

## ARE DRAIN FLUID AMYLASE LEVELS HELPFUL ON SCREENING PANCREATIC FISTULA SECONDARY TO PANCREATIC INJURY DURING EMERGENCY SPLENECTOMY?

*Drenden Ölçülen Amilaz Değerleri Acil Splenektomi Sonrası İyatrojenik Pankreas Yaralanmasına Sekonder Pankreatik Fistül Gelişimini Öngörmede Faydalı mıdır?*

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### ABSTRACT

### ÖZ

**Objective:** Splenectomy is a major surgical intervention that brings several complications as well as saving life in the surgical treatment of blunt/penetrating spleen trauma. Although it is a highly standardized procedure in terms of the surgical technique used, pancreatic tail injuries can also be observed, especially during dissection and ligation of the splenic hilum. In this study, we investigated the possible helpful effects of the amylase levels of serum and drainage fluid when there was suspicion for pancreatic injury during splenic hilum dissection.

**Material and Methods:** Forty-two patients who underwent splenectomy under emergency conditions for splenic injury secondary to acute trauma were included in the study. Nine of the patients developed pancreatic leakage/fistula (Group-1), while 33 did not in the control group (Group-2). Amylase levels measured in both the drain in the site of the surgery and in the serum at postoperative 8, 24, 48 and 72<sup>nd</sup> hours period were compared. Patients with severe systemic diseases and former hepatobiliary disease excluded.

**Results:** There was no statistically significant difference in mean blood amylase levels between Group-1 and Group-2 ( $p>0.05$ ), however, when it was examined with regard to the measured mean amylase levels, the measurement values of Group-1 were significantly higher than those of Group-2 ( $p<0.05$ ).

**Conclusion:** Considering tissue ischemia-necrosis, intraabdominal infection-abscesses, possible intraabdominal adhesions, and other serious complications occurred secondary to chemical trauma as a result of the dissemination of pancreatic secretions into the peritoneal cavity, it is very important to protect the peritoneal cavity from contact with these enzymes. For this purpose, we suggest that the use of early stage drainage fluid amylase measurement is very important.

**Keywords:** Splenectomy, pancreatic injury, amylase

**Amaç:** Künt/delici-kesici dalak travmalarının cerrahi tedavisinde splenektomi, hayat kurtarıcı olduğu ölçüde çeşitli komplikasyonları da beraberinde getiren major bir cerrahi girişimdir. Kullanılan cerrahi teknik açısından son derece standardize edilmiş bir prosedür olmakla beraber özellikle dalak hilusunun diseksiyonu ve bağlanması esnasında pankreas kuyruk yaralanmaları da görülebilmektedir. Bu çalışmada dalak hilus diseksiyonu sırasında iatrojenik pankreas yaralanması şüphesi durumunda serum ve dren amilaz değerlerinin pankreatik kaçak/fistül oluşumunu öngörmedeki başarısı incelendi.

**Gereç ve Yöntemler:** Akut travmaya sekonder Grade 3-4 dalak yaralanması nedeniyle acil koşullarda splenektomi yapılan 42 hasta çalışmaya dahil edildi. Pankreatik kaçak izlenen hastalar ile (Grup-1: 9 olgu), kaçak izlenmeyen hastaların (Grup-2: 33 olgu) postoperatif dönemde 8, 24, 48 ve 72. saatlerde hem operasyon lojundaki drenen hem kandan alınan amilaz-lipaz ölçüm değerleri açısından karşılaştırıldı. Ağır sistemik hastalığı bulunanlarla, bilinen hepatobilyer sistem ve pankreas patolojisi bulunan hastalar çalışma dışı bırakıldı.

**Bulgular:** Grup-1 ve Grup-2 arasında ortalama serum amilaz düzeyleri açısından istatistiksel olarak anlamlı fark izlenmezken ( $p>0.05$ ), drenen ölçülen ortalama amilaz değerleri açısından incelendiğinde Grup-1'in ölçüm değerleri Grup-2'ye göre istatistiksel olarak anlamlı derecede yüksekti ( $p<0.05$ ).

**Sonuç:** Pankreas salgılarının peritoneal boşluğa olan disseminasyonları sonucu oluşacak kimyasal travmaya sekonder gelişebilecek doku iskemi-nekrozu, intraabdominal enfeksiyon-abseler, olası intraabdominal adezyonlar ve diğer ciddi komplikasyonlar düşünüldüğünde, peritoneal boşluğun bu enzimlerle temasından korunmasının oldukça önemli olduğunu düşünmekteyiz. Bu amaca yönelik olarak pankreatik yaralanma şüphesi olan olgularda drenen ölçülecek amilaz değerlerinin oldukça önemli olabileceği görüşündeyiz.

**Anahtar Kelimeler:** Splenektomi, pankreas yaralanması, amilaz



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## INTRODUCTION

In the United States, 25000 splenectomies are performed annually and there are a total of 1 million patients underwent splenectomy (1,2). The advantages of performing an indicated splenectomy has known, but complications for the patient shows some difficulties. Schilling et al. suggests that the best option for patients with hereditary spherocytosis is to avoid splenectomy (3). The risk of complications that come after splenectomy can be explained as infectious and non-infectious. In this study we will review one of the main risks for splenectomy as pancreatic fistula due to iatrogenic pancreas injury during splenectomy and efficacy of amylase measurement on screening pancreatic fistula development.

