**Original article :**

# Evaluation of Safety of Epidural Anesthesia, Effect on Pancreatic Perfusion and Outcome of Patients with Acute Pancreatitis at a Tertiary care Hospital

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**Abstract**

**Background:** Acute pancreatitis is a potentially fatal disease with an overall mortality of 2 – 7% despite aggressive intervention. Although pancreatic duct obstruction may play an important role in the pathogenesis of gallstone pancreatitis, it is not sufficient to cause the morphological changes of acute pancreatitis, indicating that other events must occur if the changes induced by pancreatic duct obstruction led to acute pancreatitis. The present study was conducted for assessing the safety of epidural anesthesia (EA), its effect on pancreatic perfusion and the outcome of patients with acute pancreatitis (AP).

**Materials & Methods:** A total of 40 patients were enrolled. Inclusion criteria of the present study included AP patients. Baseline biochemical variables were recorded. Complete demographic and clinical details of all the patients was obtained. A Performa was made and detailed medical history of all the patients was recorded. All the patients were divided into two study groups: Epidural anesthesia group (study group) and control group. Among the patients of the study group, epidural anesthesia EA was inserted immediately after the admission CT scan was obtained and used for up to 5 day following randomization. Follow-up was done and CT scan images were obtained. Images of perfusion were examined. As long as the area of interest was contained inside the pancreatic parenchyma, the investigation was deemed pertinent. All the results were recorded in Microsoft excel sheet and were subjected to statistical analysis using SPSS software.

**Results:** Mean amylase levels and mean lipase levels were significantly lower in the epidural group in comparison to control group at day 2. Control group patients were accompanied by significantly higher pain as assessed by VAS at day 10. A significant improvement in arterial perfusion of the pancreas was observed 40 percent of the patients of the epidural group and in 5 percent of the patients of the control group.

**Conclusion:** EA is beneficial for preventing early tissue damage during AP.

**Keywords:** Acute Pancreatitis, Epidural Anesthesia.

## INTRODUCTION

Acute pancreatitis is a potentially fatal disease with an overall mortality of 2 – 7% despite aggressive intervention. The outcome of acute pancreatitis is determined by two factors which reflect the severity of the illness: organ failure and pancreatic necrosis. About half of the deaths in patients with acute pancreatitis occur within the first one/two weeks and are mainly attributable to multiple organ dysfunction syndromes. When not treated, the risk of recurrence in gallstone pancreatitis ranges from 32 to 61%.[1- 3]

There are many causes of acute pancreatitis, which can be easily identified in 75%-85% of patients. In developed countries, obstruction of the common bile duct by stones (38%) and alcohol abuse (36%) are the most frequent causes of acute pancreatitis. Gallstone-induced pancreatitis is caused by duct obstruction by gallstone migration. Obstruction is localized in the bile duct and pancreatic duct, or both. Duct obstruction promotes pancreatitis by increasing duct pressure and subsequent unregulated activation of digestive enzymes. Alcohol abuse is the second most frequent cause of acute pancreatitis, but the correlation between alcohol and pancreatitis is not completely understood.[4- 6] Epidural anesthesia (EA) that is used to induce analgesia in the perioperative period might be an interesting treatment of the microcirculatory blood flow abnormalities. Thus, EA can reduce the incidence of post-operative pulmonary complications, and shorten the duration of the post-operative intestinal paralysis.[7] Although pancreatic duct obstruction may play an important role in the pathogenesis of gallstone pancreatitis, it is not sufficient to cause the morphological changes of acute pancreatitis, indicating that other events must occur if the changes induced by pancreatic duct obstruction leads to acute pancreatitis. Although acinar hyperstimulation has often been implicated in acute pancreatitis pathogenesis, there is no evidence that supports it.[7, 9] Hence; the present study was conducted for assessing the safety of epidural anesthesia (EA), its effect on pancreatic perfusion and the outcome of patients with acute pancreatitis (AP).

## MATERIALS & METHODS

The present study was conducted for assessing the safety of epidural anesthesia (EA), its effect on pancreatic perfusion and the outcome of patients with acute pancreatitis (AP). A total of 40 patients were enrolled. Inclusion criteria of the present study included AP patients. Baseline biochemical variables were recorded. Complete demographic and clinical details of all the patients was obtained. A Performa was made and detailed medical history of all the patients was recorded. All the patients were divided into two study groups: Epidural anesthesia group (study group) and control group. Among the patients of the study group, epidural anesthesia EA was inserted immediately after the admission CT scan was obtained and used for up to 5 day following randomization. Follow-up was done and CT scan images were obtained. Images of perfusion were examined. As long as the area of interest was contained inside the pancreatic parenchyma, the investigation was deemed pertinent. All the results were recorded in Microsoft excel sheet and were subjected to statistical analysis using SPSS software.

**Table 1: Clinical variables**

| Variable | Epidural anesthesia | Control group | p-value |
|---|---|---|---|
| **Mean age (years)** | 56.3 | 58.1 | 0.12 |
| **Males (n)** | 15 | 12 | 0.82 |
| **Females (n)** | 5 | 8 | |
| **Diabetic (n)** | 5 | 4 | 0.91 |
| **Hypertension (n)** | 3 | 3 | - |
| **Ranson score at admission** | 3.96 | 3.46 | 0.21 |

**Table 2: Clinical outcome**

| Clinical outcome | Epidural anesthesia | Control group | p-value |
|---|---|---|---|
| **Mean amylase at admission (U/L)** | 1582.2 | 1616.2 | 0.41 |
| **Mean amylase at day 2 (U/L)** | 216.1 | 282.7 | 0.00* |
| **Mean lipase at admission (U/L)** | 1798.5 | 1812.9 | 0.71 |
| **Mean lipase at day 2 (U/L)** | 165.2 | 212.8 | 0.00* |
| **VAS at baseline** | 6.56 | 5.58 | 0.52 |
| **VAS at day 5** | 1.23 | 1.11 | 0.38 |
| **VAS at day 10** | 0.13 | 2.98 | 0.00* |

