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 <https://doi.org/10.55463/issn.1674-2974.50.11.1>

Nutrition Status after 1 Month of Biliary Drainage for Malignant Biliary Stenosis

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Received: August 20, 2023 / Revised: September 15, 2023 / Accepted: October 11, 2023 / Published: November 30, 2023

Abstract: Endoscopic biliary drainage is widely recognized as the gold standard treatment for tumor strictures. The aim of our retrospective study was to assess the impact of biliary drainage on patients' nutritional status. We examined data from patients who underwent successful endoscopic drainage at the IBN SINA University Hospital in Rabat, Morocco, between January 2019 and December 2022. All these parameters were assessed before and after 1 month of drainage. The mean age of 70 patients was 59.29 ± 13 . Mean weight increased significantly from 53.03 ± 9.85 kg before drainage to $57.4 \text{ kg} \pm 10.03$ after 1 month of drainage ($P=0.000$). Mean BMI after drainage was $19.8 \pm 3.63 \text{ kg/m}^2$, versus $18.06 \text{ kg/m}^2 \pm 3.65$ before drainage ($P=0.000$). Severe undernutrition was significantly reduced, with 8.5% of patients presenting a normal diet. 84.3% of patients were vomit-free after 1 month of drainage. ALB levels increased ($32.59 \text{ g/l} \pm 5.38$ ($P=0.000$)), while CRP levels decreased after 1 month of drainage ($P=0.003$). Total bilirubin also decreased after drainage (from 217 mg/l to 25.28 mg/l ($P=0.000$)). Our study demonstrates the effectiveness of treatment in improving patients' conditions, notably by alleviating disabling symptoms and restoring digestive functions. This improvement has a positive impact on patients' nutritional status and quality of life.

Keywords: tumor biliary stenosis, nutritional status, endoscopic biliary drainage, palliative treatment.

恶性胆道狭窄胆道引流 1 个月后的营养状况

摘要: 内镜下胆道引流被广泛认为是治疗肿瘤狭窄的金标准。我们回顾性研究的目的是评估胆道引流对患者营养状况的影响。我们检查了 2019 年 1 月至 2022 年 12 月期间在摩洛哥拉巴特新浪网大学医院成功接受内窥镜引流的患者的数据。所有这些参数均在引流前和引流后 1 个月进行评估。70 名患者的平均年龄为 59.29 ± 13 岁。平均体重从引流前的 53.03 ± 9.85 公斤显著增加至引流 1 个月后的 $57.4 \text{ 公斤} \pm 10.03$ (磷=0.000)。引流后平均体重指数为 $19.8 \pm 3.63 \text{ 公斤/平方米}$ ，而引流前为 $18.06 \text{ 公斤/平方米} \pm 3.65$ (磷=0.000)。严重营养不良的情况显著减少，8.5% 的患者饮食正常。引流 1 个月后，84.3% 的患者不再呕吐。引流 1 个月后，白蛋白水平升高 ($32.59 \text{ 克/升} \pm 5.38$ (磷=0.000))，而反应蛋白水平降低 (磷=0.003)。引流后总胆红素也下降 (从 217 毫克/升降至 25.28 毫克/升(磷=0.000))。我们的研究证明了治疗在改善患者病情方面的有效性，特别是通过减轻残疾症状和恢复消化功能。这种改善

对患者的营养状况和生活质量产生积极影响。

关键词：肿瘤胆道狭窄、营养状况、内镜下胆道引流、姑息治疗。

Introduction

Biliary obstruction is a common complication of malignant tumors of the pancreato-biliary system, which develop either as extrinsic compression of the bile ducts, or as intrinsic growth [1]. Most patients with malignant biliary obstruction present with pancreatic adenocarcinoma or cholangiocarcinoma.

Around 70% of pancreatic cancer cases are located in the head of the pancreas [2], while 20-30% of all cholangiocarcinoma are found distally [3]. Other less common gallbladder etiologies include duodenal adenocarcinoma, lymphoma and metastatic disease [4, 5].

Biliary cholangiocarcinoma accounts for 60% of all biliary tract cancers, and includes tumors that originate between the cystic duct and the second-order biliary radicals, and are likely to cause proximal biliary obstruction.

