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## Preliminary results of surgical repair of iatrogenic biliary strictures

*Resultados preliminares da correção cirúrgica de estenose cicatricial de vias biliares*

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**ABSTRACT:** *Introduction:* Iatrogenic biliary injury remains a critical complication of cholecystectomy, with devastating consequences to the liver and risk of death. *Objective:* We aimed to evaluate the long-term results of surgical repair of iatrogenic biliary injuries performed at a single center. *Methodology:* Patients who underwent surgical reconstruction for iatrogenic biliary injury between 1990 and 2016 were retrospectively evaluated. We collected data from medical records and the electronic database HCMED. The preliminary results were analyzed by comparing frequencies or arithmetic means with standard deviations of the recorded parameters. *Results:* We included 158 cases in the study, 81% of these women and with mean age of 45.54 years. The most common symptoms were jaundice (79.11% of the cases), abdominal pain (59.49%), choloria (52.53%), acholia/hipocholia (47.47%), fever (44.3%), pruritus (34.18%) and weight loss (27.22%). Biliary stricture was secondary to conventional cholecystectomy in 63.92% of the cases, laparoscopic cholecystectomy in 22.15% and non-specified cholecystectomy in 13.92%. We divided patients according to diagnosis of biliary duct stricture (BDS), n=93 cases (58.86%), and bilioenteric anastomosis stricture (BEAS), n=65 cases (41.14%). In BDS group, levels of bilirubin, ALT, AST and GGT were significantly increased pre compared to post surgical repair. In BEAS group, levels of bilirubin, AST and GGT were significantly increased in the preoperative compared to the postoperative, however there were no differences in ALT levels. Recurrence of stricture occurred in 5 cases of BDS group, and 7 cases of BEAS group. Survival in the BDS group was 98.92% in 1 year and 97.85% in 5 years, and in BEAS group, 98.64% and 95.38%, respectively. *Conclusions:* Surgical repair of complex biliary stricture can achieve long-term success in 89.87% of patients when performed in reference services.

**Keywords:** Biliary tract diseases/surgery; Postcholecystectomy syndrome/surgery.

**RESUMO:** *Introdução:* A estenose cicatricial de vias biliares permanece uma complicação crítica de colecistectomias, com consequências devastadoras para o fígado e risco de morte. *Objetivo:* Avaliar os resultados a longo prazo da correção cirúrgica de lesão iatrogênica de vias biliares realizada em um único centro. *Metodologia:* Pacientes submetidos a correção cirúrgica de lesão iatrogênica de vias biliares entre 1990 e 2016 foram avaliados retrospectivamente. As informações foram coletadas dos prontuários e da base de dados eletrônica HCMED. Os resultados preliminares foram analisados pela comparação de frequências ou médias aritméticas com desvio-padrão dos parâmetros estudados. *Resultados:* Foram incluídos 158 casos no estudo, 81% mulheres e com idade média de 45,54 anos. Os sintomas mais frequentemente apresentados foram icterícia (em 79,11% dos casos), dor abdominal (59,49%), colúria (52,53%), acolia ou hipocolia fecal (47,47%), febre (44,3%), prurido (34,18%) e perda de peso (27,22%). A estenose de vias biliares foi secundária a colecistectomia convencional em 63,92% dos casos, a colecistectomia laparoscópica em 22,15%, e a colecistectomia não-especificada em 13,92%. Os pacientes foram divididos de acordo com o diagnóstico de estenose de via biliar (EVB), n=93 casos (58,86%), ou estenose de anastomose bilio-digestiva (EABD), n=65 casos (41,14%). No grupo EVB, níveis de bilirrubina, ALT, AST e GGT eram significativamente mais altos no pré-operatório que no pós-operatório. No grupo EABD, níveis de bilirrubina, AST e GGT eram significativamente mais altos no pré-operatório que no pós-operatório, entretanto não houve diferenças nos níveis de ALT. Recidiva da estenose ocorreu em 5 casos do grupo EVB, e em 7 casos do grupo EABD. A sobrevida no grupo EVB foi de 98,92% em 1 ano e 97,85% em 5 anos; e no grupo EVB, 98,64% e 95,38%, respectivamente. *Conclusões:* A correção cirúrgica de lesões complexas de vias biliares tem uma taxa de sucesso de 89,87% quando realizada em serviços de referência.

