

# THE LONGMIRE PROCEDURE: IS IT WORTHWHILE?

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## ABSTRACT

**Objective:** To evaluate the peripheral intrahepatic cholangiojejunostomy (Longmire procedure) for the palliative treatment of jaundice in patients with irresectable malignant tumours of the liver hilum.

**Material and Methods:** In a retrospective study, indications, surgical technique, perioperative complications, and efficacy of treatment were analyzed for 17 patients who had received a Longmire peripheral intrahepatic cholangiojejunostomy between May 2000 and August 2004.

**Results:** The Longmire procedure was exclusively palliative in all 17 cases. The 30-day mortality in the study group was 11.6% (n=2/17), and the mean survival was 6.2 months. In patients surviving more than one month, a marked and persistent decrease in cholestasis was achieved in 86.6% cases.

**Conclusion:** The Longmire peripheral intrahepatic cholangiojejunostomy is a feasible and a worthwhile procedure and offers a reasonably effective palliative treatment for patients with irresectable tumours of the liver hilum.

**Key words:** Malignant Hilar Tumours, Peripheral Intrahepatic Cholangiojejunostomy, Longmire Procedure.

## INTRODUCTION

Malignant biliary obstruction at the level of the liver hilum is mainly the result of Klatskin tumours, gall bladder carcinomas, or centrally located hepatocellular carcinomas. Although much progress has been made in the diagnosis and management of malignant hilar tumours, resectability remains below 20% and the long-term outlook for most patients remains poor.<sup>1</sup> Surgical resection is usually prohibited because of its local invasiveness, and because of anatomic reasons, surgical treatment is further burdened by many technical problems.<sup>2</sup> Because of the mechanical cholestasis caused by tumour compression of the central bile ducts, these patients have severe jaundice and associated symptoms such as pruritis, recurrent cholangitis, and malaise. If removal of the tumour is impossible, as is the case in the majority of these tumours, then adequate and persistent decompression of the biliary system is the most important therapeutic aim of palliative treatment in these patients. It affords a reduction of cholangitis, hepatic failure, and an improved quality of life, albeit temporary. Even after apparently curative surgery, the mean survival reported is only 14 months to 26 months.<sup>2,3</sup>

In most cases of irresectable tumours of

the liver hilum, palliative biliary decompression is achieved by interventional methods such as endoscopic placement of bile duct stents or external diversion of the bile using a percutaneous transhepatic approach.<sup>4-6</sup> However, both methods have a number of disadvantages, including the frequent need for reintervention because of displacement of stents or external drains, stent infections, tumour compression of the stent, and impaired patient comfort from transcutaneous tubes.

Over the last fifty years, a number of different surgical approaches have been reported and summarized in overviews by Longmire,<sup>7,8</sup> Soupault and Couinaud,<sup>9</sup> Hepp et al,<sup>10</sup> Bismuth and Corlette,<sup>11</sup> and Blumgart and Baer,<sup>12</sup> although they have not become widely recognized and applied. The aim of this study is to report our experience with peripheral intrahepatic cholangiojejunostomy (PIHCJ) or the Longmire procedure for decompression of the biliary system in 17 patients with irresectable malignant tumours of the liver hilum.

## MATERIAL AND METHODS

This retrospective study comprised 17 patients who received a PIHCJ as a palliative

treatment for malignant obstruction of the hilar bile ducts by primary tumours at the surgical C ward, of Khyber Teaching Hospital, Peshawar, Pakistan, between May 2000 and August 2004. All patients were deeply jaundiced because of severe mechanical cholestasis from tumour compression of the bile ducts in the liver hilum. Additionally most exhibited signs of dehydration. Vitamin K therapy was instituted in all patients for a minimum of 5 days irrespective of the prothrombin time. All patients were also given appropriate rehydration therapy. Their preoperative haemoglobins were corrected to a minimum of 9g. All patients were evaluated by means of liver function tests, abdominal ultrasonography, and most had abdominal CT scans performed.

