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[症例報告]Traumatic neuroma associated with obstructive jaundice following the repair of bile duct injury during laparoscopic cholecystectomy

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Traumatic neuroma associated with obstructive jaundice following the repair of bile duct injury during laparoscopic cholecystectomy

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ABSTRACT

The most important factor influencing the long-term outcome after an initial repair of iatrogenic bile duct injury is late stricture at the repair site. We have encountered three cases of traumatic neuroma or a marked proliferation of nerve tissues (So-called traumatic neuroma) which were associated with obstructive jaundice following the repair of bile duct injury which occurred during a laparoscopic cholecystectomy. One patient underwent a simple suture repair for a laceration of bile duct while two patients underwent an end-to-end anastomosis for the transection of the bile duct at local hospitals. They were referred to our hospital because of obstructive jaundice due to a late stricture of the bile duct. A resection of the extrahepatic bile duct and hepaticojejunostomy was performed. A histological examination of the resected specimens revealed traumatic neuroma with fibrous connective tissue. To our knowledge, there has been no documentation of a so-called traumatic neuroma associated with obstructive jaundice following the repair of bile duct injury which occurred during a laparoscopic cholecystectomy. The so-called traumatic neuroma may contribute to the late-onset stricture of the bile duct at the repair site. These cases may have important implications when considering the mechanism of stricture following a repair of the bile duct and when determining the appropriate management strategies to surgically treat bile duct injury during a laparoscopic cholecystectomy. *Ryukyu Med. J.*, 21(1) 45~48, 2002

Key words: Repair of bile duct injury, Traumatic neurome, Obstrutive jaundice

INTRODUCTION

Intraoperative injury to the extrahepatic biliary tree is considered to be one of the most dangerous complications of a laparoscopic cholecystectomy¹⁾. A failure of the initial operative repair is prone to stricture of the bile duct and subsequent severe patient morbidity. Late strictures at the repair site can also occur at any time after a repair of the bile duct. Consequently, it is mandatory for surgeons to understand not only how to avoid bile duct injury but also how to manage it when it occurs.

We encountered three patients with the so-called traumatic neuroma associated with obstructive jaundice following the repair of a bile duct injury which had occurred during a laparoscopic cholecystectomy. These cases may have important implications when considering the mechanism of stricture following repair of the bile duct while also providing valuable information which can help in the management of such patients.

CASE REPORT

Table 1 summarizes the clinical features of the three patients (Table 1). All patients underwent a laparoscopic cholecystectomy for cholecystolithiasis at local hospitals. Since case 1 had severe inflammation around Calot's triangle, a laceration of the common bile duct accidentally occurred during the ablation procedures. The laceration of the common bile duct was repaired by a primary suture. A retrograde transhepatic biliary drainage (RTBD) tube was inserted for 37 days for the purpose of both decompression of the bile duct and splint tube for avoiding bile duct stricture. In cases 2 and 3, the common bile duct was transected after it was mistaken for the cystic duct, and was repaired by end-to-end anastomosis using an RTBD tube or T-tube which was inserted to decompress the bile duct. However, these decompression tubes spontaneously either came out on the postoperative days 19 or 9.

The three patients were referred to our hospital for obstructive jaundice 7 to 24 months after the operation. Diagnostic modalities such as endoscopic retrograde cho-

Table 1 Characteristics of three patients with so-called traumatic neuroma.

	Case 1	Case 2	Case 3
Age	41	50	28
Sex	F	M	F
DRLC	Cholecytolithiasis	Cholecytolithiasis	Cholecytolithiasis
Cause of injury	Severe inflammation	MCD	MCD
Type of injury	Laceration	Transected	Transected
Repair procedures	Primary suture	End-to-end anastomosis	End-to-end anastomosis
SDT	RTBD tube	RTBD tube	T tube
Perid (days) for placing SDT	37	19	8
IJ (Months)	24	21	7
Degree of stenosis	Complete obstruction	Complete obstruction	Severe stenosis
Reconstructive Procedure	Hepaticojejunostomy	Hepaticojejunostomy	Hepaticojejunostomy
Pathological diagnosis	Marked proliferation of nerve tissues	Traumatic neuroma	Traumatic neuroma
Post operative course	Repeated attacks of cholangitis	Uneventful (5 year 8 months)	Uneventful (1 year)

DRLC; Disease requiring laparoscopic cholecystectomy, MCD; By being mistaken for cystic duct, SDT; Stent or decompression tube, RTBD; Retrograde transhepatic biliary drainage, IJ; Interval between bile duct injury and appearance of jaundice



Fig. 1 Diagnostic modalities revealed an obstruction at the common bile duct in cases 1 (Left) 2 (Middle), and 3 (Right)(PTC).