**Descritores:** Doenças biliares/cirurgia; Síndrome pós-colecistectomia/cirurgia.

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## INTRODUCTION

Biliary duct injury is a severe complication of cholecystectomy, which can occur after surgical manipulation of biliary ducts and lead to decreased life expectancy and quality of life of affected patients<sup>1,2</sup>. The incidence of bile duct injury ranges from 0.1% to 0.2% for conventional cholecystectomy, and from 0.3 to 0.5% for laparoscopic cholecystectomy<sup>3-10</sup>. Several risk factors are implicated in the genesis of biliary duct injury, being the most influential ones acute cholecystitis, obesity and anatomic variations that can induce to error when identifying the cystic duct<sup>11</sup>.

Once the lesion happens, early identification and correct treatment are pivotal in the prognosis of these patients. In approximately 20% of cases biliary duct injury is detected during the operation, when leaking of bile is seen. In these cases, there is often an attempt to primarily repair the bile duct. In the majority of cases (80%), biliary duct injury is only detected during the postoperative period, when the patient presents signs and symptoms compatible with biliary fistula and cholestatic syndrome<sup>12,13</sup>.

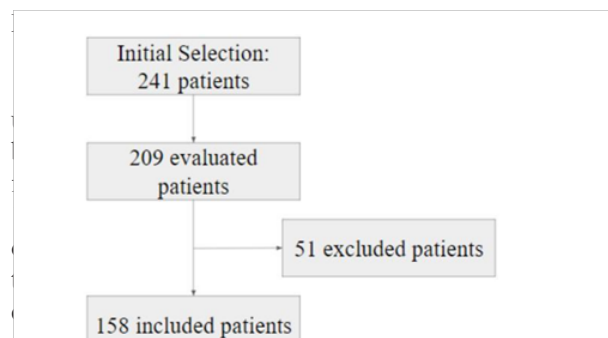
Regarding the position of the injury, higher lesions (that is, lesions closer to the hepatic ducts confluence) have higher rates of morbimortality and more complex surgical treatment than lower lesions. Studies performed at *Hospital das Clínicas* have shown that approximately 50% of patients with biliary duct injury present high lesions<sup>12,14</sup>.

Treatment of biliary duct injury often requires a multidisciplinary approach. Surgery is currently the method with best results, specially when performed in reference services. A study performed at Hospital das Clínicas by Monteiro da Cunha et al.<sup>12</sup> showed a 96% rate of long-term success for surgical correction of low biliary duct injury, and a 77% rate of long-term success for surgical correction of high biliary duct injury. Endoscopic treatment, which consists in dilatation of the bile duct and placing of prosthesis, is the most common non-surgical treatment for bile duct injury. It is indicated in incomplete sections of the bile duct and less complex cases of stricture, and has a success rate of 77%.

The Department of Pancreatic and Biliary Duct Surgery of *Hospital das Clínicas* is a reference service for treatment of biliary duct injury. In 1986, Machado et al.<sup>15</sup> published the technique for correcting high lesions of biliary duct, which is used to this day and even then presented promising results<sup>16</sup>. Patients referred to *Hospital das Clínicas* have often already been submitted to surgical or endoscopic treatment with poor results, and frequently present complications as repeated episodes of cholangitis and hepatic injury.

The objective of our study was to evaluate the long-term results of surgical repair of such complex

iatrogenic biliary injuries in a single center.



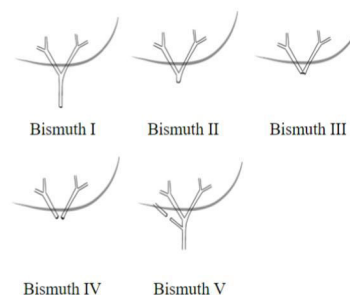
**Figure 1.** Patient selection flowchart

Patient's data was collected from medical records and the electronic database HCMED. The preliminary results were analyzed by comparing frequencies or arithmetic means with standard deviations of the recorded parameters.

## RESULTS

We included 158 cases in the study, 81% of these women and with mean age of 45.54 years. The most commonly presented symptoms were jaundice in 79.11% of the cases, abdominal pain in 59.49%, choloria in 52.53%, acholia/hipocholia in 47.47%, fever in 44.3%, pruritus in 34.18% and weight loss in 27.22%.

