



Predictors of mortality and survival patterns among patients with obstructive jaundice in a Nigerian tertiary hospital

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Abstract

Context: Obstructive jaundice particularly when caused by malignancy, remains a significant contributor to morbidity and mortality. This study aimed to assess survival rates and predictors of mortality in patients with obstructive jaundice.

Materials and Methods: The medical records of patients managed with obstructive jaundice at Irrua Specialist Teaching Hospital were retrospectively reviewed from January 2019 to December 2023. Data were collected using a predesigned proforma and analysed with Kaplan-Meier statistics and Cox regression models.

Results: The median age of patients was 55 years (IQR: 47-68), with a majority being female (40, 58.0%). Patients with malignant obstructive jaundice had significantly lower survival rates (log-rank $p = 0.03$). Among those with pancreatic head cancers, 75% of deaths ($n=12$) occurred within 48 days of hospital admission. Multivariate Cox regression showed that duration of postoperative hospital stay was significantly associated with mortality ($p=0.008$).

Conclusion: Prolonged postoperative hospitalisation is associated with increased mortality in patients with malignant obstructive jaundice. Addressing factors that contribute to longer hospital stays could potentially improve the survival outcomes.

Keywords: Obstructive jaundice, Predictors, Morbidity, Mortality, Survival

Introduction

General surgeons working in resource-limited settings often encounter difficulties in diagnosing and treating cases of obstructive Jaundice.¹ Late presentations are common in developing countries due to limited access to advanced diagnostic and therapeutic resources.¹ Patients with jaundice are at a higher risk of postoperative complications, including bleeding, impaired wound healing, renal disorders, and septic complications such as leaks, abscesses, and cholangitis.² Obstructive jaundice from benign causes, such as choledocholithiasis, typically has lower complication rates compared to malignant causes like cancer of the head of pancreas, periampullary carcinoma, cholangiocarcinoma, and gall bladder cancer.³ The prognosis for malignant biliary obstruction is typically poor, with most tumours already metastasised at the time of diagnosis.⁴ Historical data shows that approximately 10-20% of patients with malignant obstructive jaundice undergo surgery for complete resection and potential cure. However, only half of

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these patients achieve curative resection, with the rest requiring some form of palliative bypass surgery.⁵ This means that about 90% of patients with malignant obstruction may only benefit from palliative procedures. While some patients with malignant obstructive jaundice survive only a few weeks, the majority often die within six months.⁶ In

contrast, most of the patients with benign obstructive jaundice benefit from curative surgery and have a good outcome.³

In low-resource settings like ours where endoscopic and interventional radiologic procedures are not readily and easily accessible, surgical palliation remains the most realistic way of achieving symptomatic relief in many cases of malignant obstructive jaundice. Surgical bypass can provide a substantial and enduring relief from abdominal pain, pruritus, and gastric outlet obstruction, ultimately improving the patients' quality of life. However, it is important to note that the procedures carry significant risks of morbidity and mortality.⁶

The mortality rate of obstructive jaundice varies depending on the underlying causes, which can differ among populations.⁴ Surgical procedures in patients with obstructive jaundice have been found to have a higher mortality rate compared to surgeries in non-jaundiced patients.^{2,8} Additionally, mortality rates ranging from 8 to 33% have been reported for surgeries aimed at relieving biliary obstruction.⁹ Various factors, such as advanced age, duration of jaundice, malignant aetiologies, elevated bilirubin levels, and postoperative complications like coagulopathy, hepatic coma, sepsis, and renal failure have been identified in the literature to contribute to a higher mortality rates in patients with obstructive jaundice.^{2,3,8,9}

Despite improvements in preoperative and postoperative care, obstructive jaundice remains a significant cause of morbidity and mortality.⁸ Therefore, understanding the factors that contribute to higher rates of morbidity and mortality in obstructive jaundice can influence patient care and potentially improve survival rates. However, there is a paucity of published data on these factors in the sub-Saharan African region.³ This study aimed to determine the predictors of outcomes in patients managed for obstructive jaundice at Irrua Specialist Teaching Hospital in Southern Nigeria.

