The influence of time referral in the treatment of iatrogenic lesions of biliary tract

A influência do tempo de referencia no tratamento das lesões iatrogênicas da via biliar

Fernando Barros, ACBC-RJ[1]; Reinaldo Afonso Fernandes[2]; Marcelo Enne de Oliveira, TCBC-RJ[3] ; Lúcio Filgueiras Pacheco[4] ; José Manoel da Silva G. Martinho, TCBC-RJ[5]

A B S T R A C T

Objective: To evaluate the prognosis of patients with iatrogenic bile duct injury (IBDI) regarding time of referral (RT) to the unit of liver transplantation (LT). Methods: We reviewed 51 charts of patients who had suffered some kind of IBDI during cholecystectomy and who were referred to the Bonsucesso General Hospital (HGB) LT unit. Lesions were grouped according to the Bismuth classification. Besides cholecystectomy (time of injury), we also evaluated the RT and outcome. Results: Among the 51 patients studied, there were 17 men and 34 women, with a mean age of 42.7 years. Twenty-two patients (43.1%) had a type II lesion, 13 (25.5%) type III, 10 (19.6%) type I, 5 (9.8%) type IV and only 1 (2%) type V. Forty patients were operated, and three did not return for medical review, therefore, 37 were evaluated in relation to outcome. Among these, 25 patients (67.6%) had excellent or good results with average RT of 11.5 months (range: 2-48 months) and 47.2 months (range: 3-180 months) respectively. The 12 patients (32.4%) with poor results had a mean RT of 65.9 months (range: 3 264 months), which was significantly higher than the group with excellent or good results (p=0.004). Seven patients were listed for LT, but only two were transplanted. The RT of these seven patients was significantly higher (p=0.04) than those patients not listed. Seven patients died, six of which were due to liver complications. Conclusion: RT significantly influenced the prognosis of patients in our sample.

Key words: Cholecystectomy/adverse effects. Hepatic cirrhosis. Biliary ducts/lesions. Iatrogenic disease. Post-operative complications.

INTRODUCTION

More than 750,000 cholecystectomies are carried out annually in the United States of America, one of the most largely performed gastrointestinal surgeries[1]. Over 80% of benign biliary strictures (BBS) occur as a complication of cholecystectomy. The incidence of iatrogenic bile duct injuries (IBDI) has increased since the advent of laparoscopy in the late 1980s. The BBS is still a problem today, almost 20 years after the recognition of laparoscopy as the gold standard in the treatment of biliary lithiasis. This was very clear at the joint meeting of the Society of American Gastrointestinal Endoscopic Surgeons (SAGES) and the American Hepato-Biliary-Pancreatic Association held in April 2005[2]. On that occasion, more than 300 surgeons discussed various topics surrounding the IBDI, highlighting the increase in incidence in the laparoscopic era (from 0.1 to 0.3% to 0.4-0.6%).

Some risk factors for IBDI are well documented, such as inflammation of the gallbladder[3-5], anatomic variations[6], learning curve[7-10], poor technique employed[11] and the non performance of intraoperative cholangiography or other image method[12-14].

The IBDI can have serious complications if not properly and timely treated. Patients may experience repeated episodes of cholangitis, biliary cirrhosis (HBC), liver failure and death. Some variables have been proposed to explain the different results of treatment between these patients: the level of estenosis[15], extent and quality of the proximal bile duct[16], the number of previous attempts to

Work done at Hospital Geral de Bonsucesso, Rio de Janeiro - RJ, Brazil.
Article from the thesis defended by Fernando de Barros in the Post-Graduate Program in Medical Sciences at the Universidade Federal Fluminense, as one of the requirements for obtaining the Master's Degree.
1. Surgeon, Hospital Universitário Antônio Pedro. Master's Degree in General Surgery, Universidade Federal Fluminense; 2. Member, Liver Transplantation Team, Hospital Geral de Bonsucesso - Rio de Janeiro – Brazil; 3. Member, Liver Transplantation Team, Hospital Geral de Bonsucesso. Master's Degree in General Surgery, Universidade Federal do Rio de Janeiro; 4. Head, Hepato-Biliary Surgery and Liver Transplantation, Hospital Geral de Bonsucesso. Master's Degree in General Surgery, Universidade Federal do Rio de Janeiro; 5. Member, Liver Transplantation Team, Hospital Geral de Bonsucesso. Master's Degree in Gastroenterology Surgery and PhD in General Surgery, Universidade Federal do Rio de Janeiro.

repair it[17,18], hepatic function[19], laparoscopic versus conventional cholecystectomy[20,21,22], diagnosis of the injury still during surgery[16,23] and especially the experience of the multidisciplinary team to deal with te problem[24,25]. However, the time between injury and surgical repair by a team of liver transplantation (LT) in a tertiary center (reference time – RT), has not been described as a modifying factor in these patients' outcome.