All patients had prophylactic antibiotics preoperatively and peroperatively were kept well hydrated with a 10% mannitol infusion running, to circumvent the hepatorenal syndrome.

#### ***Surgical technique:***

The left-sided approach employed in this study is principally based on the procedure reported by Longmire and Sandford in 1948.<sup>7</sup> Extensive exploration was performed by a right Kochers' sub-costal incision with an extension to the left. In three patients, with previous right paramedian scars, and in two with previous supra umbilical midline scars, the peritoneal cavity was opened via their original scars with Mayo Robsons' extensions to the xyphi sternum in cases with the former. Tumours were considered irresectable in case of extensive bilateral parenchymal or vascular infiltration of the liver, diffuse intrahepatic metastases, or peritoneal dissemination of the tumour.

If the tumour was deemed inoperable, the left lobe of the liver was mobilized by extensive division of the left triangular ligament so allowing its delivery forwards and into the wound. The peripheral portion of segments II and III were amputated by means of diathermy and finger fracture. In most cases one or two dilated bile ducts draining congested bile could readily be identified at the resection surface. The extent of the tumour in the present study precluded hilar occlusion by the Pringle manoeuvre in most cases, but manual compression of the resected surface was applied; so a certain amount of blood loss was inevitable. Meticulous haemostasis at the resection surface required multiple sutures of individual vessels, taking care not to compromise the duct lumina. The use of a Longmire clamp was also not utilized. After adequate haemostasis, a Roux-en-Y loop of proximal jejunum was created, and a side to end anastomosis was carried out between the Glisson's capsule of the resection area containing

the exposed bile ducts and the open end of the Roux loop using 0 chromic catgut interrupted sutures (figure 1). This technique does not use musosa-to-mucosa anastomosis; additionally no stents were applied, but the site of the PIHCJ was drained in all cases.

## **RESULTS**

Out of 17 patients, nine patients were males and eight patients were females; the mean age was 58 years (range 42 to 75 years).

All the patients in this study group had severe mechanical cholestasis from tumour compression of the bile ducts in the liver hilum. None of the patients had any interventions for decompression of the bile ducts before the Longmire procedure. The tumour was considered irresectable in all patients, and the Longmire procedure was used as a definitive palliative procedure. All 17 patients underwent a left-sided unilateral PIHCJ or the Longmire procedure by a uniform surgical technique described above. A total of 13 patients had preoperative percutaneous transhepatic cholangiograms done. Seven patients had previous failed attempts for placement of endoscopic stents.

Intraoperative transfusion requirements ranged from 0 to 3 units (mean 1.5 units).

Indications for the Longmire procedure or PIHCJ in the 17 patients are summarized in table 1.

### **INDICATIONS FOR LONGMIRE PROCEDURE**

<b>Indication</b>	<b>Number of patients n=17</b>	<b>Percentage</b>
Laparoscopy/laparotomy	06	35.2
Previous open and close elsewhere	04	23.5
Failed endoscopic intubation	07	41.3

Table 1

The underlying diagnoses in the 17 patients are summarized in table 2.

### **UNDERLYING DIAGNOSIS**

<b>Underlying diagnosis</b>	<b>Number of patients n=17</b>	<b>Percentage</b>
Klatskin tumours	09	52.9
Gall bladder carcinoma	07	41.3
Hepatocellular carcinoma	01	05.8

Table 2

Two patients died within 30 days after PIHCJ; thus giving a mortality figure of 11.6%. Death resulted in a 74 years old male, 48 hours after surgery from liver failure. Another female, 68