Materials and methods

Study design and setting

This retrospective study was conducted at the Department of Surgery, Irrua Specialist Teaching Hospital in Irrua, Edo State, Nigeria over a 5-year period from January 2019 to December 2023. The hospital is a referral centre for specialised tertiary

care, providing services to the local community, neighbouring towns and states. It is known for its expertise in diagnosing, treating, and controlling viral haemorrhagic fever and emerging pathogens, and also serves as a training facility for medical students from Ambrose Alli University.

Sampling technique

A convenience sampling method was used based on the availability of records, as it was a retrospective study. Participants' records were abstracted consecutively until all available data were collected.

Study population

The study population consisted of patients aged 18 years and above who were diagnosed with obstructive jaundice and received treatment during the specified study period. They included patients with jaundice caused by biliary obstruction from various conditions such as cancer of the head of pancreas, periampullary carcinoma, cholangiocarcinoma, gall bladder cancers, and choledocholithiasis. Patients with medical jaundice and those with incomplete or missing data were excluded from the study.

Data collection

Patients' data were collected from their case files, electronic medical records and theatre registers. The information extracted included their sociodemographic characteristics, duration of symptoms before presentation, causes of obstructive jaundice, and various laboratory parameters such as full blood count (FBC), liver function test (LFT), and clotting profile. Postoperative complications, length of hospital stays, and mortality were also recorded. This data was entered into a proforma and then inputted into a data analysis software program.

Data analysis

Descriptive statistics were applied to all collected parameters, and the results were presented in tables and figures. Survival curves were analysed by the Kaplan-Meier method, and the statistical significance of survival was evaluated by the log-rank test. Univariate and multivariate analyses were performed using the Cox proportional hazards regression model. The predictive performance of

prognostic factors was demonstrated using Receiver Operating Characteristic (ROC) curve and the corresponding Area Under Curve (AUC). All statistical analyses were carried out using the Statistical Package for the Social Sciences (SPSS) version 25 for Windows (SPSS Inc., Chicago, IL, USA). A p-value of <0.05 was considered statistically significant.

Ethical considerations

The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). It was approved by the Ethics Committee of the Ambrose Alli University, Ekpoma (NHREC/12/06/2013; with approval number 117/24) and individual consent for this retrospective analysis was waived.

Results

Sixty-nine patients with obstructive jaundice were included in the study. The age distribution showed that the largest proportion of patients were between 40 and 49 years (33.3%), followed by those aged 60 to 69 years (23.2%). The median age was 55 years (IQR: 47-68), reflecting a predominantly middle-aged and elderly population. There was a female preponderance, with 40 patients (58.0%) being female compared to 29 patients (42.0%) being males. With respect to education, 21 patients (30.4%) had completed primary education, 21 (30.4%) had completed secondary education, 15 (21.7%) had tertiary education, and 12 (17.4%) had no formal education. The majority were Christians (61, 88.4%), while 8 (11.6%) were Muslims. Most patients were married (52, 75.4%), 14 (20.3%) were widowed, and 3 (4.4%) were single. More than half of the patients were self-employed (49, 59.4%), followed by public servants (13, 19.8%), retirees (8, 11.6%), and private-sector workers (7, 10.1%).

Malignant tumours were the leading cause of obstructive jaundice in the study, accounting for 62 cases (89.9%). The most common tumour type was carcinoma of the head of the pancreas (45, 65.2%), followed by periampullary carcinoma (11, 15.9%). The distribution of the remaining cases is shown in Figure 1.

