

• CASE REPORT •

A case of methicillin-resistant *Staphylococcus aureus* infection following bile duct stenting

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Abstract

AIM: To present a case of methicillin-resistant *Staphylococcus aureus* (MRSA) infection following bile duct stenting in a patient with malignant biliary obstruction.

METHODS: A 78-year-old male patient was admitted to a community hospital with progredient painless jaundice lasting over two weeks, weight loss and sweating at night. Whether a stent should be implanted pre-operatively in jaundiced patients or whether these patients should directly undergo surgical resection, was discussed.

RESULTS: ERC and a biopsy from the papilla of Vater revealed an adenocarcinoma. In addition, a 7-Ch plastic stent was placed into the common bile duct. Persistent abdominal pain, increasing jaundice, weakness and indigestion led to the transfer of the patient to our hospital. A pylorus-preserving pancreatoduodenectomy was performed. Intraoperatively, bile leaked out of the transected choledochus and the stent was found to be dislocated in the duodenum. A smear of the bile revealed an infection with MRSA, leading to post-operative isolation of the patient.

CONCLUSION: As biliary stents can cause severe infection of the bile, the need for pre-operative placement of biliary stents should be carefully evaluated in each individual case.

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Key words: Methicillin-resistant *Staphylococcus aureus*; Bile; Infection; Stent; Biliary obstruction; Malignancy; Surgery

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INTRODUCTION

The placement of a biliary stent in jaundiced patients prior to resection is still controversial. The data in the literature provide evidence for its clinical advantages. However, they also clearly show disadvantages. "To stent or not" pre-operatively in patients with obstructive jaundice is an important question raised in an article by Povoski *et al*^[1]. In this paper the authors questioned the use of pre-operative biliary drainage. The paper also focuses on the comparison of pre-operative biliary stenting and definite surgery without previous biliary drainage.

CASE REPORT

A 78-year-old male patient with an adenocarcinoma of the papilla of Vater was admitted to a community hospital with progredient painless jaundice over two weeks, weight loss of 5 kg over 2 mo and sweating at night. Transabdominal ultrasound showed dilated intra- and extra- hepatic bile ducts. A dilatation of the common bile duct up to 2 cm was found in a contrast enhanced hydro-CT-scan. An ERCP revealed a prominently swollen papilla of Vater and a distally obstructed common bile duct. A papillotomy with insertion of a 7-Ch plastic stent was performed. A biopsy of the papilla of Vater revealed histologically a highly differentiated adenocarcinoma. Three weeks later the patient was transferred to our department for surgical treatment.

At admission, the bilirubin level was markedly increased, despite the stent placement. In addition, alkaline phosphatase and CRP were also slightly elevated. Amylase and lipase serum levels were within the normal range. In the clinical examination, the patient complained of persistent abdominal pain, weakness and indigestion. It was a case of severe jaundice (total bilirubin serum level 268.5 $\mu\text{mol/L}$, normal range: 2-21 $\mu\text{mol/L}$), urine was dark in color and stool was light in color and unformed.

A pylorus-preserving pancreatoduodenectomy was performed. Intraoperatively, the common bile duct was transected and bile leaked out into the abdomen. The stent was dislocated from the common bile duct into the duodenum. The histology report described an undifferentiated carcinoma of the papilla of Vater with infiltration of the duodenal wall and the pancreas. Lymph nodes as well as the resection margins were tumor-free. The TNM classification of this tumor was pT3, pN0, M0, R0.

During the operation a smear of the bile was taken, which showed an infection with methicillin-resistant *Staphylococcus aureus* (MRSA), leading to the isolation of this patient as well as other patients who had been in contact with him.

Table 1 Effect of preoperative biliary drainage on postoperative morbidity and mortality rates

Study	Number of patients	Number of BD	Number of BB/PD	Effect of BD on	
				Postoperative morbidity	Postoperative mortality
Sohn <i>et al.</i> ^[10]	567	408	0/567	No difference	No difference
Martignoni <i>et al.</i> ^[5]	257	99	0/257	No difference	No difference
Karsten <i>et al.</i> ^[7]	241	149	45/163	No difference	NA
Povoski <i>et al.</i> ^[11]	240	126	0/240	Increased, $P<0.025$	Increased, $P<0.037$
Lai <i>et al.</i> ^[3]	87	37	49/23	No difference	No difference
Heslin <i>et al.</i> ^[4]	74	39	0/74	Increased, $P<0.04$	No difference
Hatfield <i>et al.</i> ^[8]	57	29	34/5	No difference	No difference

Abbreviations: BD, biliary drainage; BB, biliary bypass; PD, pancreatoduodenectomy; NA, not available.