Because of its subclinical presentation, biliary obstruction is associated with late diagnosis and significant morbidity. Weight loss, pruritus, malaise, abdominal discomfort or pain are the main symptoms in patients with locally advanced or metastatic disease, and obstructive jaundice can be complicated in cholangitis by sepsis and liver failure [6, 7].

The best potentially curative treatment for malignant biliary obstruction is complete surgical resection [8, 9]. Unfortunately, the majority of these patients with advanced cases are not good candidates for such curative treatment and may benefit from palliative therapy. This is due to its impact on patients' quality of life, the late onset of symptoms combined with the aggressive nature of pancreatobiliary malignancies, and the high risk of surgery, particularly in elderly patients. This poses a permanent therapeutic challenge: for example, only 20% of periampullary tumors are resectable at the time of first presentation [10, 11].

In this context, endoscopic biliary drainage via stent insertion is the treatment of choice for malignant biliary obstruction caused by unresectable neoplasms. It offers minimally invasive solutions aimed at long-term drainage of the biliary system and improved quality of life [12].

The aims of this palliative care are to relieve obstructive cholestasis and its associated morbidities such as pruritus, cholangitis and pain; to avoid liver failure due to progressive biliary obstruction; and to improve quality of life.

The main aim of this article is to study the impact of the biliary drainage procedure on the nutritional status

of patients diagnosed with malignant stenosis. By seeking to understand the changes in patients' nutritional status following the procedure.

1. Materials and Methods

70 patients with malignant biliary obstruction who underwent successful endoscopic biliary drainage were included in this study conducted at the Department of Functional and Digestive Operations, CHU Ibn Sina, located in Rabat, Morocco, over a period from January 2019 to December 2022.

The selection criteria applied in our study were: inclusion of all patients over 18 years of age with tumoral biliary stenosis for whom curative treatment was not feasible. All patients with stenoses of benign origin were excluded from the study.

This research is based on the analysis of data collected from patients' medical records. Information about each patient was indexed according to the following criteria:

- Demographic data, including age and gender;
- Surgical and medical history;
- Anthropometric measurements;
- Biological analyses;
- Assessment of nutritional risk factors.

This work aims to thoroughly examine these data to better understand the impact of endoscopic biliary drainage on the nutritional status of patients with tumor biliary stenosis, which may contribute to improving their medical management and quality of life.

Consent was obtained from all participants included in our study. Patient information was processed anonymously and stored in compliance with the protection of personal data.

1.1. Anthropometric Parameters

For all study participants, anthropometric measurements were recorded, including height in centimeters (cm), weight before and after biliary drainage in kilograms (kg), Body Mass Index (BMI), measured in kg/m^2 , was calculated by dividing weight in kg by the square of height in meters (m^2). According to the defined criteria, a patient with a BMI of less than $18.5 \text{ kg}/\text{m}^2$ was considered underweight, a BMI between 18.5 and $24.9 \text{ kg}/\text{m}^2$ indicated normal weight, while a BMI greater than $29.9 \text{ kg}/\text{m}^2$ indicated overweight.

1.2. Biological Parameters

Data on biological parameters were extracted from patients' blood test results, which were available from

their medical records. Total bilirubin, C-reactive protein and albumin were recorded for each patient.

1.3. Nutritional Risk Factor

The nutritional risk factor was assessed on the basis of protein-calorie malnutrition, using the Nutritional Risk Index (NRI) [7]. This was calculated according to the following equation:

$$NRI = 1,519 \times \text{Albumin (g/l)} + 0,417 \times (\text{Current weight/Normal weight}) \times 100$$

Based on the values obtained, a patient was considered severely malnourished if the NRI was below 83.5, and moderately malnourished if the NRI was between 83.5 and 97.5. Normal nutritional status was established if the NRI was greater than or equal to 97.5.

1.4. Frequency of Vomiting

Vomiting was recorded according to recurrence: absent, occasional, and daily.

All these parameters were sampled before endoscopic biliary drainage and again after 1 month of endoscopic biliary drainage.

1.5. Statistical Analysis

Data were subjected to analysis using SPSS software, version 26.0, known as Statistical Package for Social Sciences. Descriptive statistics were used for quantitative variables, providing mean values and standard deviations, while categorical variables were summarized using numerical figures and percentages. To assess changes in nutritional status before and after drainage, the paired-samples t-test was used. Statistical significance was determined using a P-value threshold

of less than 0.05.

