global incidence is on the rise. The majority of patients are diagnosed at a stage when the disease has already metastasized and is no longer curable, resulting in a 5-year survival rate of around 10% in the United States. Nevertheless, individuals diagnosed at an earlier stage tend to have significantly better outcomes. Although there is no current recommendation for population-wide screening for Pancreatic Ductal Adenocarcinoma, identifying individuals with above-average lifetime risk has been suggested as a potential method to form a screening-eligible group. [(1)]

Chronic pancreatitis (CP) is a fibroinflammatory condition affecting the exocrine pancreas, with diverse causes and a wide range of clinical presentations—from asymptomatic cases to severe chronic pain accompanied by both exocrine and endocrine dysfunction. [(1,2)] Chronic Pancreatitis is a well-recognized risk factor for the development of pancreatic ductal adenocarcinoma (PDAC). Persistent inflammation in Chronic Pancreatitis enhances cellular turnover and stimulates pancreatic stellate cell activity, contributing to a tissue microenvironment that favors cancer development. [(1,2)] The lifetime risk of pancreatic carcinoma is particularly

increased in specific forms of Chronic Pancreatitis, such as hereditary and tropical pancreatitis, which are marked by early-onset pancreatic inflammation. [1] Autoimmune pancreatitis (AIP), a form of Chronic Pancreatitis that responds to steroid treatment and is associated with intense inflammation, may also be linked to malignancy risk. [1]

Pancreatic cancer is a biologically aggressive tumor from the onset, clinically quiescent for a longtime and hence presents in advanced stage. [2,3] It is caused by damage to DNA. This damage leads to abnormal and uncontrolled growth of cells in the pancreas. [4]

The link between acute pancreatitis (AP) and the risk of developing pancreatic ductal adenocarcinoma (PDAC) remains uncertain. While AP may represent the initial clinical sign of PDAC—possibly resulting from tumor-induced obstruction of the pancreatic ducts—the long-term risk of PDAC following an episode of AP has not been clearly established. Given the clinical importance of clarifying how various forms of pancreatitis relate to pancreatic cancer, we undertook this study to assess the extent of the association between chronic pancreatitis and Pancreatic carcinoma. [1,4]

The aim of the study is

1. To identify the number of cases showing chronic pancreatitis and pancreatic carcinoma in Whipple specimen.
2. To know the association between chronic pancreatitis and pancreatic carcinoma

MATERIALS & METHODS

This is a 6year observational study done at tertiary hospital. Our study includes cases of Whipple specimen sent from surgical gastroenterology department for Histopathological Examination. Cases were collected from January 2018-December 2024. Relevant clinical information was retrieved from patient medical records. Formalin-fixed, paraffin-embedded tissue sections stained with Hematoxylin and Eosin (H&E) were examined for all included cases. Statistical analysis was performed, with variables presented as frequencies and percentages.

RESULT

Our study included 28 cases of Whipple specimen from the Department of Surgical gastro-enterology. Most of the cases were in the age group 50-70 years except three cases which are in the age group of 20-40 years (table-01). Females are predominantly affected than males(table-02).

Table-1: Distribution of patients based on age group

AGE GROUP	NUMBER OF PATIENTS
21-30	01 (3.57%)
31-40	02(7.14%)
41-50	04(14.28%)
51-60	10(35.71%)
61-70	10(35.71%)
71-80	01(3.57%)

Table-2: Distribution of patients based on sex

SEX	NUMBER OF PATIENTS
Males	12 (42.8%)
Females	16(57.1%)
Total	28(100%)

Table-3: relationship between chronic pancreatitis and pancreatic carcinoma

PANCREATIC CANCER CASES	PRESENCE OF CHRONIC PANCREATITIS FEATURES	ABSENCE OF CHRONIC PANCREATITIS FEATURES
28	18 (64%)	10 (36%)

Table-4: subtypes of pancreatic carcinoma showing pancreatitis

PANCREATIC CARCINOMA SUBTYPES	NO. OF CASES	NO. OF CASES SHOWING CHRONIC PANCREATITIS FEATURES
Pancreatic ductal adenocarcinoma	24	17
Cystic duct carcinoma	1	0
Neuroendocrine tumor	2	0
Mucinous adenocarcinoma	1	1