## THE COMPLETED LONGMIRE PROCEDURE

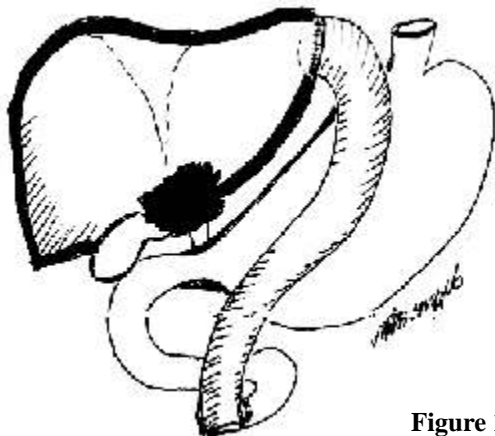


Figure 1

years of age, had an incessant bile leak and died of pneumonia on the eighteenth postoperative day. Non-lethal major complications were observed in five patients (29.4%): bile leakage at the anastomosis in three (17.6%); a wound dehiscence, requiring resuturing in one (5.8%) patient with a history of chronic obstructive pulmonary disease; and a left subphrenic collection in one (5.8%), which responded to percutaneous aspiration. In the fifteen patients surviving more than 30 days, a marked and a persistent decrease in cholestasis was observed in 13 patients, although complete return to normal levels was rarely seen. In one patient, an initial improvement was observed, but later revealed signs of cholestasis; and in one no improvement was noted at all. The procedure was therefore considered successful in 86.6% of the patients in this study group. The mean postoperative stay was 11 days (range 7 to 18 days). Excluding the 30-day mortality, the mean survival in this study was 6.2 months (range 2 months to 16 months); patients with Klatskin tumours demonstrating a better survival compared to patients with gall bladder carcinomas.

## DISCUSSION

Malignant hilar tumours usually grow slowly and patients frequently die of cholangitis and hepatic failure before distant metastases are evident.<sup>13,14</sup> The prognosis of such patients is usually frustrated; not only are these lesions frequently unresectable, but also their invasiveness hinders a curative resection. Moreover, adjunctive chemotherapy and/or radiation therapy usually do not help prolong survival.<sup>15-17</sup> Persistent decompression of the biliary system and relief from cholestasis and its associated symptoms are the major therapeutic goals for palliation in patients with advanced and irresectable tumours of the liver hilum. The Longmire procedure was considered a potentially successful method for three reasons: it should lead to a major

decompression of the biliary tree via dilated peripheral bile ducts; it stays well away from the tumour-infiltrated hilum, so that it should remain open even with growth of the tumour; and internal bilio-enteric drainage without the risk of stent occlusion or displacement, should be associated with good patient comfort.<sup>18</sup>

Despite the marked decrease in bilirubin values observed in almost 87% of patients and considerable clinical improvement, totally normal values were achieved only rarely, and clinical symptoms related to cholestasis could not be eliminated completely. Although complete drainage of the biliary tree should not be necessary for the bilirubin level to return to normal,<sup>8,19</sup> persistent segmental cholestasis could be source for sub clinical cholangitis and chronic inflammation in these patients in the biliary system, a feature found histologically in almost all patients at surgery.<sup>18</sup> Therefore, long-term antibiotic treatment might be indicated in patients after a Longmire procedure.

During the many decades, various surgical strategies have been used for decompression of the biliary tree in patients with irresectable tumours in the liver hilum when the porta hepatis cannot be dissected. These techniques can be divided into two approaches: first, a peripheral approach exposing dilated ducts by parenchymal dissection or resection based on the initial description of such a technique by Longmire and Sandford in 1948,<sup>7</sup> and second, a more central approach based on extrahepatic dissection of the segment III bile duct through the round ligament, as performed by Soupault and Couinaud in 1957.<sup>9</sup> This technique has also been used by several groups, one particularly large series, reported by Bismuth et al,<sup>11</sup> showed very promising results in terms of relief of jaundice and mean survival. We have observed in our series that the umbilical fissure is either involved by the malignant process or precariously close to it, thus precluding the use of this approach.

Besides fashioning an intrahepatic cholangiojejunostomy within the depths of the umbilical fissure recess can be difficult due to lack of space.