2. Results

2.1. Patients' Characteristics

The characteristics of the patients included in this study are presented in Table 1.

Patients	N=70	Percentage
Gender		
Male	40	57.1%
Female	30	42.9%
Average age (years)	59.23±13 (18-88ans)	-
Type of tumor		
Pancreatic cancer	24	34.3%
Extrahepatic cholangiocarcinoma	38	44.3%
Metastasis	7	10%
Ampulloma	1	1.4%

2.2. Nutritional Status Assessment

2.2.1. Assessment of Nutritional Parameters

Data on pre- and post-drainage variables, including weight, BMI, NRI, and frequency of vomiting, are presented in Table 2. The average body weight of subjects before drainage was 53.03 kg ± 9.85. This mean showed a significant improvement after drainage, with an increase in body weight noted one month later, reaching a mean of 57.4 kg ± 10.03 (P = 0.000). Similarly, BMI also increased, from 18.06 ± 3.65 kg/m² before drainage to 19.8 kg/m² ± 3.63 (P = 0.000) after one month.

Table 2 Comparison of nutritional parameters in pre- and post-endoscopic biliary drainage

Parameters	Before endoscopic biliary drainage (Mean±SD or %)	After endoscopic biliary drainage (Mean±SD or %)	P value
Height (cm)	169 cm±6.3	-	
Weight (kg)	53.03 kg±9.85	57.4 kg±10.03	0.000
BMI (kg/m ²)	18.06 kg/m ² ±3.65	19.8 kg/m ² ±3.63	0.000
NRI			
Severe undernutrition	59 (84.3%)	30 (42.8%)	0.000
Moderate undernutrition	11 (15.7%)	34 (48.5%)	0.000
Normal	0 (0%)	6 (8.5%)	0.000
Vomiting			
Daily	21 (30%)	1 (1.4%)	0.000
Occasional	42 (60%)	10 (14.3%)	0.000
Absent	7 (10%)	59 (84.3%)	0.000

Before drainage, 59 subjects (84.3%) were classified as "severe undernutrition", while 11 subjects (15.7%) were classified as "moderate undernutrition" according to the Nutritional Risk Index (NRI). After the endoscopic biliary drainage procedure, the number of subjects suffering from "severe undernutrition" decreased significantly (P<0.05). After one month, only 30 subjects (42.8%) were still severely undernourished, and 8.5% of the population no longer showed signs of undernutrition, being classified as

"normal nutrition" with an NRI>97.5. There was also a marked reduction in the frequency of vomiting, with 60% of subjects showing occasional and 30% daily vomiting before drainage. After the endoscopic biliary drainage procedure, only 1.4% of subjects still had daily vomiting, 14.2% had Occasional vomiting, and 84.3% were vomit-free one month after drainage (P<0.05).

2.2.2. Assessment of Biological Parameters before and after Drainage

The evolution of the patients' biological indicators is shown in Table 3. After drainage, albumin levels rose significantly, from a mean of 28.32 g/l \pm 4.27 before drainage to 32.59 g/l \pm 5.38 one month after drainage (P=0.000). C-reactive protein (CRP) levels were significantly reduced after drainage. The mean CRP

level before drainage was 52.56 mg/l (P=0.003), while one month after drainage it was significantly lower (29 mg/l). In addition, total bilirubin also decreased one month after drainage compared with levels recorded before the procedure (from 217.04 mg/l before drainage to 25.28 mg/l after 1 month of drainage) (P=0.000).

Table 3 Comparison of biological parameters in pre- and post-endoscopic biliary drainage

Parameters	Before endoscopic biliary drainage (Mean \pm SD or %)	After endoscopic biliary drainage (Mean \pm SD or %)	P value
Albumin (ALB g/l)	28.32 g/l \pm 4.27	32.59 g/l \pm 5.38	0.000
Total Bilirubin (TB mg/l)	217.04 mg/l \pm 110.9	25.28 mg/l \pm 20.1	0.000
C-reactive protein (CRP mg/l)	52.56 mg/l \pm 59.1	29 mg/l \pm 26.06	0.003

The effectiveness of this treatment can be clearly seen in nutritional status, since after the relief of bile duct obstruction, all the nutritional parameters assessed improved significantly, clearly optimizing their quality of life.

