

Evaluation of amylase levels in the neck drainage and serum for early diagnosis of the pharyngocutaneous fistula

Farengokütanöz fistülün erken tanısında boyun drenajı ve serumdaki amilaz seviyelerinin değerlendirilmesi

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Objectives: To assess the value of amylase levels in neck drainage and serum for the diagnosis of pharyngocutaneous fistula in the early postoperative period.

Patients and Methods: We conducted a prospective study in a tertiary referral setting. Thirty-two patients (31 males, 1 female; mean age 63; range 45 to 75 years) who had laryngectomy operation as the primary treatment were studied. Amylase levels in the neck drainage and serum were analyzed in the first three postoperative days. The results were compared between patients who developed pharyngocutaneous fistula and who did not.

Results: Serum amylase levels were significantly higher in pharyngocutaneous fistula group, whereas amylase in the neck drainage was not diagnostic.

Conclusion: Serum amylase levels may be used in laryngectomy patients for the early diagnosis of pharyngocutaneous fistula.

Key Words: Amylase; laryngectomy; pharyngocutaneous fistula.

Amaç: Boyun drenajı ve serumdaki amilaz seviyelerinin belirlenmesiyle, farengokütanöz fistülün erken ameliyat sonrası dönemde saptanabilmesi.

Hastalar ve Yöntemler: Üçüncü basamak sağlık hizmeti veren bir merkezde, ileriye yönelik çalışma uyguladık. Primer tedavi olarak larenjektomi uygulanan 32 hasta (31 erkek, 1 kadın; ort. yaş 63; dağılım 45-75 yıl) çalışmaya alındı. Boyun drenajı ve serumdaki amilaz seviyeleri, ameliyat sonrası ilk üç günde bakıldı. Farengokütanöz fistül gelişen ve gelişmeyen hastalar arasındaki sonuçlar karşılaştırıldı.

Bulgular: Farengokütanöz fistül grubunda, serum amilaz seviyeleri belirgin olarak yüksek olmakla birlikte, boyun drenajında tanısız değildi.

Sonuç: Larenjektomili hastalarda serum amilaz seviyeleri, farengokütanöz fistülün erken tanısında kullanılabilir.

Anahtar Sözcükler: Amilaz; larenjektomi; farengokütanöz fistül.

Pharyngocutaneous fistula (PCF) is one of the most common complications following laryngectomy operations. The incidence of the pharyngocutaneous fistula is generally reported between 20 and 25% with a range of 2 to 66%.^[1-3] Pharyngocutaneous

fistula leads to increased morbidity, additional psychological breakdown and delayed oral feeding. Treatment costs increase due to prolonged hospitalization and additional surgeries. It also delays adjuvant therapies.

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Treatment options in the PCF include conservative management such as compression dressings and placement of a salivary by-pass tube, however, additional surgical procedures may be necessary.^[1,4,5] Early detection of the PCF may decrease the morbidity through early diagnosis and treatment.

A number of alternatives are present for the early diagnosis of the PCF.^[5-9] Wound amylase levels have been reported to be an indicator for early diagnosis of PCF in a few studies.^[1,4,10]

Our aim is to investigate the value of the amylase levels in the serum and neck drainage for the early diagnosis of the PCF after a laryngectomy.

PATIENTS AND METHODS

Thirty-two consecutive patients (31 males, 1 female; mean age 63 year; range 45 to 75 years) who underwent laryngectomy as the primary treatment of laryngeal carcinoma in Uludağ University Faculty of Medicine Department of Otorhinolaryngology-Head and Neck Surgery between September 1998 and June 2000 were included in the study. The study was approved by the Uludağ University Ethics Committee and informed consents were obtained from the patients. Twenty-six patients underwent total laryngectomy (TL) and six patients underwent partial laryngectomy (PL) with the diagnosis of laryngeal carcinoma. Selective neck dissections were done in 19 of the patients whereas comprehensive neck dissections were done on 13 patients. The closed suction drainage system was used in all of the patients. Neck drainage was collected in sterile suction containers daily from 7:00 AM to 7:00 AM for the first three days while blood samples were also obtained concurrently. Samples collected in the sterile suction containers were analyzed for amylase calorimetrically by autoanalyser. Normal values of amylase were accepted as 0-104 Somogy units/100 ml for serum and 3000±160 Somogy units/100 ml for saliva.^[9]