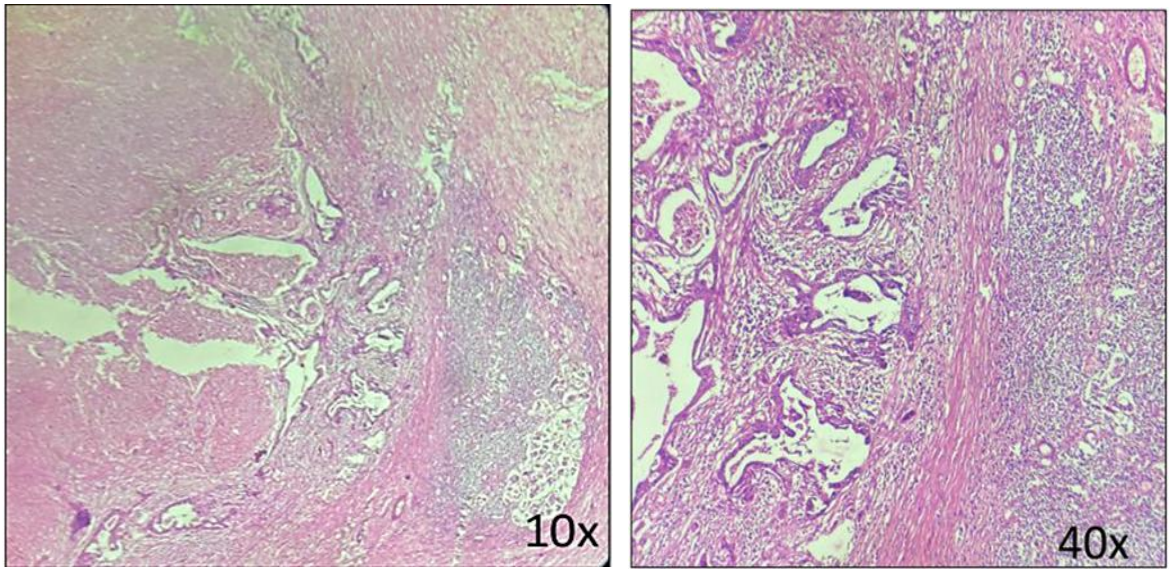

Figure 1 & 2 showing Pancreatic ductal adenocarcinoma with chronic pancreatitis changes (H&E).

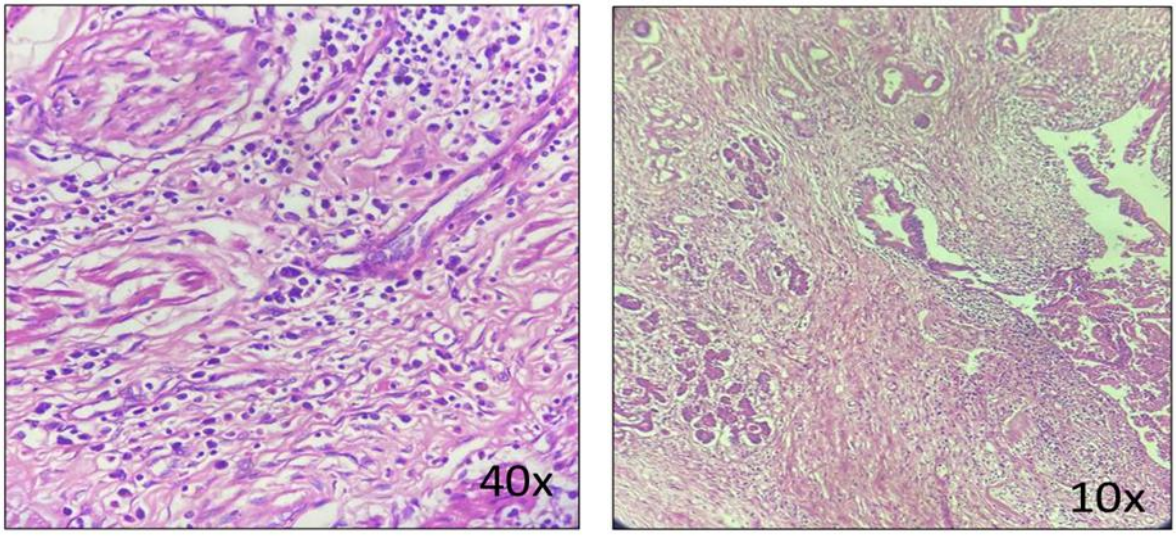

Figure 3 & 4 showing Pancreatic ductal adenocarcinoma with chronic pancreatitis having extensive fibrosis and dense inflammatory infiltrate (H&E).