METHODS

We analyzed medical records of 51 patients with IBDI referred to the Liver Transplant Service of Bonsucesso General Hospital from September 1999 to September 2009. Only patients with BBS were included. Patients who underwent biliary-enteric bypass due to other causes (stones, post-transplant, choledochal cyst, trauma or tumors) were excluded from the analysis. Of the 51 patients, 40 were operated until the end of this work. However, three did not return for review and could not enter the analysis of outcome.

The BBS were grouped according to the Bismuth classification[26]. Patients were contacted by telephone, telegram or e mail and asked to return to the unit for monitoring. The information on cholecystectomy and RT were gathered to complete the medical reports. During the clinical examination, patients were asked about the presence of symptoms suggestive of cholestasis, such as fever, chills, rash, abdominal pain and discharge of bile from the wound. Aiming to further elucidate the complaints we requested laboratory tests (complete blood count, transaminases, bilirubin and fractions, alkaline phosphatase, gamma-GT) and an ultrasound to evaluate the biliary tract.

Treatment outcomes were classified based on clinical and laboratory examination: 1) excellent, if the patient remained completely asymptomatic with normal or stable levels of liver enzymes; 2) good, if the patient presented with symptoms without the need for hospital or residential treatment or only one episode of cholangitis, but without the need for surgery, 3) poor, if subjected to two or more episodes of cholangitis, need for surgery, progression to HBC and therefore listed for LT[27].

The software SPSS for Windows (SPSS Inc., Chicago, IL, USA) was used for data analysis and statistical comparisons. The analysis of RT and outcome was performed using the Kruskal-Wallis nonparametric test and, additionally, the Mann-Whitney test. A p value <0.05 was considered significant for all tests.

RESULTS

As shown in Table 1, our sample comprised 34 women and 17 men with a mean age of 42.7 years (range: 3-71); 30 were Caucasians, 14 mulattoes and seven African Brazilian. Thirty-five patients (68.6%) came from hospitals with residency program in general surgery. Forty patients were operated. Another 11 patients were treated conservatively (five cases) or are still awaiting the best time for surgical approach (six cases). Three patients did not continue the treatment. The mean follow up was 44.6 months (range: 5-117).

According to the Bismuth classification, the type II lesion was the most common (22 patients, 43.1%), followed by type III (13 patients, 25.5%), type I (10 patients, 19.6%), type IV (five patients, 9.8%) and type V (one patient, 2.0%). One patient who had type IV also had an associated vascular injury (left portal vein). With respect to cholecystectomy, we found 27 patients (52.9%) who suffered the injury during elective surgery, 16 of these by conventional surgery and 11 by laparoscopy. Twenty-four patients (47.1%) were operated on an emergency basis, 15 cases by conventional surgery and nine by laparoscopy. We found no significant difference between patients operated by laparoscopic vs. conventional surgery ($p=0.564$).

The Hepp-Couinaud Surgery was the choice of treatment whenever possible (26 cases, 51%) (Table 1). The second most frequent was the Roux-en-Y hepaticojejunostomy (nine cases, 17.6%), followed by left hepatectomy with right hepaticojejunostomy (two cases, 3.9%) and only one case (2%) of coledocojejunostomy, "T" tube biliary drainage and external drainage of the cavity due to inability to visualize the bile duct. Nine surgeries (17.6%) had to be carried out urgently (eight cases of cholangitis and one of choleperitoneum). Twenty-seven anastomoses (67.5%) were made using a running, single plane, 6.0, PDS suture. A closed tubular drain was used to drain the cavity for an average of 6.5 days (range: 4 18). Seven patients (12.5%) complicated with biliary fistula and one (2%) with enteric fistula, all resolved with supportive care. The average duration of postoperative hospitalization was 15.5 days (range: 5-90). Until the outcome of this study, there was no need for any new operation.