Among the 61 patients with malignant aetiology, 57.4% underwent palliative bypass surgery, 11.5% had laparotomy and biopsy, 23.0% were deemed unsuitable for surgery, and 8.2% were referred for

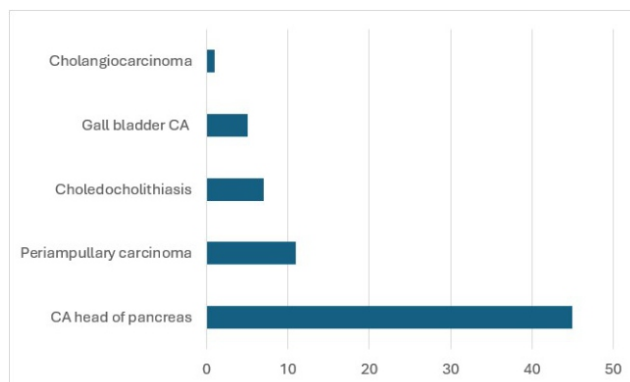


Figure 1: Aetiology of obstructive jaundice

endoscopic intervention. Postoperative complications were observed in 20 patients. These included wound infection (30%), renal failure (30%), anastomotic leak (20%), intraabdominal abscess (10%), and cholangitis (10%).

The Kaplan-Meier survival analysis was used to illustrate the overall survival outcomes of the study population. In this study, 18 patients died, giving a mortality rate of 26.1%. Approximately 25% of all deaths occurred within 27 days of admission (Figure 2).

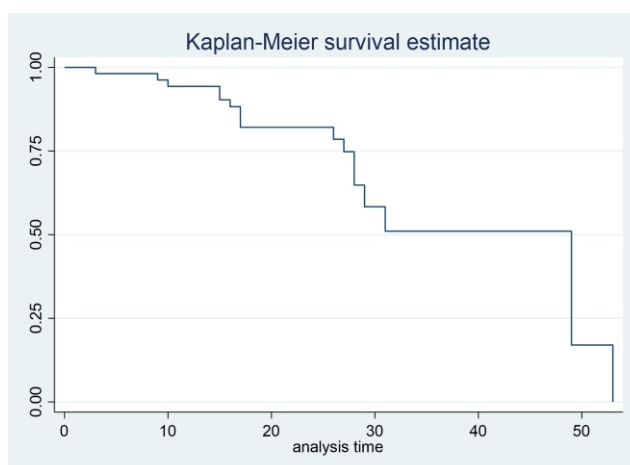


Figure 2: Survival Experience for patients admitted for Obstructive Jaundice using Kaplan Meir plots

Figure 3 shows that 25% of male deaths occurred within 17 days, while for females, this occurred at 31 days. Furthermore, 75% mortality was reached among females within 49 days, whereas this level of mortality was not observed in males during the study period.

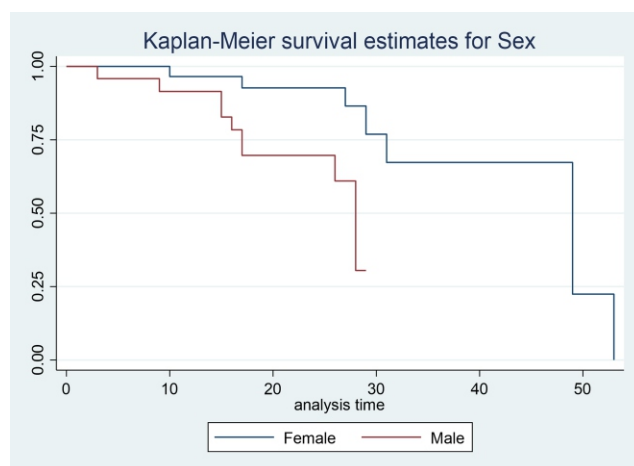


Figure 3: Kaplan-Meier survival curves of gender for patients with obstructive jaundice

Patients with malignant causes of obstructive jaundice had significantly lower survival rates compared to those with benign causes like choledocholithiasis. In patients with pancreatic head carcinoma, survival was notably poor, with 75% of deaths occurring within 48 days of admission (Figure 4).