*: Significant

## RESULTS

The mean age of the patients of epidural group and control group was 56.3 years and 58.1 years respectively. Majority proportion of patients of both the epidural group and control group were males. Mean amylase levels and mean lipase levels were significantly lower in the epidural group in comparison to control group at day 2. Control group patients were accompanied by significantly higher pain as assessed by VAS at day 10. A significant improvement in arterial perfusion of the pancreas was observed in 40 percent of the patients of the epidural group and in 5 percent of the patients of the control group. Complications were significantly higher in the control group in comparison to the epidural anesthesia group.

## DISCUSSION

Pancreatitis, which is most generally described as any inflammation of the pancreas, is a serious condition that manifests in either acute or chronic forms. Chronic pancreatitis results from irreversible scarring of the pancreas, resulting from prolonged inflammation. Six major etiologies for chronic pancreatitis have been identified: toxic/ metabolic, idiopathic, genetic, autoimmune, recurrent and severe acute pancreatitis, and obstruction. The most common symptom associated with chronic pancreatitis is pain localized to the upper-to-middle abdomen, along with food malabsorption, and eventual development of diabetes. Treatment strategies for acute pancreatitis include fasting and short-term intravenous feeding, fluid therapy, and pain management with narcotics for severe pain or nonsteroidal anti-inflammatories for milder cases. Patients with chronic disease and symptoms require further care to address digestive issues and the possible development of diabetes. Several scoring systems can predict the severity of pancreatitis and recent work has attempted to compare their relative predictive values. The greater the number of Ranson criteria present, the higher the predicted mortality. Patients with two or less Ranson criteria have around one per cent mortality; those with more than five criteria have a mortality of around 40%. Other grading systems, such as the Glasgow (or Imrie) score, may be more accurate in the specific case of gallstone pancreatitis. Unfortunately, both Ranson and Glasgow systems take 48 hours for full assessment.[10-14] Hence; the present study was conducted for assessing the safety of epidural anesthesia (EA), its effect on pancreatic perfusion and the outcome of patients with acute pancreatitis (AP).

Demirag Alp et al investigated the effect of epidural anaesthesia (EA) on pancreatic microcirculation during acute pancreatitis (AP). AP was induced by injection of sodium taurocholate into the pancreatic duct of Sprague-Dawley rats. To realize EA, a catheter was introduced into the epidural space between T7 and T9 and bupivacaine was injected. At the end of the experiment (≤5 h), pancreas was removed for histology. The animals were divided into three groups: Group 1 (n =9), AP without EA; Group 2 (n =4), EA without AP; and Group 3 (n =6), AP treated by EA. In Group 1, pancreatic microcirculatory flow prior to AP was 141±39 perfusion units (PU). After AP, microcirculatory flow obviously decreased to 9 ± 6 PU ($P < 0.05$). After initiation of EA, microcirculatory flow obviously increased again to 81±31 PU ($P < 0.05$). BE was -6±4 mmol/L, which was significantly different compared to Group 1 ($P < 0.05$). Furthermore, histology revealed less extensive edema and necrosis in pancreatic tissue in Group 3 than that in Group 1. AP caused dramatic microcirculatory changes within the pancreas, with development of metabolic acidosis and tissue necrosis. EA allowed partial restoration of microcirculatory flow and prevented development of tissue necrosis and systemic complications. Therefore, EA should be considered as therapeutic option to prevent evolution from edematous to necrotic AP.[15] It has been postulated that several factors, such as local metabolic acidosis which activates various proteases, oxygen-free radical that injures endothelium and parenchyma, or the incapacity of plasma protease inhibitors to circulate through acinar cells, participate in the modifications of pancreatic microcirculation during AP. These modifications result in diminished intravascular volume, chemically-induced vasoconstriction, intravascular coagulation, and increased endothelial permeability. Finally, pancreatic ischemia, as a consequence of all these local effects, may convert a mild disease to a severe AP with parenchymal necrosis. This has been demonstrated by Klar et al who have shown in anesthetized rabbits that pancreatic blood flow increases when AP is edematous (cerulein injection), whereas pancreatic blood flow decreases when AP is severe (necrotizing form induced by taurocholate injection).[16-18]A Bernhardt et al assessed the safety of epidural anaesthesia in a large group of patients with severe acute pancreatitis, who were admitted to an intensive care unit. Epidural anaesthesia alone produced excellent analgesia on 1,083 of 1,496 observation days (72%) without the systemic use of other analgesic substances. Even in patients with marginal cardiovascular stability, epidural injection of local anaesthetic solution was tolerated well. Only 8% of all local anaesthetic injections were associated with a hemodynamic reaction that required pharmacological intervention. There was no case of a septic or neurological complication of epidural anaesthesia. Initially elevated serum amylase and lipase were normalized after 17.4 days (minimum one day, maximum 19 days). Surgical intervention was necessary for 36 patients, with a total of 64 surgeries having to be performed, including cholecystectomy. Sixteen patients required artificial ventilation for an average time of 12.3 days (minimum two days, maximum 48 days). Lethality was 2.5% (three patients), with all three patients suffering from an acute stage III pancreatitis. The average duration of ICU treatment was 12.4 days (minimum two days, maximum 101 days).[19]

## CONCLUSION

EA is beneficial for preventing early tissue damage during AP.

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