A modification of the Longmire procedure has been described by Cameron et al<sup>20</sup> and may improve results. In Cameron's modification, at the time of preoperative cholangiography a percutaneous transhepatic catheter is threaded into the biliary tree and advanced into a large duct near the periphery of the left hepatic lobe. This catheter is easily palpated during the subsequent operation and exposed by resection of a small portion of the left lobe. A silastic stent is then sutured to the end of the percutaneous transhepatic catheter, and

withdrawn through the liver substance as previously described. The Roux-en-Y limb of jejunum is sutured to the liver capsule around the duct, with the stent protruding into the jejunal lumen. This eliminates two problems with the Longmire procedure as originally described. First, the percutaneous transhepatic catheter makes identification of the peripheral left hepatic duct easy, and second the transhepatic stent prevents stenosis of the hepaticojejunostomy.

Interventional procedures represent the first-line treatment for internal or external decompression of an obstructed biliary tree in patients with primary irresectable hilar tumours, but they have certain disadvantages.<sup>4</sup> First, adequate drainage of the biliary tree to an extent similar to that of the Longmire procedure usually requires the placement of two or more internal stents or external drains to relieve cholestasis from both liver lobes. Moreover, repeated interventions are frequently necessary for stent exchange, either to prevent or treat infection or to replace dislodged stents.<sup>5</sup> In case of large and rapidly growing tumours, stent implantation may even be impossible, or stents will become secondarily obstructed by the tumour. In such cases a percutaneous external drain may be easier to place, but it would be associated with much worse patient comfort. Placement of self-expanding metallic stents across the tumour may lead to improved results,<sup>6</sup> but again overgrowth by the tumour may limit the efficacy. A review of literature with regard to percutaneous and endoscopic stenting versus surgical drainage does not reveal significant differences in median survival;<sup>1,3,21,22</sup> Nordback et al<sup>23</sup> have shown that results obtained with surgical placement of large-bore silicone rubber transhepatic stents into the Roux limb were equivalent to those obtained after non-surgical palliative procedures. Lai et al<sup>24</sup> found a significantly lower 30-day mortality in surgically drained patients. Shimada et al<sup>25</sup> and Paquet,<sup>26</sup> have reported better mean survival figures after surgical decompression as compared to endoscopic stenting or percutaneous transhepatic drainage. Guthrie et al<sup>27</sup> observed a lower incidence of cholangitis in the surgically drained cases (55% vs 19%).

Compared with interventional procedures, surgery carries an increased risk of morbidity and mortality. In the present study the mortality recorded was 11.6% compared to 9% recorded in Schlitt et al<sup>18</sup> series and 21% recorded in Yeung et al<sup>28</sup> series. Although some of the postoperative complications were clearly related to the peripheral intrahepatic cholangiojejunostomy, considerable mortality and morbidity rates have been observed in such patients after exploratory laparotomy alone, probably because of the poor preoperative

condition of many patients. Besides, it has been shown that elevated bilirubin affects the morbidity and mortality significantly in biliary tract surgery.<sup>29,30</sup> The advanced tumour stage in our patients is also reflected by the short mean survival after palliative treatment, but this is in accordance with recent findings by others.<sup>2,3,18,25,26,28</sup> Despite tremendous refinement in imaging techniques, even today the decision about respectability can often be made only during surgery. Some have used the Longmire procedure as a bridging procedure to liver transplantation.<sup>18</sup>

## CONCLUSION

Overall, the data demonstrate that creation of a PIHCJ or the Longmire procedure is a reasonably effective method for palliative decompression of the biliary tree and does not represent a significant penalization vis a vis percutaneous or endoscopic stenting, if the patient has already undergone a laparotomy or facilities for the later are wanting. It is particularly useful when combined with careful patient selection. Considering the perioperative risk, however, interventional procedures if available clearly remain the first-line treatment for patients with malignant tumours of the liver hilum that can be recognized as irresectable before surgery with the use of appropriate imaging techniques.

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