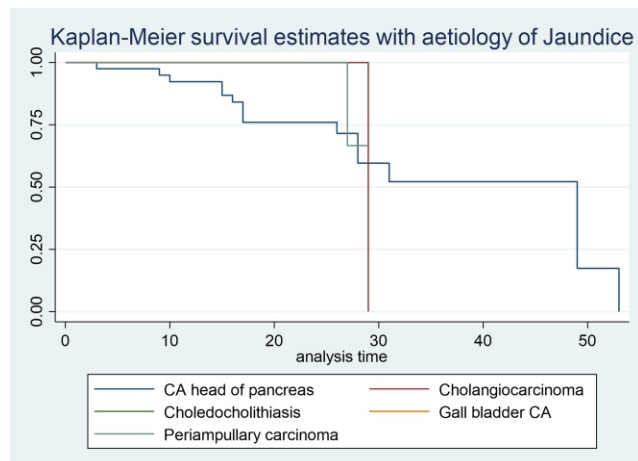


Figure 4: Kaplan-Meier survival curves of aetiology for obstructive jaundice

The duration of postoperative hospital stay was significantly associated with mortality, as shown in both univariable (HR = 0.83, 95% CI: 0.71-0.67, $p = 0.018$) and multivariable (AdjHR = 0.77, 95% CI: 0.63-0.93, $p = 0.008$) Cox regression models. This indicates that longer hospitalisation post-surgery was associated with a poorer prognosis. While body

weakness had a strong impact in the univariable analysis (HR = 7.05, $p = 0.035$), it was not significant in the adjusted models. Other clinical features like jaundice, pruritus, dark urine, pale stool, weight loss, abdominal pain, anorexia, vomiting, easy fullness, fever, and the presence or absence of complications did not show a significant association with the outcome in either univariable or multivariable analysis.

Among laboratory indices, the neutrophil count was significantly associated with the outcome in univariable analysis (HR = 1.05, 95% CI: 1.01-1.12, $p = 0.033$), but this association was not significant after adjustment (AdjHR = 1.08, $p = 0.190$). Similarly, the platelet count showed statistical significance in the univariable analysis (HR = 0.99, 95% CI: 0.69-0.99, $p = 0.020$) but lost significance in the multivariable model ($p = 0.121$). Other haematological and biochemical markers, including packed cell volume, total white cell count, liver enzymes, bilirubin, creatinine, and coagulation indices, were not associated with survival outcomes (Table 1).

Table 1: Univariable and multivariable Cox proportional hazard regression model for mortality

Variable	Univariable			Multivariable		
	HR	95% CI	p-value	AdjHR	95% CI	p-value
Clinical parameters						
Age (years)	0.83	0.97-1.05	0.624	1.02	0.96-1.09	0.426
Duration of symptoms before presentation	0.97	0.94-1.01	0.262	0.98	0.94-1.02	0.156
Duration of postoperative hospital stay	0.83	0.71-0.67	0.018	0.77	0.63-0.93	0.008
Duration of hospital stay	1.02	0.97-1.08	0.351	1.02	0.93-1.13	0.573
Laboratory parameters						
Packed Cell Volume	1.01	0.92-1.10	0.803	0.96	0.81-1.14	0.667
White Blood Cell count	1.00	0.99-1.00	0.106	1.00	0.99-1.00	0.459
Neutrophil	1.05	1.01-1.12	0.033	1.08	0.96-1.20	0.190
Platelet	0.99	0.69-0.99	0.020	0.99	0.99-1.00	0.121
Aspartate Aminotransferase	0.97	0.99-1.02	0.446	0.99	0.97-1.01	0.434
Alanine aminotransferase	0.99	0.98-1.00	0.368	1.02	0.95-1.08	0.654
Alkaline Phosphatase	0.96	0.99-1.01	0.912	0.99	0.99-1.00	0.368
Total Bilirubin	1.00	0.95-1.05	0.845	0.91	0.74-1.11	0.336
Conjugated Bilirubin	0.99	0.96-1.03	0.800	1.19	0.89-1.57	0.223
Urea	1.01	0.99-1.02	0.372	0.98	0.94-1.03	0.500
Creatinine	1.84	0.83-4.08	0.132	1.64	0.21-12.7	0.635
Prothrombin Time	1.04	0.91-1.18	0.574	0.81	0.46-1.45	0.493
Activated Partial Thromboplastin Time	1.02	0.99-1.08	0.077	1.01	0.94-1.08	0.757
International Normalised Ratio	1.03	0.23-4.67	0.962	2.77	0.09-7.99	0.146

