Diagnostic and Prognostic Value of CRP in Post-ERCP Pancreatitis

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Abstract

Background and Aim: Acute pancreatitis (AP) is an inflammation of the pancreas secondary to a variety of causes. It is the most common serious complication of endoscopic retrograde cholangiopancreatography (ERCP). As most ERCP is performed on an outpatient base, early evaluation can allow safe discharge of the majority of patients. The aim of this study was to identify the value of C-reactive protein (CRP) in the diagnosis and prognosis of post-ERCP pancreatitis (PEP).

Methods: One hundred patients who were candidate for ERCP examination either diagnostic or therapeutic included in the present study. All patients has been followed-up daily for at least 48 hours after ERCP for symptoms and signs suggestive of post-ERCP pancreatitis and follow-up of post ERCP pancreatitis patients has been done until pancreatic enzymes and CRP became normal. Serum amylase, lipase and CRP were done immediately after ERCP and on 2nd and 7th day after ERCP. CT abdomen was performed for patients who developed post-ERCP pancreatitis.

Results: Patients were divided into group A (GA) which developed post-ERCP pancreatitis [25 patients (25%)] and group B (GB) which had no pancreatitis [75 patients (75%)]. Serum amylase and lipase were significantly higher in GA relative to GB at T₀, T₂, T₇. Additionally, at T₂ both serum amylase and lipase was more than 3 fold the upper limit of normal in GA. Also data concerned with CRP level at T₀, T₂, T₇ revealed a significant increase in GA relative to GB. Data were highly significant at T₂ and T₇. Out of the 25 cases of Post-ERCP pancreatitis, 17 cases showed CT findings consistent with acute pancreatitis, 13 of them had mild and moderate disease. The remaining 4 cases had severe acute pancreatitis.

Conclusion: Since the mean value of CRP at T₇ in GA is still high above upper limit of normal, while serum amylase and lipase were not, and the significant rise in CRP level at T₀, T₂, T₇ in GA was directly correlated to the CT findings. Therefore, these data might suggest the importance of the CRP level as a diagnostic test and also in the assessment of the prognosis of Post-ERCP Pancreatitis; it is cheap, readily available but it is not an early marker.

Key Words: CRP – ERCP – Pancreatitis.

Introduction

ACUTE pancreatitis (AP) is an inflammation of the pancreas secondary to a variety of causes. The resulting inflammatory process results in the activation of a number of pancreatic proteolytic enzymes that can culminate in digestion of the organ itself [1]. One of the key features of AP is the severe systemic inflammatory response driven by circulating cytokines [2]. From the peritoneal cavity, cytokines rapidly enter the systemic circulation and are responsible for the systemic inflammatory response and multi-organ dysfunction syndrome [3].

Acute pancreatitis is the most common serious complication of endoscopic retrograde cholangiopancreatography (ERCP) [4], with an incidence reported by Lella et al. [5] of 30%. A commonly used definition of post-ERCP pancreatitis (PEP) is abdominal pain for more than 24 hours after the procedure and levels of serum pancreatic enzymes three times above normal [6]. Its diagnosis is based on clinical presentation, pancreatic enzymes (serum amylase and lipase) and in addition, inflammatory markers (C-reactive protein), abdominal ultrasonography and contrast enhanced CT scan, can be used to assess the severity of acute pancreatitis [7].

As most ERCP is performed on an outpatient base, early evaluation can allow safe discharge of the majority of patients who will not develop PEP, or develop only mild symptoms that will be self limited. Alternatively early detection of those patients who will go on to develop moderate or severe PEP can guide decisions regarding hospital admission and proper management.

The primary goal of this study was to identify the value of C-reactive protein (CRP) in the diagnosis and follow-up of post-ERCP pancreatitis.

Patients and Methods

One hundred patients, who were candidate for ERCP examination either diagnostic or therapeutic, were included in the present study. Their age ranged
between 28-89 years, 53 of them were females and 47 were males. Patients with previous history of post-ERCP complications or contrast media reactions were excluded.

At enrollment, history taking, physical examination, liver function tests, coagulation profile, renal function tests, hemogram, serum calcium, blood sugar and abdominal ultrasound were performed. All patients had been followed-up daily for at least 48 hours after ERCP for symptoms and signs suggestive of post-ERCP pancreatitis and follow-up of post ERCP pancreatitis patients had been done until serum CRP became normal.