## MATERIALS AND METHODS

Forty-two patients who underwent splenectomy between 2011 and 2013 under emergency conditions for splenic injury secondary to acute trauma were included in this study. Abdominal exposure was afforded with an upper midline incision. Upon entry into the abdominal cavity, open splenectomy was performed. To avoid injury to the pancreas, the dissection was carried out at the hilum in close proximity to the spleen. A rubber drain was placed in the operation area and abdominal incision was closed. After surgery amylase levels were measured in both the drain in the site of the surgery and in the serum at the postoperative 8, 24, 48 and 72<sup>nd</sup> hours of all patients. After 30 days from surgery, patients who developed pancreatic fistula were addressed as Group-1 and the other patients without any complication were addressed as Group-2. Amylase levels were compared retrospectively from our study files to evaluate if the levels differed from each other in respect of these groups.

Pneumococcus, meningococcus and Hemophilus influenzae Type B vaccinations were completed.

Nine of the patients developed pancreatic leakage/fistula (Group-1), while 33 were did not, as the control group (Group-2). Patients with severe systemic disease and patients with known hepatobiliary system pancreatic pathology were excluded from the study. SPSS for Microsoft 17 program was used for statistical analysis, student-t test and ki-square test used.

## RESULTS

The mean age of patients was 34,9 and all were male. There was no statistically significant difference in mean blood amylase-lipase levels between Group-1 and Group-2 ( $p>0.05$ ). However, when it was examined with regard to the measured mean amylase levels from the drainage fluid, the measurement values of Group-1 (mean:  $804.3\pm 25.3$ ) were significantly higher than those of Group-2 (mean:  $102.3\pm 17.4$ ) ( $p<0.05$ ). High levels of amylase of the abdominal drainage depended on the parameters explained. When the abnormal levels were found to be threefold higher than the serum levels, there were 4 patients presenting abnormal levels on the first postoperative day. Higher levels of drain amylase at postoperative day one was significantly connected with leaks ( $p<0.001$ ). Higher drain amylase was also significantly associated with longer hospital stay ( $4.0\pm 2.7$  versus  $7.5\pm 3.3$  days;  $p<0.001$ ), 10-day reoperations (44% versus 1%;  $p<0.001$ ), and leaks (44% versus 0;  $p<0.001$ ). No patient presented with high levels of amylase in the drain on postoperative day four. Among the patients with abnormal drain amylase levels, due the first postoperative day, only one patient presented clinical signs of sepsis and a computed tomography that showed signs of a leak. Other seven individuals presented a normal postoperative course. Among the patients with abnormal drain amylase levels until postoperative 4<sup>th</sup> day, 1 patient presented clinical signs of sepsis and a computed tomography that showed indirect signs of a leak.

## DISCUSSION

The complications due to splenectomy can be assessed as infectious and non-infectious. The connection between splenectomy and these complications is still unknown (1). The particular patients' immune response to infection has regressed and these patients can easily be presented with sepsis. Additionally, splenectomy has even been thought to contribute to vascular complications after surgery (1). After splenectomy operation, pulmonary hypertension could be developed as a fulminant complication (1).

One of the important complications of splenectomy remains to be pancreatic injury which can result in pancreatic fistula (4). Pancreatic fistula could be explained by measuring the drainage fluid in respect of amylase levels. If these levels are threefold higher than serum fluid, it can be assessed as pancreatic leakage according to the definition given by the International Study Group on Pancreatic Fistula (ISGPF) (4). If grading of these fistulas is evaluated, we can describe Grade A fistula as asymptomatic and temporary, can be screened only with laboratory tests of amylase levels. Grade B leakage could bring forth some additional treatment options like antibiotic therapy, supplemental nutrition, somatostatin analogs, and percutaneous drainage. Grade C fistula is the most serious type which requires major interventions on the treatment plan. Therefore, a grade C fistula could lead to sepsis, organ dysfunction, and even death and may require surgical exploration for definitive management (4).

Due to these high risks of complications, current studies are investigating to predict the risks. The drain fluid amylase on the first postoperative day could be more helpful in the prediction of those patients with pancreatic leakage, and the level of drain fluid amylase on the first postoperative day higher than 1300 U/L was a risk factor for pancreatic fistula. The diagnostic value and suggested cut-off levels of drain fluid amylase on Day 1 in the prediction of postoperative pancreatic leakage will

have to be validated by multicenter prospective studies (5).

On the other hand, a pancreatic fistula after splenectomy deserves so much attention due to both the increase in the morbidity and mortality rate and for the cost and need for resources to treat the affected patients (6). Furthermore, these studies to predict as soon as possible in the postoperative course on patients who are more likely to develop this complication, as we can be able to predict those which could be treated in enhanced recovery pathways (7).

Amylase levels of the drain fluid on the postoperative first day enable to predict occurrence and severity of pancreatic fistula after splenopancreatic surgery (8). This test led us to divide the patients in low-risk and high-risk ones, and also helps in decision-making regarding the treatment and screening the abdominal drains after that operation (9).

Even though extensive literature throughout the world, there aren't enough studies that have been run on this very important issue. Although a very high number of cases underwent pancreatic or splenic surgery, there are very few studies available regarding this matter (10). A significant number of patients and care providers may benefit from the information obtained after the results of drain fluid amylase.

Furthermore, our study showed a significant benefit of drainage fluid amylase measurement on screening the risk of pancreatic fistula development. We suggest routine detection of both drain discharge and serum amylase levels after both emergency and elective splenectomies as a novel marker for pancreatic leakage.

*Conflict of interest:* None.

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