All patients received antibiotic prophylaxis with 900 mg clindamycin 30 minutes before the operation and three doses postoperatively at eight-hour intervals. The pharyngeal defect after total laryngectomy was reconstructed with a running Connell-type suture in T-fashion using 3/0 vicryl. The submucosal tissue was sutured as the second layer and the pharyngeal constrictors were sutured as the third layer of closure. In patients who had undergone partial laryngectomy, the laryngeal and

pharyngeal reconstruction was done according to the type and amount of resection. Nasogastric tubes were used in all patients for seven to 10 days post-operatively. Pharyngocutaneous fistula was diagnosed clinically if the patient had salivary leak through the neck incision line.

Analysis of the data was performed by SPSS version 15.0 for Windows (SPSS Inc., Chicago, Illionis, USA). Mann-Whitney U-test was used in the statistical analysis. A p-value less than 0.05 is accepted to be statistically significant.

RESULTS

There were five patients with T₂, 14 patients with T₃ and 13 patients with T₄ lesions. Patient characteristics and fistula rates are shown in Table 1. All lesions were reported as squamous cell carcinoma in the final pathological report. Pharyngocutaneous fistula occurred in four (12.5%) of the patients.

Amylase levels in the serum and neck drainage are shown in Table 2. All patients had their highest amylase levels in the neck drainage in the 1st postoperative day and a downward trend was observed in the following measurements. Amylase levels in the neck drainage of the patients with PCF were found to be higher than the patients without PCF. However, this difference did not reach to the level of statistical significance. Amylase levels in the neck drainage were higher than the serum amylase levels in all of the measurements.

Serum amylase levels followed a stable course in the measurements of the first three postoperative days. Serum amylase levels in the patients with PCF were found to be significantly higher than non-PCF group in 1st and 3rd days (p=0.047 and 0.007 respectively). It was also close to significance in 2nd day (p=0.082).

DISCUSSION

Pharyngocutaneous fistula usually occurs in the early postoperative period and it often heals with the compression dressings in the most of the patients. However, surgical interventions may be necessary in some patients. Pharyngocutaneous fistula leads to a prolonged hospital stay and is one of the most troublesome complications causing increased morbidity.^[1,4,5] Pharyngocutaneous fistula may also be associated with fatal complications like the carotid artery blow-out. For these reasons, numerous studies have been made to establish the method for the earliest diagnosis of the PCF. Some

Table 1. Patient characteristics according to groups

	non-PCF	PCF	Total
Gender			
Male	27	4	31
Female	1	–	1
Age (mean±SD)	63.32±1.66	62.25±4.11	63.18±8.60
T stage			
2	4	1	5
3	13	1	14
4	11	2	13
Laryngectomy			
Vertical	2	–	2
Supraglottic	2	1	3
Supracricoid	1	–	1
Total	23	3	26
N stage			
0	11	2	13
1	7	1	8
2	8	1	9
3	2	–	2
Neck dissection			
Comprehensive	17	2	19
Selective	11	2	13

Mean±SD: Mean±standard deviation; PCF: Pharyngocutaneous fistula; T: Tumor; N: Nodes.

of these studies have shown that the PCF can be diagnosed in five to 10 days.^[7,11]

Newman et al.^[9] obtained salivary scintigraphy with technetium-99m sodium pertechnetate in the 3rd and 6th postoperative days before the drains were

removed. However, this method is neither practical nor cost-effective. Krouse and Metson^[6] evaluated the patients with barium swallow X-rays in the postoperative two-week period prior to oral feeding. They remarked that a sinus tractus of 2 cm in length was associated with post-laryngectomy PCFs. Still, this technique was not adequate for the early diagnosis. Moses et al.^[7] employed the cinepharyngoesophagogram method for this aim too, but they also pointed out that it was not necessary to apply it in symptom-free patients prior to oral feeding. Friedman et al.^[8] emphasized that fever (>101.5 °F) in the first 48 hours postoperatively was a very good indicator for the early diagnosis of PCF.