Prognosis

Among the operated patients, 25 (67.6%) were classified as having an excellent or good outcome whilst 12 (32.4%) had a poor one. The average RT for patients with poor, good and excellent results was, respectively, 65.9 months (range: 3-264 months), 47.2 months (range: 3-180 months) and 11.5 months (range: 2 -48 months), respectively (Figure 1), with statistical significance ($p=0.004$). Pairwise comparisons between these groups also showed that patients with excellent results had a significantly lower RT than those with good results ($p=0.007$) and poor results ($p=0.004$).

Table 1 – Demographic data.

	S	*A*	*R*	*CB*	*PRA*	*RT*	*Repair*	*Outcome*	*T*		*Death*
									List	Done	
1	M	27	B	I	1	3	HJ	-	No	No	-
2	F	30	Mu	IV	1	2	HC	Excellent	No	No	-
3	F	24	C	II	1	168	HJ	Poor	No	No	-
4	M	53	Mu	I	1	22	HJ	Poor	Yes	No	Encephalopathy
5	F	51	C	III	1	3	HC	Poor	Yes	No	HDA
6	F	44	C	V	0	2	HC	Excellent	No	No	IAM
7	F	37	B	I	1	62	HJ	Poor	Yes	No	HDA
8	F	40	B	II	1	3	HC	Excellent	No	No	-
9	M	8	C	II	2	26	HC	Good	No	No	-
10	F	24	C	III	1	24	HC	Good	No	No	-
11	M	26	C	II	0	6	HC	Excellent	No	No	-
12	F	51	Mu	I	2	8	HJ	Good	No	No	-
13	F	47	C	II	0	4	HC	Excellent	No	No	-
14	M	64	C	IV	1	7	HC	-	No	No	-
15	F	20	Mu	II	1	3	HC	Good	No	No	-
16	F	64	C	I	0	9	HJ	Excellent	No	No	-
17	M	19	C	II	1	264	EDC	Poor	Yes	No	Encephalopathy
18	F	64	Mu	II	0	34	HJ	Poor	No	No	-
19	F	57	C	II	1	34	HC	Good	No	No	-
20	F	46	B	III	0	12	HC	Excellent	No	No	-
21	F	70	C	I	0	36	HC	Excellent	No	No	-
22	F	19	C	III	0	180	HC	Good	No	No	-
23	F	40	Mu	III	0	60	HC	Poor	Yes	No	-
24	M	48	C	III	1	48	HC	Excellent	No	No	-
25	F	34	C	II	1	13	HC	Good	No	No	-
26	M	49	C	I	1	96	CJ	Poor	Yes	Yes	LF
27	M	44	Mu	III	1	2	HC	Excellent	No	No	-
28	F	49	C	II	1	8	HC	-	No	No	-
29	M	36	C	I	0	2	DK	Excellent	No	No	-
30	F	3	C	IV	1	7	LH+HJ	Excellent	No	No	-
31	M	61	Mu	IV	1	39	LH+HJ	Poor	No	No	-
32	M	50	Mu	III	3	20	HC	Poor	No	No	-
33	F	31	C	II	1	53	HC	Good	No	No	-
34	F	60	C	III	1	20	HC	Poor	No	No	-
35	F	12	C	II	1	12	HC	Excellent	No	No	-
36	F	46	C	II	1	7	HC	Excellent	No	No	-
37	M	65	C	I	0	20	HJ	Excellent	No	No	-
38	M	50	C	I	1	44	HJ	Good	No	No	-
39	M	34	Mu	II	1	87	HC	Good	No	No	-
40	F	41	Mu	II	0	3	HC	Poor	No	No	Sepsis
41	M	44	Mu	IV	0	-	-	-	No	No	-
42	F	57	C	II	1	-	-	-	No	No	-
43	M	32	C	III	1	-	-	-	No	No	-
44	F	44	Mu	II	1	-	-	-	No	No	-
45	F	41	C	II	0	-	-	-	No	No	-
46	F	56	B	III	2	-	-	-	No	No	-
47	F	44	C	II	1	-	-	-	No	No	-
48	F	34	C	II	0	-	-	-	No	No	-
49	F	64	Mu	II	1	-	-	-	No	No	-
50	F	55	B	III	1	-	-	-	No	No	-
51	F	71	B	III	1	-		-	No	No	-

S, sex; M, male; F, female; A, age; R, race; B, black; Mu, Mulattoe; C, Caucasian; CB, Bismuth classification[26]; PRA, previous repair attempts; RT, time of referral; HGB Bonsucesso General Hospital; HJ, hepaticojejunostomy; HC, Hepp-Couinaud, EDC, external drainage of the cavity; TD, "T" drain, LH, left hepatectomy; T, transplant; UGIB, upper gastrointestinal bleeding, MI, myocardial infarction; LF, liver failure.