langiography (ERC), percutaneous transhepatic cholangiography (PTC) and magnetic resonance cholangiography (MRC) revealed a complete obstruction at the common bile duct in cases 1 and 2, and severe stenosis of the common bile duct in case 3 (Fig. 1). Endoscopic dilatation of the stenosis failed, and therefore a resection of the extrahepatic bile duct and a hepaticojejunostomy were performed in all cases. The tissue sections histologically revealed a marked proliferation of nerve fibers with a proliferation of connective tissue in case 1 (Fig. 2 A). Immunohistological staining for S-100 protein showed an abundant proliferating nerve bundles around the large nerves similar to neuroma (Fig. 2 B). In cases 2 and 3, a histological examination and immunohistological staining for S-100 protein revealed an abundant proliferation of nerve bundles surrounded by connective tissue, and these findings were compatible with traumatic neuroma (Fig. 3). In case 1, the postoperative recovery was uneventful but repeated attacks of cholangitis have occurred during the 5-year postoperative period. Cases 2 and 3 have shown uneventful postoperative courses and both are doing well at

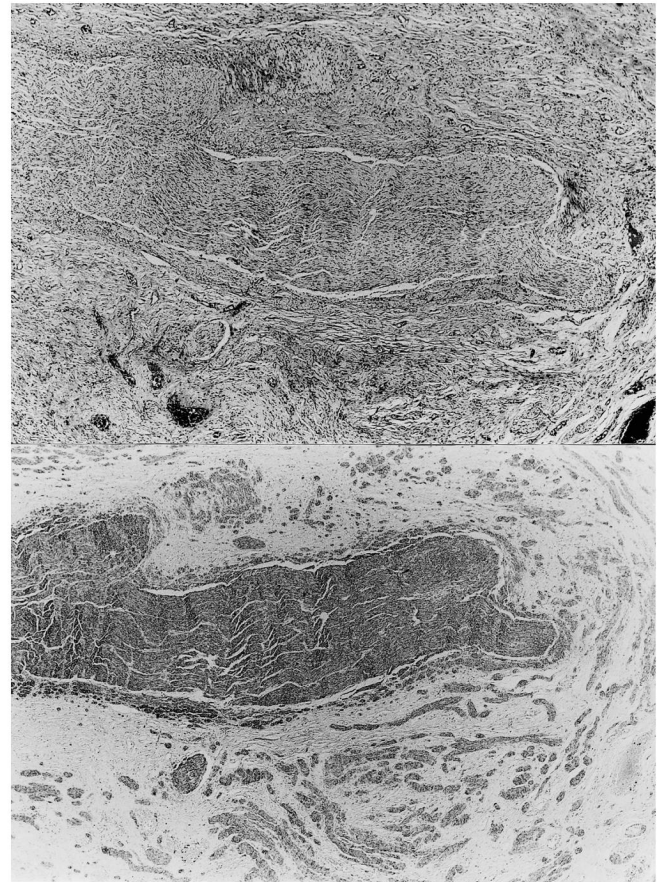


Fig. 2 A histological examination shows a marked proliferation of nerve fibers (Top; hematoxylin and eosin, original magnification $\times 25$). Immunohistological staining for S-100 protein shows an abundant proliferating nerve bundles around the large nerves (Bottom; LSAB, original magnification $\times 25$). (Case 1)

this writing.