Serum amylase, lipase and CRP were done immediately, on 2nd and 7th day after ERCP. CT abdomen was performed for patients who develop post-ERCP pancreatitis.

Blood samples:
Venous blood samples were obtained under complete aseptic precautions. A part of the sample was taken on EDTA for subsequent assessment of CBC and ESR. Whereas another portion of the sample was taken in a test tube with prompt separation of serum which was stored at -20°C for subsequent assessment of LFTs, RFTs, CRP, amylase, and lipase. Hemolysed samples were discarded and repeated freezing was avoided.

Assay methods:
A- CRP: CRP latex reagent kit is used for quantitative and qualitative measurement of CRP in human serum. It is based on an immunological reaction between CRP antisera bound to biologically inert latex particles and CRP in the test specimen.

B- Serum amylase: Assay was carried out colorimetrically.

C- Serum lipase: Lipase activity was measured by turbidimetric method.

Endoscopic retrograde cholangopancreatography (ERCP):

Preparation of the patient before ERCP: All patients should be fasting for 12 hours before ERCP and continue fasting after the procedure for up to 24 hrs depending on clinical circumstances. Examination was done in a room with X-Ray equipment, including image amplification and television. The procedure was carefully explained to the patient. Premedication with propofol 50mg (IV) and midazolam 5mg (IV) was used for sedation prior to insertion of the duodenoscope.

The procedure: The Olympus CLV-U20 was the model used. The scope is side viewing, so that the papilla can be seen (face on) and cannulated with a 1.7mm teflon catheter through a scope conduct. The scope was disinfected with Glutaraldehyde 2% for 20 minutes prior to the procedure. The scope was passed in the usual way into the duodenum with the patient in the left semiprone position and was given hyosine N-butylbromide (40mg) (IV) to obtain duodenal ileus. Search for the papilla of vater began about half way down the second portion of the duodenum on its posteromedial wall. The major papilla usually protrude into the duodenal lumen but is flat in about 10% of patients. The pattern of duodenal folds associated with the papilla is helpful in its detection and orientation. The scope is maneuvered very close to the papilla and the catheter prefiled with contrast media was advanced under direct vision into the orifice.

The contrast medium used was Urovideo 75% (Amidotrizoic acid); the contrast was introduced under low pressure by hand injection under fluoroscopic control. The amount of contrast was controlled by observation rather than by a predetermined amount. Careful fluoroscopic observation included attention to technical problems such as avoiding introduction of air bubbles and overfilling of either duct systems. Observation also included factors incriminated in increase of the risk of post-ERCP pancreatitis such as sphincterotomy, underlying pancreatic disease, time of the procedure, etc.

Statistical analysis:
Statistical presentation and analysis of the present study was conducted, using the mean, standard error, student t-test, Mann-Whitney analysis, Wilcoxon test and Chi-square by SPSS V10.

Results

The present study included one hundred cases: 53 (53%) were females and 47 (47%) were males. ERCP was carried out in all cases. Subjects were divided into group A (GA) who developed post-ERCP pancreatitis [25 patients (25%)] and group B (GB) who had no pancreatitis [75 patients (75%)]. GA included 15 females (60%) and 10 males (40%) and GB included 38 females (50.67%) and 37 males (49.33%) (Table 1).

There age ranged from 36 to 85 years in GA with a mean age of 57.32 ± 13.306 and from 28 to 89 years in GB with a mean age of 54.493 ± 12.124 and these results were statistically insignificant, as shown in Table (2).
Table (1): Frequency of sex in GA & GB.

<table>
<thead>
<tr>
<th></th>
<th>Female</th>
<th>Male</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Group A:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>15</td>
<td>10</td>
<td>25</td>
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<tr>
<td>%</td>
<td>60.00</td>
<td>40.00</td>
<td>100.00</td>
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<tr>
<td><strong>Group B:</strong></td>
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<tr>
<td>N</td>
<td>38</td>
<td>37</td>
<td>75</td>
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<tr>
<td>%</td>
<td>50.67</td>
<td>49.33</td>
<td>100.00</td>
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<td><strong>Total:</strong></td>
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<td>N</td>
<td>53</td>
<td>47</td>
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<tr>
<td>%</td>
<td>53.00</td>
<td>47.00</td>
<td>100.00</td>
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</tbody>
</table>

Fisher’s exact test 0.282

Table (2): Frequency of age in GA & GB.