HR - Hazard ratio, AdjHR - Adjusted Hazard Ratio, CI - Confidence Interval

The Receiver Operating Characteristic curve and its AUC showed predictive ability of prognostic factors in determining mortality or survival

(discharge alive) among patients with obstructive jaundice. The model attained an AUC of 0.62, indicating that the combined prognostic factors could predict mortality in patients with malignant obstructive jaundice with 62.0% accuracy (Figure 5)

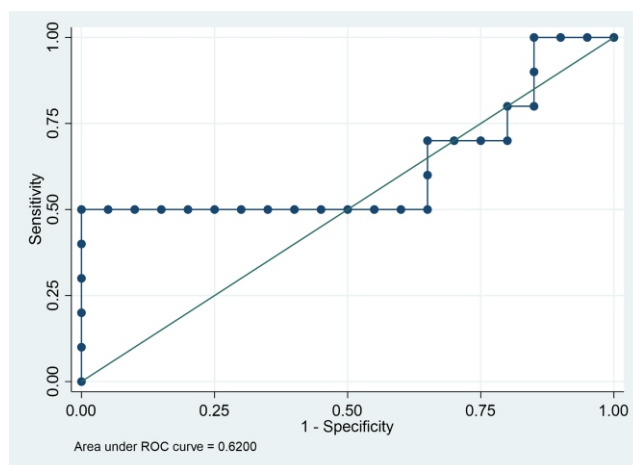


Figure 5: Post regression modelling (ROC)

Discussion

This retrospective study aimed to assess the factors impacting mortality and survival patterns among patients managed for obstructive jaundice over a five-year period. The majority of cases (89.9%) were due to malignant obstruction, underscoring the predominance of cancer-related causes in sub-Saharan Africa.^{3,10} This predominance is not merely descriptive; it shapes prognosis, treatment options, and the speed with which clinical deterioration occurs. Patients with malignant obstructive jaundice had significantly lower survival rates in this study, with particularly poor outcomes seen in cases of pancreatic head cancers, where 75% of deaths occurred within 48 days of admission. These findings are consistent with previous studies indicating that the presence of malignant disease and the severity of jaundice are important risk factors for mortality in obstructive jaundice.^{10,11,12} The early clustering of deaths also suggests that many patients present late, when curative or even effective palliative options are limited.

The study's overall mortality rate was 26.1%, which is comparable to the 29.2% reported in Uganda by Odongo et al.¹⁰ However, it is higher than the rates reported in Tanzania (20.3%)³ and Greece (21.9%).⁸

A study in Indonesia reported a higher mortality of 55.2%,⁴ while another in Sweden by Björnsson et al. reported a much higher rate of 95%.¹² These variations in mortality rates may be due to differences in sample size, duration of follow-up, case mix, and the biliary drainage methods used. Efficient biliary drainage in patients with inoperable malignant obstructive jaundice has been shown to improve overall quality of life.⁶ In our study, palliative surgical bypass was the only biliary drainage method used due to late presentation of the patients and limited facilities for more advanced procedures like endoscopic retrograde biliary drainage and percutaneous transhepatic biliary drainage. This context is important because the choice of drainage method has prognostic implications, as less invasive techniques may be safer when available.¹³