Amylase is an enzyme found in low concentrations in serum and in high concentrations in the saliva. Amylase contamination of the wound occurs during surgical procedures in the oral cavity, hypopharynx and esophagus surgeries or procedures involving the dissection of the salivary tissue. Small amounts of amylase found in the serum may appear in the neck drainage in other head and neck procedures too.

In the present study, we investigated amylase levels both in the neck drainage and serum simultaneously to find out a simple way to achieve an early diagnosis of PCF. Larsen and Schuller^[10] were able to diagnose PCF early by the progressive increase of the amylase levels in the neck drainage. On the other hand, in late fistulas, increase in the amylase levels was not found to be prominent. Similarly, PCF was reported to be diagnosed in

Table 2. Comparison of amylase levels in neck drainage and serum between pharyngocutaneous fistula and non-pharyngocutaneous fistula patients

	Neck drainage		Serum	
	Mean±SD	<i>p</i>	Mean±SD	<i>p</i>
Day 1				
Non-Pharyngocutaneous fistula	2088.82±339.66	0.27	44.50±2.51	0.047
Pharyngocutaneous fistula	3475.25±1216.04		125.75±37.90	
All patients	2262.12±335.55		54.65±6.74	
Day 2				
Non-Pharyngocutaneous fistula	1475.21±220.39	0.64	44.92±3.13	0.082
Pharyngocutaneous fistula	2052.50±957.20		103.75±28.15	
All patients	1547.37±221.98		52.28±5.41	
Day 3				
Non-Pharyngocutaneous fistula	1115.42±107.51	0.60	43.53±2.67	0.007
Pharyngocutaneous fistula	1559.00±948.27		137.00±37.25	
All patients	1170±142.76		55.21±7.28	

Mean±SD: Mean±standard deviation.

second postoperative day through the serial measurements of the amylase levels of the neck drainage.^[1,4,10,12]

The amylase levels in the neck drainage were not helpful to detect the PCF patients in our study. In this aspect, our study is discordant with the literature.^[1,4,10] The amylase levels in the neck drainage of the PCF patients were found to be higher than the non-PCF patients in the 1st, 2nd, and 3rd postoperative days but this difference was not statistically significant. Amylase levels in the neck drainage showed a propensity to decrease in the 2nd and 3rd days following the operation. Although less pronounced, this trend was also observed in patients with PCF. Most of the fistulas are known to occur in the early postoperative period and close with conservative measures.^[4] This tendency to closure may explain the decrease of amylase levels in the patients with PCF. However, this finding may also be related to the relatively small sample size.

On the other hand, the serum amylase levels were found to be significantly higher in the PCF patients. Serum amylase analysis was helpful for the diagnosis in three out of four PCF patients and these levels were within the normal range in all non-PCF patients. Thus, serum amylase in the first three postoperative days diagnosed the PCF with 75% sensitivity and 100% specificity. These results were obtained in a limited sample size, however, as far as we know, this is the first study that demonstrated a potential role of the serum amylase for the diagnosis of PCF.

A possible reason for higher serum amylase levels in PCF patients may be that the serum amylase can be re-absorbed by soft tissues in the neck and then passed to the serum.

Radiotherapy is a well-known risk factor for PCF.^[13] The relatively higher rates of PCF in our patients, despite the omission of patients who received radiotherapy, may be related to the closure of the defect in T fashion which is a well-known factor to increase the possibility of PCF.^[14]

In conclusion, increases in the serum amylase levels may be helpful in the early diagnosis of the

salivary fistula, although amylase levels in the neck drainage did not serve to this purpose in this study.

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