Journal of Pediatric Surgery (2007) **42**, 1337–1340

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Journal of Pediatric Surgery

www.elsevier.com/locate/jpedsurg

Partial internal biliary diversion through a cholecystojejunocolonic anastomosis—a novel surgical approach for patients with progressive familial intrahepatic cholestasis: a preliminary report

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Index words:
Progressive familial intrahepatic cholestasis;
Pruritus;
Biliary diversion

Abstract

Background/Purpose: The purpose of the study was to describe the initial experience with a novel approach to the surgical treatment of progressive familial intrahepatic cholestasis (PFIC), avoiding the creation of a permanent stoma.

Methods: Two teenaged patients, aged 15 and 17 years, underwent partial internal biliary diversion to treat incontrollable pruritus associated with PFIC. The surgical technique involved the creation of an isolated jejunal conduit, anastomosed proximally in a terminolateral fashion to the gallbladder and distally to the ascending colon. This operation combines the advantages of partially diverting the biliary flow from the enterohepatic cycle, avoiding an external biliary fistula. In one of the patients, this technique was used as a primary procedure, whereas in the other, a previous partial external diversion was converted to an internal diversion.

Results: Both patients had complete resolution of their pruritus and normalization of hepatic laboratory tests. One of the patients developed a mild choleretic diarrhea that can be controlled with eventual use of cholestyramine. No complications were observed related to this operation.

Conclusions: Biliary diversion appears to be a very attractive surgical option for the treatment of PFIC in children with a normal gallbladder. Long-term follow-up is necessary to evaluate late results and eventual complications of this approach.

Progressive familial intrahepatic cholestasis (PFIC, Byler disease) is an autosomal recessive disorder resulting in liver fibrosis/cirrhosis and progressing to liver failure [1]. Before the 1990s, liver transplantation was the only effective therapy for children with this condition [2]. During the last 12 years, 2 alternative methods of surgical treatment have been proposed: partial external biliary diversion (PEBD) [3] and ileal bypass procedure [4], which allow for effective elimination of bile acids accumulated in the body. In this

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doi:10.1016/j.jpedsurg.2007.03.029

Table 1 Results of pre- and postoperative laboratory tests and evolution of pruritus

	Patient no. 1		Patient no. 2			
	Preoperative	Postoperative	Preoperative 1	Postoperative 1	Preoperative 2	Postoperative 2
AST (U/L) (<37 U/L)	37	35	45	38	31	28
ALT (U/L) (<40 U/L)	24	18	22	29	53	30
γ-GT (U/L) (<40 U/L)	25	15	10	22	272[a]	100[a]
TB (mg/dL) (<1.0 mg/dL)	–	0.73	2.1	1.6	0.4	0.63
ALB (g/dL)	4.7	–	3.9	3.23	3.77	4.1
INR (<1.25)	1.23	1.29	1.4	1.17	1.09	1.10
Cholesterol (mg/dL) (<200 mg/dL)	–	79	249	154	186	149
Pruritus	Yes	No	Yes	No	No	No

In patient no. 2, preoperative 1 and postoperative 1 relate to the external diversion, and preoperative 2 and postoperative 2 relate to the internal diversion operation. AST indicates aspartate aminotransferase; ALT, alanine aminotransferase; γ-GT, γ-glutamyl transpeptidase; TB, total bilirubin; ALB, albumin; INR, international normalized ratio, cholesterol.

[a] Patient no. 2 was using a hepatotoxic anticonvulsive drug.

study, we describe a novel approach to the surgical treatment of this disease, which has the advantage of avoiding the creation of a permanent stoma.

1. Patients and methods

1.1. Case reports

1.1.1. Patient no. 1

A 17-year-old black male adolescent was referred to our care in April 1998. He had been born after a 38-week uneventful gestation; his birth weight was 3150 g. Benign recurrent cholestasis syndrome was present in 3 of his siblings. Cholestatic episodes developed since he was 8 months old. These episodes lasted days to months every year and ceased spontaneously. Serologic testing for hepatitis B and C were negative. Laboratory tests for alpha$_1$-antitrypsin, ceruloplasmin, and autoantibodies, as well as the serum levels of γ-glutamyl transpeptidase (γ-GT) and cholesterol, were normal. A liver biopsy showed slight hepatocyte cholestasis. Therefore, the diagnosis of benign recurrent cholestasis syndrome was established, and the case has been followed since.

From August 2003, however, the episodes became more frequent and severe. The pruritus became unbearable and did not respond to rifampicin, ursodeoxycholic acid, phenobarbital, and naltrexone.

A subsequent hepatic biopsy performed in May 2004 showed signs of chronic progressive hepatopathy with portal fibrosis and moderate to severe hepatocyte and canalicular cholestasis. Electronic microscopy disclosed thickened and grainy bile, suggestive of Byler disease. External biliary diversion was proposed to treat the pruritus, and it was refused by the patient, who was very reluctant to live with a permanent ostomy. After discussion with the pediatric surgical team, internal biliary diversion to the ascending colon was considered a plausible surgical option. This was promptly accepted by the patient, after being thoroughly informed of the inherent benefits and risks.

On September 1, 2004, this patient was operated on. Through an upper midline abdominal incision, the gallbladder and the liver were evaluated. An intestinal conduit was constructed using a 15- to 20-cm segment of midjejunum, which was sutured initially to the gallbladder wall and then terminolaterally to the midportion of the ascending colon. The conduit was made at least 15 cm long to create a certain resistance to the bile flow and allow a certain amount of it to flow to the duodenum. The distal end of the jejunum was slightly tapered in a way that the jejunum could reach the colon in an isoperistaltic direction to prevent colonic contents from entering the conduit. The abdominal wall was then closed in the usual way. Prophylaxis consisted of cephalotin 50 mg/kg of body weight intraoperatively.

Postoperative course was uneventful. Food was resumed on the second postoperative day, and the patient was discharged on the fifth postoperative day. Early in the follow-up period, this patient had a transient increase in the number of daily bowel movements (up to 5 times a day), which was controlled with the use of oral cholestyramine. Eventually, this improved with time, and presently, he has an average of 2 bowel movements a day and uses cholestyramine only sporadically.

1.1.2. Patient no. 2

This female adolescent, born in 1990, presented with severe itching at the age of 5 months and subsequently developed signs of cholestatic jaundice. Total bilirubin was 14.0 mg/dL (0.3-1.3 mg/dL), conjugated bilirubin was 9.5 mg/dL (0.1-0.4 mg/dL), and unconjugated bilirubin was 4.5 mg/dL (0.2-0.8 mg/dL). Abdominal ultrasound revealed an enlarged liver with an irregular surface. Ceruloplasmin; transaminases; γ-GT activity; albumin; coagulation tests; urine; and serologic tests for hepatitis A, B, and C, and rubella were all normal. Screening for inherited metabolic diseases was negative. Total cholesterol was 230 mg/dL, and triglyceride levels were 428 mg/dL.