The study found a significant association between the duration of postoperative hospital stay and mortality in both univariable (HR = 0.83, $p = 0.018$) and multivariable (AdjHR = 0.77 95% CI: 0.63-0.93, $p = 0.008$) Cox regression models. This variable is best understood as a marker of the postoperative course rather than a direct cause of death. A prolonged stay can indicate a more severe postoperative course, especially if there are complications, which can directly increase the risk of mortality. Conversely, early postoperative deaths may shorten hospital stay, which complicates the interpretation of the hazard ratio. Nonetheless, the independent association after adjustment highlights the prognostic importance of the postoperative period. Ingabire et al. in Rwanda found that post-procedural complications and longer hospital stays were significantly associated with mortality in patients with obstructive jaundice from pancreatobiliary diseases.¹³ Mabula et al. in Tanzania also observed that complications, particularly postoperative sepsis, were important factors predicting longer hospital stays and higher mortality in patients with obstructive jaundice.³ One possible reason for the longer postoperative hospital stays in this study could be the choice of biliary drainage method, with less invasive techniques generally considered safer than surgical options.¹³ Neutrophil and platelet counts were initially found to be significant predictors of survival in patients with malignant obstructive jaundice in univariate

analysis in this study, though they did not maintain their significance in the multivariate model. A study conducted by Sahinli et al. in Turkey identified platelet count as an independent predictor of survival in patients with malignant obstructive jaundice following percutaneous transhepatic biliary drainage.¹⁴ Neutrophil count has been documented to have a negative correlation with the prognosis of certain tumours, and the prognostic value of platelet count has been confirmed in lung cancer, gynaecologic malignancies, and hepatocellular carcinoma.^{15,16,17} Han et al. have reported neutrophil and platelet counts as potential prognostic biomarkers for pancreatic cancers.¹⁸ These markers remain inexpensive and widely available. Further research is needed to assess their usefulness in malignant obstructive jaundice and to determine whether they can be incorporated into practical prognostic scores. In our study, the loss of statistical significance after adjustment may have been due to confounding by infection, systemic inflammation, or biliary obstruction.

Other haematological and biochemical markers such as haematocrits, total white cell count, liver enzymes, creatinine, and coagulation indices did not show any association with survival outcomes in this study. This may seem surprising given that jaundice severity is often assumed to predict outcome. However, it suggests that in this population, the underlying diagnosis and the postoperative course may matter more than isolated laboratory values. Furthermore, factors such as advanced age, prolonged duration of jaundice, malignant aetiology, hyperbilirubinaemia, and postoperative complications like sepsis, hepatic coma, renal failure, and coagulopathy have been identified in the literature as contributing to high mortality rates in patients with obstructive jaundice.^{2,3,8,9} While malignant causes were found to be significant in this study, the other prognostic factors did not reach statistical significance. This difference may be due to variations in sample size, length of the study period, and geographic location. Further research is recommended to explore additional factors influencing mortality and survival, such as Charlson comorbidity index score, Child-Pugh score, patients' nutritional status, and disease stage.

Limitations of the study

This study has limitations. Being a single-centre study may affect its generalisability. It was also limited by its retrospective design and the narrow scope of analysed outcomes. Therefore, future research should involve large-scale prospective multicentre studies with more diverse samples to improve statistical power. Furthermore, the exclusion of patients with incomplete or missing data could introduce selection bias, potentially impacting the results, especially in relation to mortality.

Conclusion

The results of this study showed poor outcomes for patients with malignant obstructive jaundice, particularly for those with cancers of head of the pancreas who had very low survival rates. A longer postoperative hospital stay was significantly associated with mortality. Understanding the factors that impact postoperative morbidity and mortality in these patients will help in making more informed decisions regarding appropriate surgical or non-surgical treatments that could potentially improve survival rates. Further research is needed to identify additional predictors of mortality and survival, using a robust prospective study design.

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Conflicts of interest

The authors declare no conflict of interest.

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