<table>
<thead>
<tr>
<th>Age</th>
<th>t-test</th>
<th>t</th>
<th>p value</th>
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</thead>
<tbody>
<tr>
<td><strong>Group A</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>Mean ± SD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>36.00-85.00</td>
<td>57.320±13.306</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Group B</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28.00-89.00</td>
<td>54.493±12.124</td>
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</table>

Table (3) & Fig. (1) show the mean value of serum amylase at T0, T2 & T7. It was respectively 181.480±71.811u/L, 500.040±194.122u/L and 163.840±72.343u/L in GA versus 43.653±19.539u/L, 56.853±26.441u/L & 46.320±18.627u/L in GB. Serum amylase mean value at T0, T2 and T7 were significantly higher in GA relative to GB. Besides, at T2, the reported hyperamylasaemia was more than 3 fold the upper limit of normal in GA.

Table (3): Comparative study between GA & GB amylase values at T0, T2 & T7.

<table>
<thead>
<tr>
<th>Serum Amylase u/L (n=16-108 u/L)</th>
<th>Group A</th>
<th>Group B</th>
<th>Mann-Whitney test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean ± SD</td>
<td>Mean ± SD</td>
<td>Z</td>
<td>p value</td>
</tr>
<tr>
<td><strong>Baseline</strong></td>
<td>181.480±71.811</td>
<td>43.653±19.539</td>
<td>−6.653</td>
</tr>
<tr>
<td><strong>After 2 days</strong></td>
<td>500.040±194.122</td>
<td>56.853±26.441</td>
<td>−7.464</td>
</tr>
<tr>
<td><strong>After 7 days</strong></td>
<td>163.840±72.343</td>
<td>46.320±18.627</td>
<td>−7.186</td>
</tr>
</tbody>
</table>

* Significant at p value <0.05.

Table (4) & Fig. (2) show the mean value of serum lipase at T0, T2 and T7. It was respectively 270.760±155.521u/L, 639.120±207.283u/L and 283.680±150.400u/L in GA versus 54.827±21.269u/L, 66.040±22.270u/L and 56.880±21.300u/L in GB. Serum lipase mean values at T0, T2, T7 were significantly higher in GA relative to GB. Additionally hyperlipasemia was more than three fold the upper limit of normal in GA at T2.

Table (4): Comparative study between GA & BA lipase at T0, T2 & T7.

<table>
<thead>
<tr>
<th>Lipase u/L</th>
<th>Group A</th>
<th>Group B</th>
<th>Mann-Whitney test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean ± SD</td>
<td>Mean ± SD</td>
<td>Z</td>
<td>p value</td>
</tr>
<tr>
<td><strong>Baseline</strong></td>
<td>270.760±155.521</td>
<td>54.827±21.269</td>
<td>−5.605</td>
</tr>
<tr>
<td><strong>After 2 days</strong></td>
<td>639.120±207.283</td>
<td>66.040±22.270</td>
<td>−7.464</td>
</tr>
<tr>
<td><strong>After 7 days</strong></td>
<td>283.680±150.401</td>
<td>56.880±21.300</td>
<td>−6.401</td>
</tr>
</tbody>
</table>

* Significant at p value <0.05.
Tables (5) & Fig. (3) show the mean values of serum CRP at T₀, T₂ and T₇. It was respectively 12.760±6.704mg/dL, 113.840±48.084mg/dL and 82.560±47.790mg/dL in GA versus 7.920±2.277mg/dL, 8.600±2.218mg/dL and 7.987±1.751mg/dL in GB. CRP mean values at T₀, T₂, T₇ were significantly higher in GA compared to GB. Moreover, data in GA were highly significant at T₂ and T₇.