Six patients were listed for Liver Transplantation; their mean RT was 84.5 months (range: 3-264 months). This time was significantly longer (p=0.04) when compared with patients who were not listed (average of 27.9 months, range 2-180 months) (Figure 2). One patient was transplanted (cadaveric donor), but died on the 14th postoperative day (RT = 96 months) due to liver failure. A total of seven patients died due to: encephalopathy (two cases), upper gastrointestinal bleeding (two cases), liver failure (one case), biliary sepsis (one case) and acute myocardial infarction (one case).

DISCUSSION

Several methods are accepted in the current literature for the treatment of IBDI. The procedures include everything from an esophageal stent by endoscopy up to complex derivative operations. Currently, there are numerous ways to make a bypass through a biliodigestive anastomosis. However, due to the variety of injuries that can be found, choosing the appropriate operation for each patient can be crucial for outcome. Most authors agree that the best method for treating IBDI is through a biliary-enteric Roux-Y bypass, as shown by Lillemoe et al.[25]. All patients with complete section of the biliary tract treated with primary anastomosis and biliary "T" drain had a poor prognosis. In contrast, the success rate was 63% among those in whom surgical repair was the Roux-Y bypass. In our sample, the Hepp-Couinaud surgery was preferred when the left hepatic duct was good and when the hepatic duct confluence was intact, as suggested by other authors[20]. By the end of the study, no patient had returned with restenosis.

In two cases a left hepatectomy combined with a right hepaticojejunostomy was necessary due to HBC. Although these two patients did not require further intervention, one had serious septic complications of biliary origin. However, Santibañes et al.[20] reported good results for IBDI patients who required hepatectomy.

It is unclear in the literature whether the RT to a tertiary center with a team with experience in LT may influence outcome. The average RT for the 37 patients who underwent surgery and returned for review was 38.8 months (range: 2-264 months). Patients with poor results had a higher RT compared to those with excellent or good results (p=0.004). Patients with a short RT had a smaller number of previous surgeries, better results and were less frequently listed for transplant.

Although the short-term consequences of IBDI are significant, it is the long-term outcome that will determine the success of surgical treatment. The largest series of follow-up of patients treated surgically was presented by

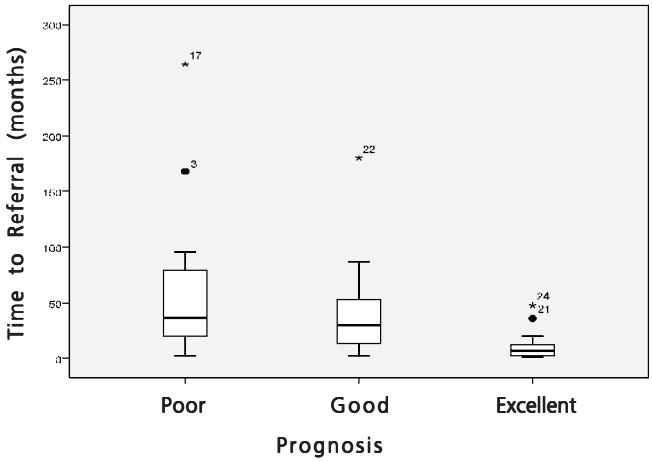

Figure 1 – *Analysis of the referral time and prognosis (p=0.004). Kruskal-Wallis test used.*

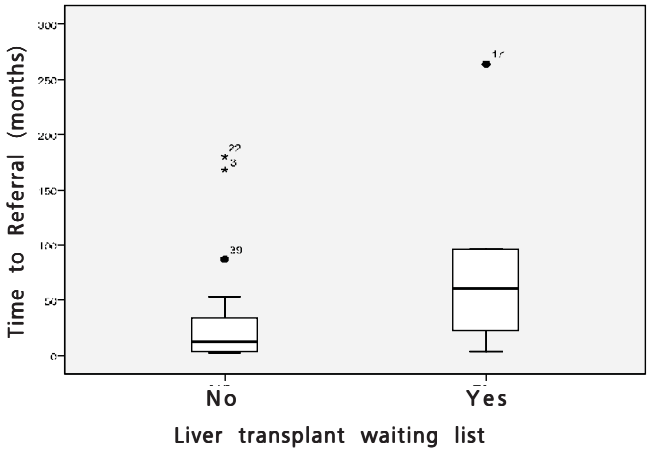

Figure 2 - *Analysis of the referral time and indication (listing) for transplant. The listed patients had a longer referral time (p=0.004). Mann-Whitney test used.*