The patient's post-operative course was complicated by elevated leukocytes (>22 g/L, normal range: 3.2–9.8 g/L), CRP levels (>110 mg/L) and liver enzymes. This period of approximately 8 d was accompanied by fever >38 °C, which was treated over 7 d with intravenous antibiotics (vancomycin and rifampicin).

DISCUSSION

To date, numerous studies have been published addressing the effects of preoperative biliary drainage in patients with malignant biliary obstruction. Interestingly, while there are a number of generally accepted indications for the preoperative placement of biliary stents, e.g., patients with cholangitis, obstructive jaundice or patients who have to wait several weeks until definitive surgery^[2], a number of well-designed prospective randomized trials as well as retrospective data analyses have shown no benefit of pre-operative stenting^[1,3–10] (Table 1). Martignoni *et al.*^[5] concluded in a consecutive retrospective series of 257 patients that preoperative biliary stenting does not affect early or late outcome in patients undergoing pancreatoduodenectomy. Furthermore, Büchler *et al.*^[11] concluded in a recent article that preoperative biliary drainage does not affect mortality and/or morbidity in high-volume centers of pancreatic surgery.

Moreover, a recent study by Povoski *et al.*^[11] even found an increased incidence of infectious complications after pre-operative biliary stenting and pancreatic head resection.

Endoscopic stenting can cause acute pancreatitis which can delay or even eliminate the possibility of curative surgery^[12]. Additionally, biliary stents introduce organisms into the bile which is usually sterile prior to the manipulation^[6,7,13]. As a result, preoperative stenting conveys the risk of cholangitis and inflammatory reactions around the bile duct, which often impairs the initial situation of a later surgical intervention^[2,6,14]. In addition, Hochwald *et al.*^[6] reported a relationship between bacterial bile contamination and the duration of stent placement. This analysis also showed that infectious complications, such as wound infection, intra-abdominal abscess, pneumonia and cholangitis, are associated with pre-operative biliary stenting, representing the greatest source of post-operative morbidity^[6]. The incidence of bacterial bile contamination after endoscopic stenting at the time of resection is up to 94%^[7]. Clearly, these data show that pre-operative stents convey a risk of increased bile contamination (Table 2).

Table 2 Postoperative complications after preoperative stenting

Study	Complications preoperative stent vs no stent		
	Positive bile culture (after preoperative stent)	Infectious complications: wound or abdominal complications	Increase of total days spent in hospital
Povoski <i>et al.</i> ^[11]	NA	41% vs 25% ($P<0.014$)	NA
Heslin <i>et al.</i> ^[4]	NA	33% vs 6% ($P<0.003$)	20%
Hochwald <i>et al.</i> ^[6]	69%	52% vs 28% ($P<0.03$)	0%
Karsten <i>et al.</i> ^[7]	94%	NA	NA
Pisters <i>et al.</i> ^[9]	NA	37% vs 31% ($P<0.71$, NS)	NA
Sohn <i>et al.</i> ^[10]	NA	35% vs 30% (NS)	NA

Abbreviations: NS, not significant; NA, not available.

In our patient, incubation of the intra-operative bile smear revealed MRSA. To our knowledge, this is the first report of biliary MRSA infection followed by endoscopic stenting. Infection with MRSA increases the risk of morbidity and mortality, which results in prolonged hospitalization and high utilization of costly treatment modalities^[15]. The treatment options for an established infection with these multidrug-resistant strains are limited as MRSA is resistant to most antimicrobials. Antibiotics with potential or proven activity against MRSA are fluoroquinolones, fusidic acid, rifampicin and vancomycin^[15,16]. In order to prevent infections with these multi-resistant strains, it is important to develop appropriate standards referring to the optimal use of antibiotics in hospitals and extensive application of hospital hygiene measures. In addition, iatrogenic infections have to be avoided. Since our patient had an infection of the bile due to pre-operative biliary stenting with a clear indication for curative resection, a crucial question is whether preoperative endoscopic stenting was even necessary. The fact that even though several studies show no benefit of pre-operative biliary stenting for obstructive jaundice in malignant diseases, the question “to drain or not” pre-operatively as a supportive measure for surgery has not yet been definitely answered. However, even if there is a limited benefit of pre-operative stenting, its necessity has to be questioned, particularly in regard to its side effects.

In conclusion, pre-operative stenting in malignant obstructive jaundice can cause severe problems like biliary infection and may delay or even eliminate the possibility of curative surgery. Biliary infections, especially with MRSA, are very difficult to treat and can be very costly. Although the retrospective nature in most studies calls for caution, the authors' conclusions are consistent: One should be very

thoughtful about the placement of biliary stents in patients with periampullary neoplasms who are candidates for curative surgery.

In order to generate unbiased scientific evidence, the role of pre-operative drainage in patients with malignant biliary obstruction has to be clarified in a large, controlled and randomized trial.

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