Biliary stricture was secondary to conventional cholecystectomy in 63.92% of the cases, laparoscopic cholecystectomy in 22.15% and non-specified cholecystectomy in 13.92%. Regarding Bismuth's classification of bile duct injury (Figure 2), 17 patients (10.76%) presented lesion classified as B1, 61 (38.61%) as B2, 61 (38.61%) as B3, 16 (10.13%) as B4 and 4 (2.53%) were impossible to be classified with the available data.



**Figure 2.** Bismuth's classification for bile duct injury

We divided patients according to diagnosis of biliary duct stricture (BDS), n= 93 cases (58.86%), and

bilioenteric anastomosis stricture (BEAS), n= 65 cases (41.14%). The BEAS group consisted of patients who had already been submitted to an attempt of surgical correction of iatrogenic biliary injury in other service, but had a recurrence in the biliary stricture and were then referred to *Hospital das Clinicas*.

In BDS group, levels of bilirubin, ALT, AST and GGT were significantly increased pre compared to post surgical repair (Table 1). In BEAS group, levels of bilirubin, AST and GGT were significantly increased in the preoperative compared postoperative; however there were no differences in ALT levels (Table 1).

**Table 1.** Comparison of results pre and post surgical repair in bile duct stricture (BDS) group and bilioenteric anastomosis stricture (BEAS) group

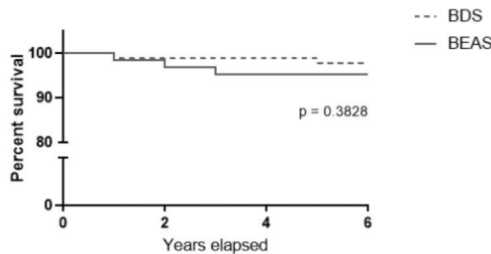
		Preoperative	Postoperative	P value
<b>BDS group</b>	Bilirubin, mg/dL	5.42±7.72	1.10±2.04	0.0023
	AST, UI/L	68.84±55.64	33.23±29.37	0.0026
	ALT, UI/L	90.61±98.76	37.63±42.24	0.0055
	GGT, UI/L	392.6 ± 327.1	193.5±264.7	0.0046
<b>BEAS group</b>	Bilirubin, mg/dL	5.20±6.51	2.78±6.77	0.0488
	AST, UI/L	77.84±63.47	55.73±61.74	0.0413
	ALT, UI/L	79.10±64.44	61.61±77.62	0.1004
	GGT, UI/L	498.1±452.2	292.1±378.0	0.0003

Recurrence of stricture occurred in 5 cases of BDS group (5.38%), submitted again to surgical repair, and in 7 cases of BEAS group (10.77%), 4 submitted to surgical repair and 3 referred to the Liver Transplant Unit. Survival in the BDS group was 98.92% in 1 year and 97.85% in 5 years, and in BEAS group 98.64% and 95.38%, respectively (Figure 3).

to laparoscopic cholecystectomy. The conclusions we can draw from this finding are very limited, as this type of study is not adequate to analyze prevalence.

We observed a predominance of higher biliary lesions, with 77.22% of the cases classified as B2 and B3. As was already mentioned, high lesions have more complex treatment. The prevalence of such lesions, then, confirms the position of Hospital das Clinicas as a reference service.

There was a significative decrease in all laboratorial parameters analyzed in BDS group, and in all but ALT in BEAS group. This poorer result in BEAS group can be due to delayed treatment and longer exposure of the liver to lesion. We observe, concordantly, that the rate of recurrence in the BEAS group was twice the rate at BDS group, and that in this first group, 3 patients had to be referred to the Liver Transplant Unit. There was no difference in survival between the groups.



**Figure 3.** 5-year patient survival after correction of biliary stricture

**DISCUSSION**

The epidemiology of patients submitted to surgical repair of iatrogenic biliary injury is compatible with that of patients who undergo cholecystectomy, in other words, there is a predominance of adult women in both procedures. The symptoms most commonly presented are also consistent with cholestatic syndrome, as was expected.

Contrary to what is described in literature, we have found a higher prevalence in biliary duct injury caused by conventional cholecystectomy, instead of secondary

**CONCLUSION**

Surgical repair of complex biliary stricture can achieve long-term success in 89.87% of patients when performed in reference services.

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