**Table (5): Comparative study between CRP values in GA & GB at T₀, T₂ &T₇.**

<table>
<thead>
<tr>
<th>CRP mg/dL (n=less than 10 mg/dL)</th>
<th>Group A</th>
<th>Group B</th>
<th>Mann-Whitney test</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean ± SD Baseline</td>
<td>12.760±6.704</td>
<td>7.920±2.277</td>
<td>–3.778</td>
<td>0.000*</td>
</tr>
<tr>
<td>Mean ± SD After 2 days</td>
<td>113.840±48.084</td>
<td>8.600±2.218</td>
<td>–7.504</td>
<td>0.000*</td>
</tr>
<tr>
<td>Mean ± SD After 7 days</td>
<td>82.560±47.790</td>
<td>7.987±1.751</td>
<td>–7.540</td>
<td>0.000*</td>
</tr>
</tbody>
</table>

* Significant at p value <0.05.

Fig. (3): Comparative study between CRP values in GA & GB at T₀, T₂ & T₇.

It was noted that out of the 25 cases of Post-ERCP pancreatitis, 17 cases showed CT findings consistent with acute pancreatitis, 13 of them had mild and moderate disease with interstitial edema of pancreatic parenchyma and peri-pancreatic fat necrosis. They were managed conservatively and their hospital stay was about three days. The remaining 4 cases had severe acute pancreatitis, CT showed coagulation necrosis of the pancreas and surrounding fat, decreased pancreatic enhancement following IV contrast with hemorrhage inside the pancreas and peri-pancreatic fluid collection. These patients were managed in the ICU, with nasogastric drainage, parenteral nutrition, intravenous antibiotics and supportive care. The other 8 cases showed normal pancreatic parenchyma and peri-pancreatic fat.

**Discussion**

Endoscopic Retrograde cholangiopancreatography (ERCP) is a non-surgical approach to diseases of the pancreatico-biliary system that dates back to the late 1960s. Initially (ERCP) was purely a diagnostic procedure. After the first report of endoscopic sphincterotomy (ES) in 1974, therapeutic uses were possible for diseases that previously required surgery. As therapeutic indications broaden, our understanding of complications has tempered the initial excitement [8]. Pancreatitis in fact still remains the most common and most feared complications of ERCP. So non-invasive imaging in many circumstances has replaced its diagnostic utilization, it is now reserved primarily for therapeutic indications [8].

The incidence of post-ERCP pancreatitis PEP is variable from one centre to another, Tarnasky et al. (1998) [9], reported an incidence of 0-40%., while Freeman et al. [10], reported 6.7%. The variable incidence may be reflection of diverse definitions of pancreatitis, patient population, method of data collection, indication for the procedure and endoscopist experience. Although most episodes of PEP are mild (about 90%), a small percentage of patients (about 10%) may develop severe pancreatitis resulting in a prolonged hospitalization, intensive unit care and utilization of major hospital resources; these patients have a significant morbidity and mortality [11].

Clinical assessment alone has been shown to be unreliable in predicting the development of pancreatitis [12]. In search for more objective criteria to accurately predict PEP, many studies have looked at pancreatic enzyme elevations alone or in conjunction with clinical assessment. A combined clinical and laboratory approach has been shown to be much more reliable than serologic testing alone [13,14,15].

Post-ERCP pancreatitis usually evolves over 2–6 hours and manifests as epigastric or back pain and nausea [16]. A higher rate of pancreatitis is caused by increased manipulation around the papilla and multiple injections of the pancreatic duct [17]. However, there appears to be no definite correlation between the severity of pancreatitis and the degree of serum amylase elevation. After 48 to 72 hours, even with continuing evidence of pancreatitis, total
serum amylase values tend to return to normal [18]. Although it lacks sensitivity and specificity, measurement of the serum amylase level is the most widely used method of diagnosing pancreatitis as it is quickly performed, easily obtained and inexpensive [19].

Lipase levels are also elevated and parallel the elevations in amylase levels. The levels of both enzymes remain elevated with ongoing pancreatic inflammation, with amylase levels typically returning to normal shortly before lipase levels in the resolution phase [20]. The specificity and sensitivity of lipase measurements are better than those of amylase measurement. The specificity of both may be improved by raising the threshold to at least three times the upper limit of the normal reference values [19].

The acute-phase reactant C-reactive protein (CRP) is currently the serum variable of choice for an early, accurate and cost-effective severity assessment of acute pancreatitis in the daily clinical routine [21,22].