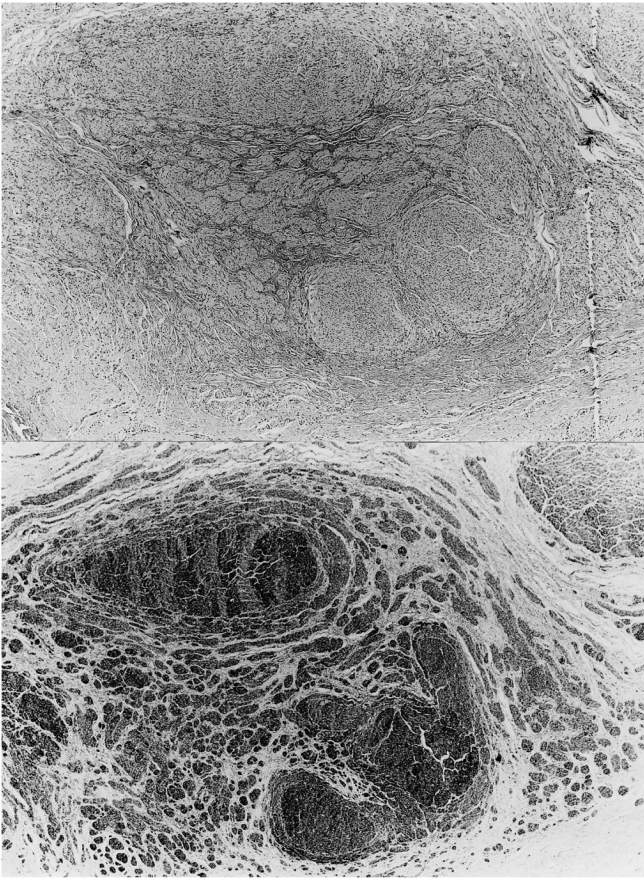


Fig. 3 A histological examination (Top; hematoxylin and eosin, original magnification $\times 25$) and immunohistological staining for S-100 protein (Bottom; LSAB, original magnification $\times 25$) shows an abundant proliferation of nerve bundles surrounded by connective tissue, which were compatible with traumatic neuroma (Case 2).

DISCUSSION

The initial operative treatment for bile duct injuries consisted of several options: a simple suture repair with or without stenting, end-to-end anastomosis with or without T-tube drainage, or a Roux-en-Y hepaticojejunostomy^{2, 3}. It is generally recommended that severe injuries or a transection of the bile duct should be managed with a Roux-en-Y hepaticojejunostomy due to the fact that the incidence of late stricture with end-to-end anastomosis is higher than that with a Roux-en-Y hepaticojejunostomy, although end-to-end anastomosis is more physiologically effective than Roux-en-Y hepaticojejunostomy regarding the preservation of the papillary function^{1, 2}. However, it still remains controversial as to which type of repair should be adopted according to the severity or classification of the bile duct injury.

The formation of traumatic or amputation neuromas after biliary tract surgery is a well recognized entity, particularly at the cystic duct stump after cholecystectomy^{4, 5}. Berge *et al.*⁶ histologically examined the cystic duct

remnant in 40 patients who had undergone a cholecystectomy not later than 6 months prior to autopsy. Neuroma or a marked proliferation of nervous tissue was noted in 16 of these patients, of whom 11 had neuroma. In general, the majority of traumatic neuromas demonstrate no symptoms, but some of them can cause postcholecystectomy pain which closely resembles biliary colic⁵. Furthermore, traumatic neuromas associated with obstructive jaundice are rare.

Traumatic neuromas giving rise to biliary obstruction after reconstructive surgery for iatrogenic injuries of the biliary tract have also been reported⁷. Due to increasing frequency of performing biliary reconstructive operations, it is postulated that traumatic neuroma resulting in biliary obstruction may increase, and thus should be included in the group of causative factors for biliary obstruction⁷. Traumatic neuroma following liver transplantation have also been recently described^{8, 9}. Colina *et al.*⁸ reported that serial hilum sections taken from 93 specimens obtained during a resection of the donor liver prior to retransplantation or at autopsy revealed the presence of 26 traumatic neuromas (27.9%). Only one of them showed obstructive jaundice in which the patients died from septic shock due to cholangitis. Concerning biliary stricture caused by traumatic neuroma after liver transplantation, only three cases have been described previously⁹. Although its incidence after transplantation may be underestimated because of a low incidence of symptoms, neuroma should be considered in the differential diagnosis of the late biliary stricture after transplantation⁹. To the best of our knowledge, only two cases of traumatic neuroma associated with obstructive jaundice after laparoscopic cholecystectomy without biliary reconstructions have been described previously^{10, 11}. In addition, there is still no documentation on traumatic neuroma associated with obstructive jaundice following the repair of bile duct injury which occurred during a laparoscopic cholecystectomy.

The exact mechanism causing late-onset stricture after a repair of the bile duct has not yet been elucidated, but thermal injury, the improper use of endoclips, or an excessive manipulation of the bile duct are considered to be important factors¹¹. The so-called traumatic neuroma may contribute to late-onset strictures of bile duct at the repair site. Several factors that induce traumatic neuroma formation have been suggested: irritation with bile, thermal injury, local infection, foreign bodies and ischemia^{10, 12}. In our cases, marked bile leakage occurred due to a dislocation of the T-tube or severe inflammation around the bile duct, which may have enhanced the proliferation of both nerve tissue and fibrous connective tissue.

Consequently, when either a primary closure of a laceration or end-to-end anastomosis for bile duct injuries are performed, it is essential that surgeons are careful to avoid bile leakage, thermal injury or any excessive manipulation of the bile duct. If severe inflammation around the bile duct or severe bile duct injuries are detected during a laparoscopic cholecystectomy, a hepaticojejunostomy is

recommended to avoid late biliary stricture. Based on our findings, when late biliary stricture develops following a primary closure of either a laceration or end-to-end anastomosis for bile duct injuries, especially after a laparoscopic cholecystectomy, traumatic neuroma should be considered in the differential diagnosis.

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