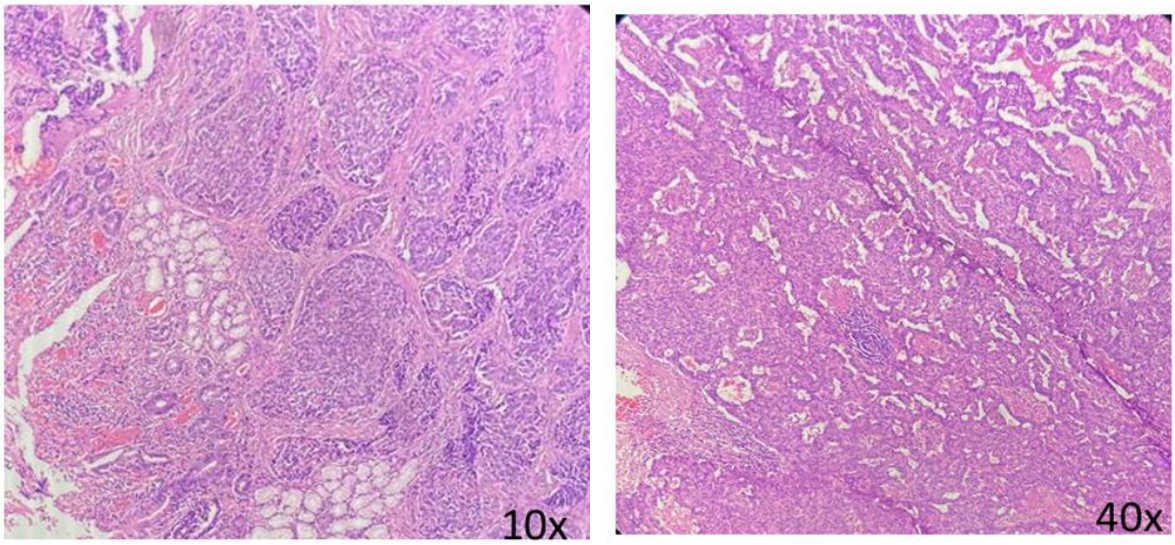

Figure 5 & 6 showing Neuroendocrine tumor: Tumor cells are arranged in sheets and cords (H&E)

DISCUSSION

Most of the pancreatic cancers are seen in elderly patients. It can occur in younger patients who are less than 40 years. This can be correlated with 3 cases in our study who are less than 40 years. [3]

In a study conducted by Kim HS et al, Chronic pancreatitis is known as one of the major risk factors for pancreatic cancer. The incidence ratio of pancreatic cancer in patients with CP have been reported to be 7.6–68.1, which also demonstrated that CP has higher risk for pancreatic cancer. [3]

When there is chronic inflammation, inflammatory cells secrete toxins and growth factors. Accumulation of these toxins will cause DNA damage. This DNA damage finally progress into oncogenic mutation resulting in malignant transformation. [4]

According to study conducted by Kirkegard et al. there is a relative risk of evolution of chronic pancreatitis to pancreatic carcinoma. [4]

Chronic pancreatitis is a progressive inflammatory disease with irreversibly functional and morphological changes. [5]

According to study conducted by Gina Gheorghe study et al, female gender and an advanced age has more association of pancreatic carcinoma with chronic pancreatitis. [5] This has correlated in this study with female predominance and age group above 50 years

In a study conducted by Mario C et al, age was the primary risk factor for PC. People at risk for PC were exposed to risk variables more often as they aged [6] which is correlated with the present study.

Although infrequent, the potential for malignancy arising in the setting of chronic pancreatitis (CP) should remain a consideration for clinicians—especially when new or evolving symptoms such as back pain, weight loss, poorly controlled diabetes, or jaundice emerge. Imaging in CP is inherently challenging due to fibrotic and calcific changes, necessitating thorough and cautious interpretation. In instances of diagnostic uncertainty, endoscopic ultrasound-guided fine-needle aspiration biopsy (EUS-FNAB) can be valuable for sampling suspect areas within the inflamed and fibrotic parenchyma. The integration of molecular analysis, including the detection of KRAS mutations, may further support the identification of malignant transformation. [7]

CONCLUSION

- Since inflammation is one of the major risk factors for carcinogenesis it was quite logical to hypothesize that chronic pancreatitis were more susceptible to pancreatic cancers.
- In our study it has observed that there is an association of pancreatic carcinoma with chronic pancreatitis.
- Close short-term monitoring, both clinically and through ancillary investigations, is essential to detect pancreatic cancer at a potentially resectable stage.

Declaration by Authors

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