It is of paramount importance that we accurately identify which patients will go on to develop post-ERCP pancreatitis. As most ERCPs are performed on an outpatient basis, early evaluation can allow safe discharge of the majority of patients who will not develop post-ERCP pancreatitis or develop only mild symptoms that will be self-limited. Alternatively, early detection of those patients who will go on to develop moderate or severe post-ERCP pancreatitis can guide decisions regarding hospital admission and aggressive management and can help direct the use of targeted therapies that have the potential to prevent or mitigate pancreatic inflammation. Thus, significant efforts have focused on trying to identify predictors of post-ERCP pancreatitis [23].

The primary goal of this study was to identify the value of C-reactive protein (CRP) in the diagnosis and prognosis of post-ERCP pancreatitis (PEP). The present study included 100 patients undergoing ERCP for diagnostic or therapeutic purposes. 25 of them developed PEP (GA) and the other 75 patients had no PEP and named group B (GB). The incidence of PEP in this study was 25%. Estimation of serum amylase, lipase and CRP had been done at day time 0, 2, 7 (T₀, T₂, T₇).

The comparison between serum amylase mean value at T₀, T₂ and T₇ revealed that there were significant change between GA and GB results at all times being higher in GA. Also, there were hyperamylasaemia more than 3 folds the upper limit of normal in GA at T₂. In parallel to serum amylase results, serum lipase mean values at T₀, T₂ and T₇ were significantly higher in GA relative to GB. Additionally hyperlipasemia was more than three folds the upper limit of normal in GA at T₂. The results of the present study were in agreement with the early work by LaFerla et al. [24], who documented elevated serum amylase levels at 2 hours after ERCP. Of the 20 post-ERCP patients evaluated, only 7 went on to develop pancreatitis. In these 7 patients, serum amylase levels rose quickly and were significantly higher than in those patients who did not develop pancreatitis. Thus, they concluded that amylase elevations 2 hours post-ERCP could accurately predict those patients that were at risk of developing pancreatitis.

Further studies supported these early findings [25,26]. In the absence of pancreatitis, serum amylase levels peak at 90 minutes to 4 hours after ERCP and return to normal levels within 48 hours. Although serum amylase is commonly elevated in uncomplicated ERCPs, the swiftness and degree of elevation is much more marked in patients who develop PEP [27,28].

In addition, Gottlieb et al. [12] prospectively evaluated 231 patients in whom serum amylase and lipase determinations were made 2 hours after ERCP. Additionally, these patients underwent clinical evaluation specifically addressing the symptoms of abdominal pain, nausea and emesis. This study demonstrated that clinical assessment alone was unreliable in predicting PEP; one third of patients who developed pancreatitis had no pain 2 hours after the end of the procedure whereas one third of patients who did not develop pancreatitis did complain of pain. These authors also found that values of serum amylase (2 hours post ERCP) more than 6 times the upper reference limit (URL) predicted a greater than 90% probability of developing pancreatitis.

In an effort to more thoroughly characterize post procedure amylase elevations, Testoni et al. [14], conducted a study in which they evaluated 409 patients who underwent endoscopic sphincterotomy and measured serum amylase levels before the procedure and at 2, 4, 8 and 24 hours afterwards. These investigators recommended using serum amylase levels greater than 5 times the URL as a cut-off so as not to miss cases of PEP. They found that sensitivity of serum amylase levels in predicting PEP was most accurate at 4 hours (68%) and 8 hours (100%), not at 2 hours (26%).
In a recent study from Australia, Thomas and Sengupta [15] evaluated 263 patients who had undergone ERCP and/or endoscopic sphincterotomy, a 4-hour post ERCP amylase level was found to be a rapid and useful predictor of pancreatitis: they proposed an algorithm for patient management based on stratification by the 4-hour serum amylase level. If the amylase level is less than 1.5 times the URL (negative predictive value 100%), then the patient could be safely discharged home. If the amylase level is greater than 3.0 times the URL (positive predictive value 36.8%) then the patient should be admitted to the hospital. If the value falls between 1.5 and 3.0 times the URL, then clinical assessment, concerns or risk factors should govern decisions on management. The above strategy proposed is one that could be employed in the management of outpatient ERCPs [18].