Lillimoe et al.[25]. Of the 156 patients with BBS who underwent surgery, 142 completed treatment with a mean follow up of 57.5 months. Of these, 90.8% were considered to have excellent or good results. The mean follow up of our 37 patients was 44.9 months (range: 2-117 months). Twenty-five (67.5%) of them were classified as having excellent or good results.

Some authors suggest that different mechanisms of the laparoscopy injury, its complex nature and the frequent association of inflammation and fibrosis secondary to undiagnosed small fistulas can worsen prognosis[17,22]. Nevertheless, we found no significant difference between patients who sustained the injury during an operation by laparoscopy or conventional surgery (p=0.564). Therefore, the excellent results reported in some studies of patients treated with conventional surgery should be interpreted with caution[17,22].

R E S U M O

***Objetivo**: Avaliar o prognóstico dos pacientes com lesão iatrogênica da via biliar (LIVB) em relação ao tempo de referencia (TR) para a unidade de transplante hepático (TH).* ***Métodos**: Foram revisados 51 prontuários de pacientes que sofreram algum tipo de LIVB durante a colecistectomia e que foram encaminhados para a unidade de TH no Hospital Geral de Bonsucesso (HGB). As lesões foram agrupadas de acordo com a classificação de* Bismuth. *Além da colecistectomia (momento da lesão), também avaliamos o TR e o desfecho.* ***Resultados:** Dentre os 51 pacientes estudados encontramos 17 homens e 34 mulheres com uma média de idade de 42,7 anos. Vinte e dois pacientes (43,1%) tinham uma lesão do tipo II; 13 (25,5 %) do tipo III; 10 (19,6 %) do tipo I, 5 (9,8 %) do tipo IV; e apenas um (2 %) do tipo V. Quarenta pacientes foram operados, sendo que três não retornaram para revisão médica e portanto, 37 foram avaliados em relação ao desfecho. Dentre esses, 25 pacientes (67,6 %) tiveram resultados excelentes ou bons com TR médio de 11,5 meses (intervalo: 2-48 meses) e 47,2 meses (intervalo: 3-180 meses) respectivamente. Os 12 pacientes (32,4 %) com resultados ruins tiveram um TR médio de 65,9 meses (intervalo: 3-264 meses), que foi significativamente maior do que o grupo com resultados excelentes ou bons (p=0,004). Sete pacientes foram listadas para fila de TH, porém apenas dois foram realizados. O TR desses sete pacientes foi significativamente mais elevado (p=0,04) do que o daqueles pacientes não listados. Sete pacientes morreram, dos quais seis foram causados por complicações hepáticas.* ***Conclusão:** O TR influenciou significativamente no prognóstico dos pacientes da nossa amostra.*

***Descritores:** Colecistectomia/efeitos adversos. Cirrose hepática. Ductos biliares/lesões. Doença iatrogênica. Complicações pós-operatória.*