3. Discussion

The aim of our study was to assess the effect of endoscopic biliary drainage on the nutritional status of patients with malignant biliary stenosis, comparing their condition before and after 1 month of drainage.

Patients with biliary obstruction of malignant origin face severe nutritional problems due to the complications associated with their disease. Through analysis of the various parameters in our study, we were able to demonstrate the importance of this drainage as part of palliative treatment aimed at relieving and improving the quality of life of these patients by restoring their nutritional status.

The first indicator we used to assess the nutritional status of these patients was their weight. We observed a significant improvement in weight in all patients after drainage (P=0.000). This weight gain was accompanied by a significant increase in body mass index (BMI) (P=0.000). The mean BMI rose from 18.06 kg/m² before endoscopic drainage to 19.8 kg/m² after 1 month of drainage.

Moreover, the frequency of vomiting in this population also improved significantly, with 84.3% of patients no longer showing signs of vomiting after 1 month (P=0.000).

Biological parameters also showed significant improvements. Albumin levels (ALB) after 1 month of drainage averaged 32.59 g/l, compared with 28.32 g/l before drainage (P=0.000). These results are in agreement with a similar study by Peiyuan Cui et al. [13], who also observed a significant increase in albumin after 1 and 3 months of drainage (P<0.05).

Total bilirubin (BT) showed a very marked improvement, from 217.04 mg/l before drainage to an average of 25.28 mg/l after 1 month of drainage, (P = 0.000). These results concur with those of Bugra Tolga Konduk et al. [14] who also observed a significant

reduction in bilirubin levels after 1 month of prosthesis insertion.

Patient follow-up also revealed a significant reduction in C-reactive protein (CRP) levels after endoscopic biliary drainage. The mean CRP level fell from 52.56 mg/l before drainage to 29 mg/l after 1 month of drainage (P=0.003). These results are consistent with a study by Francisco J Padillo et al. [15], who found that restoration of bile flow after drainage resulted in an immediate decrease in CRP levels, although this decrease faded progressively over time.

In sum, our results demonstrate that after biliary prosthesis placement, a significant improvement is observed, with a reduction in total bilirubin levels and restoration of bile flow in all patients. This led to the disappearance of complications such as jaundice and pruritus, with a positive impact on nutritional assessment parameters. The frequency of vomiting decreased considerably, and body weight increased significantly one month after drainage. This improvement was also reflected in biological parameters, with albumin reaching a normal mean level and a significant decrease in CRP levels.

The positive change observed in all patients had a significant impact on the level of undernutrition, assessed using the Nutritional Risk Index (NRI). The NRI showed a clear improvement after drainage. The percentage of patients without signs of undernutrition fell to 8.5% after 1 month, compared with 0% before drainage, and the number of patients with severe undernutrition dropped to 42.8% after 1 month, compared with 84.3% before drainage (P=0.000).

Relief of symptoms such as jaundice and pruritus, as well as improved nutritional status thanks to biliary decompression, had a positive impact on patients' quality of life in terms of physical, emotional and functional health [16-20]. In our study, exhausted patients reported a significant improvement in their quality of life, with improvement in all factors assessed. Cheung et al. [21] also found a significant improvement in quality of life in patients undergoing drainage for distal malignant obstruction. In addition,

the study by Barkay et al. in 2013 [22] reported a significant improvement in quality of life after 30 days and 180 days of drainage. These results are consistent with the findings of our study.

In summary, the results of our study indicate that endoscopic biliary drainage is a promising approach in the palliative management of patients with malignant biliary obstruction. This technique has a positive impact on all parameters related to the evolution of nutritional status, thus improving patients' quality of life.

4. Conclusion

The endoscopic procedure of biliary drainage prosthesis placement is commonly employed in the palliative treatment of individuals suffering from tumoral biliary stenosis. This approach alleviates bile duct obstruction by implanting an endoscopic prosthesis facilitating adequate bile flow. A thorough review of multiple studies and scientific journals reveals the notable efficacy of this method, highlighting its many benefits, including promoting nutritional status and improving patients' quality of life. The results obtained in our study confirm the positive impact of this treatment on the nutritional status and quality of life of these patients. These findings encourage us to initiate future research to prospectively study the long-term impact of this drainage on the quality of life and nutritional status of these patients.

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