David (2006), [20] noticed that elevated lipase level parallel the elevations in amylase level and both enzymes remain elevated with ongoing pancreatic inflammation, with amylase levels typically returning to normal shortly before lipase levels in the resolution phase. The serum lipase may remain elevated slightly longer than amylase. It is usually not necessary to measure both serum amylase and lipase. Serum lipase may be preferable because it remains normal in some non pancreatic conditions that increase serum amylase including macroamylasemia, parotitis, and some carcinomas. In general, serum lipase is thought to be more sensitive and specific than serum amylase in the diagnosis of acute pancreatitis [20]. Daily measurement of serum amylase or lipase after the diagnosis of acute pancreatitis has limited value in assessing the clinical progress of the illness or ultimate prognosis. If serum amylase and/or lipase remain elevated for several weeks, possibilities include persisting pancreatic/peripancreatic Inflammation, blockage of the pancreatic duct, or development of a pseudocyst [29].

C-reactive protein (CRP) is an acute phase reactant synthesized by hepatocytes. It has been shown to be elevated in patients with acute pancreatitis. CRP was more important than both enzymes as a diagnostic test and in the assessment of the prognosis of PEP. In the present study CRP mean values at T0, T2, T7 significantly higher in GA relative to GB results. Data were highly significant at T2 and T7. Since mean value of CRP at T7 in GA is still high above upper limit of normal, while serum amylase and lipase were not, so CRP has both diagnostic and prognostic importance in diagnosis and consequently management of PEP.

The results of the present work correlated with those recorded by Kiviniemi et al. (1994) [30], who studied CRP response in uncomplicated and complicated ERCPs. They prospectively evaluated 42 patients and measured amylase, lipase and CRP values before ERCP, at 6, 24 & 48 hours post procedure. In half of the uncomplicated ERCPs, serum amylase and lipase became elevated however no rise in CRP was seen. In the 3 patients who developed PEP, CRP levels were greatly elevated at 48 hours post-procedure.

In addition, Oezcueruemz-Porsch et al. [31] evaluated a number of inflammatory markers and acute phase reactants in 94 patients who underwent ERCP. Twelve patients developed PEP. The authors found that among all of the parameters that were evaluated, only peak CRP, IL-6 and IL-10 showed significant correlations with clinical data: i.e. pain score and duration of ERCP. In another study, Kaw and Singh [32], measured CRP and interleukin-6 (IL-6) levels in 85 patients. Serum levels were measured before ERCP and at 12-24 hours and 36-48 hours after ERCP. In the 20 patients who developed PEP, serum levels of CRP and IL-6 correlated with severity of PEP. Thus, studies have shown that serum CRP is an accurate and readily available laboratory test for predicting severity of PEP, but it appears to be a late marker.

Contrast-enhanced CT scan is the best imaging technique to exclude conditions that masquerade as acute pancreatitis, to diagnose the severity of acute pancreatitis, and to identify complications of pancreatitis [33-35]. Findings on CT scan that confirm the diagnosis of acute pancreatitis include enlargement of the pancreas with diffuse edema, heterogeneity of pancreatic parenchyma, peripancreatic stranding, and peripancreatic fluid collections. With the use of IV contrast, a diagnosis of pancreatic necrosis can be established. Results of this work revealed that out of the 25 cases of Post-ERCP pancreatitis, 17 cases showed CT findings consistent with acute pancreatitis, 13 of them had mild and moderate disease with interstitial edema of pancreatic parenchyma and peri-pancreatic fat necrosis. They were managed conservatively and their hospital stay was about three days. The remaining 4 cases had severe acute pancreatitis. CT showed coagulation necrosis of the pancreas and surrounding fat, decreased pancreatic enhancement following IV contrast with hemorrhage within the pancreas and peri-pancreatic fluid collection. These patients were managed in the ICU, with nasogastric drainage, parental nutrition, intravenous antibiotics and finally supportive care. The other 8 cases showed normal pancreatic parenchyma and
peri-pancreatic fat, the comparison between CRP results and CT findings, revealed that, there is a correlation between CT findings and CRP values in GA.

In conclusion, CRP is important for diagnosis, assessment of the severity and prognosis of Post-ERCP Pancreatitis. It is an inexpensive and readily available test; however, it is most helpful at 24-48 hours and thus is not an early marker.

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