REFERÊNCIAS

1. Graves EJ, Owings MF. National Hospital Discharge Survey. Advance data from vital and health statistics 1997;no. 291. National Center of Health Statistics.
2. Larso M. Laparoscopic biliary tract injury: what are the limits of prevention? Surg Endosc 2006;20:1635–1637.
3. Deziel DJ, Millikan KW, Economou SG, Doolas A, Ko ST, Airan MC. Complications of laparoscopic cholecystectomy: a national survey of 4292 hospitals and an analysis of 77604 cases. Am J Surg 1993;165:9-14.
4. Pitt HA, Miyamoto T, Parapatis SK, Tompkins RK, Longmire Junior WP. Factors influencing outcome in patients with postoperative biliary strictures. Am J Surg 1982;144:14.
5. Wherry DC, Marohn MR, Malanoski MP. An external audit of laparoscopic cholecystectomy in the steady state performed in medical treatment facilities of the department of defense. Ann Surg 1996;224:145-154.
6. Kurumi Y, Tani T, Hanasawa K, Kodama M. The prevention of bile duct injury during laparoscopic cholecystectomy from the point of view of anatomic variation. Surg Laparosc Endosc Percutan Tech 2000;10:192-199.
7. Cohen MM, Young W, Theriault ME. Has laparoscopic cholecystectomy changed patterns of practice and patient outcome in Ontario? Can Med Assoc J 1996;154:491-500.
8. Russell JC, Walsh SJ, Mattie AS. Bile duct injuries, 1989-1993. A statewide experience. Connecticut laparoscopic cholecystectomy registry. Arch Surg 1996;131:382-388.
9. Windsor JA, Pong J. Laparoscopic biliary injury: more than a learning curve problem. Aust N Z J Surg 1998;68:186-189.
10. Tantia O, Jain M, Khanna S, Sen B. Iatrogenic biliary injury: 13,305 cholecystectomies experienced by a single surgical team over more than 13 years. Surg Endosc. 2008;22:1077–1086.
11. Callery MP. Avoiding biliary injury during laparoscopic cholecystectomy: technical considerations. Surg Endosc 2006;20:1654–1658.
12. Traverso LW. Biliary tract forum. Surg Endosc 2006;20: 1659–1661.
13. Sarli L, Costi R, Roncoroni L. Intraoperative cholangiography and bile duct injury. Surg Endosc 2006;20:176–177.
14. Machi J, Johnson JO, Deziel DJ, Soper NJ, Berber E, Siperstein A, Hata M, Patel A Singh K, Arregui ME. The routine use of laparoscopic ultrasound decreases bile duct injury: a multicenter study. Surg Endosc 2009;23:384–388.
15. Davids PHP, Tanka AKF, Rauws EAJ. Benign biliary strictures surgery or endoscopy? Ann Surg 1993;217:237-243.
16. Sikora SS, Srikanth G, Sarkari A, Kumar A. Hilar benign biliary strictures: need for subclassification. Aust N Z J Surg 2003;73:484-488.
17. Blumgart LH. Benign bile duct stricture following cholecystectomy: critical factors in management. Br J Surg 1984;71:836-843.
18. Mercado MA. Early versus late repair of bile duct injuries. Surg Endosc. 2006;20:1644-1647.
19. Nealon WH, Urrutia F. Long-term follow-up after bilioenteric anastomosis for benign bile duct stricture. Ann Surg 1996;223:639-648.
20. de Santibañes E, Palavecino M, Ardiles V, Pekolj J. Bile duct injuries: management of late complications. Surg Endosc 2006;20:1648–1653.
21. Topal B, Aerts R, Penninckx F. The outcome of major biliary tract injury with leakage in laparoscopic cholecystectomy. Surg Endosc 1999;13:53–56.
22. Tsalis KG, Christoforidis EC, Dimitriadis CA, Kalfadis SC, Botsios DS, Dadoukis JD. Management of bile duct injury during and after Laparoscopic cholecystectomy. Surg Endosc 2003;17:31–37.
23. MacFadyen Jr. BV, Vecchio R, Ricardo AE, Mathis CR. Bile duct injury after laparoscopic cholecystectomy. The United States experience. Surg Endosc 1998;12:315–321.
24. Huang CS, Lein HH, Tai FC, Wu CH. Long-term results of major bile duct injury associated with laparoscopic cholecystectomy. Surg Endosc 2003;17:1362–1367.
25. Lillemoe TD, Melton GB, Cameron JL, Pitt HA, Campbell KA. Postoperative bile duct strictures: management and outcome in the 1990s. Ann Surg 2000;232:430–441.
26. Bismuth H. The Biliary Tract (Clinical Surgery International Series: Postperative strictures of the biliary tract) 9ª Ed Churchill Livingstone 1983 Edinburgo (Escócia).
27. Alves A, Farges O, Nicolet J, Watrin T, Sauvanet A, Belghiti J. Incidence and consequence of an hepatic artery injury in patients with postcholecystectomy bile duct strictures. Ann Surg 2003;238:93-96.

Received 07/10/2009
Accepted for publication 05/12/2009
Conflict of interest: none
Source of funding: none

How to cite this article:
Barros F, Fernandes RA, Oliveira ME, Pacheco LF, Martinho JMS. The influence of time referral in the treatment of iatrogenic lesions of biliary tract . Rev Col Bras Cir. [periódico na Internet] 2010; 37(6). Disponível em URL: http://www.scielo.br/rcbc

Address for correspondence:
Fernando Barros
E-mail: barroscirurgia@gmail.com