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# Outcomes of laparoscopic Kasai portoenterostomy for biliary atresia: A systematic review

Mohammed Hassan Hussain [a,b], Naved Alizai [b,*], Bijendra Patel [a]

[a] Queen Mary University of London, London, United Kingdom
[b] Leeds General Infirmary, Leeds, United Kingdom

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ABSTRACT

*Aims:* Biliary atresia (BA) is a rare disease for which mainstay of treatment consists of open Kasai portoenterostomy. The aim of this review was to assess the outcomes of laparoscopic Kasai portoenterostomy, which offers potential benefits of minimally invasive surgery. Outcomes identified were postoperative cholangitis rates, incidence of adhesions at subsequent liver transplantation, native liver survival rates and actuarial survival rates.

*Methods:* A comprehensive systematic literature search was conducted in the PubMed and Cochrane databases using the keywords hepatic portoenterostomy, biliary atresia and laparoscopy. Robotic cases were excluded.

*Results:* Ten studies (n = 149 patients) were included in this review. The mean age at the time of operation was 66 (range 14–119) days. The mean operative time was 261 (range 120–662) minutes. The rate of postoperative cholangitis was 34% (range 11%–50%). The mean native liver survival rate was 57% (range 33%–78%) at 6 months and 47% (range 8%–76%) at 2 years. Mean actuarial survival rate was 87% (range 54%–100%) at 2 years. Subsequent adhesions were reported in 4 patients. Two patients had dense adhesions and 2 had no adhesions.

*Conclusions:* Although laparoscopic Kasai portoenterostomy is a feasible operation, outcomes in terms of native liver survival rates and actuarial survival rates are unfavourable compared to conventional surgery. There is no evidence that laparoscopic Kasai is associated with fewer adhesions at subsequent liver transplantation.

*Level of evidence:* III. Type of study: Treatment study.



Biliary atresia (BA) is an obstructive cholangiopathy characterised by neonatal jaundice. It is a rare condition affecting about 1:17,000 infants in the UK [1]. The exact aetiology remains unknown but there are likely to be a number of different aetiological variants within a spectrum (e.g. syndromic biliary atresia where there are other congenital abnormalities). The commonly used anatomical classification of the disease centres on the level of obliteration. In type I, the common bile duct is atretic with more proximal patency; in type II, the common hepatic duct is atretic with proximal hepatic duct patency; and in type III (>90% cases), all of the extrahepatic ducts are atretic. Left untreated, infants develop liver cirrhosis and have a life expectancy of less than 2 years [2].

The mainstay of management for biliary atresia is the Kasai portoenterostomy (KPE) and subsequent liver transplantation if this is not successful or fails to continue to drain bile. KPE involves excising the remnants of the extrahepatic bile ducts, exposing the microscopic ductules within the porta hepatis and usually anastomosing a Roux-en-Y jejunal loop onto the porta hepatis.

Success is measured by clearance of jaundice and survival of the native liver. In the UK, and in virtually all centres worldwide, open surgery continues to be the gold standard.

KPE was first performed laparoscopically in 2001 by Esteves et al. of Brazil [3]. The proposed advantages of minimally invasive surgery being reduced incisional morbidity, shorter hospital stay and improved cosmetic results [4]. Added to this, and pertinent to the KPE, minimally invasive surgery may be associated with reduced adhesion formation postoperatively, perhaps reducing the morbidity of future transplant operations. However, this has really only been shown in adult studies [5,6].

The aim of this study was to review the published experience with laparoscopic KPE from a systematic review of the literature.

## 1. Methods

A prospective protocol according to PRISMA guidelines was used to conduct this systematic review. An unrestricted search was carried out in PubMed and the Cochrane Library on 1st November 2015 using tthe following keywords as Medical Subject Headings: hepatic portoenterostomy; biliary atresia; laparoscopy. The bibliographies of retrieved articles were also reviewed to check for any further relevant articles.

* Corresponding author at: Leeds Children's Hospital, Leeds General Infirmary, Leeds LS1 3EX, United Kingdom. Tel.: +44 1133925276; fax: +44 1133925129.
*E-mail address:* Naved.Alizai@nhs.net (N. Alizai).

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### 1.1. Selection criteria

Inclusion criteria included articles in the English language; outcomes of laparoscopic Kasai portoenterostomy (LKPE); human studies; case series and case reports. Exclusion criteria included outcomes of open or robotic KPE, animal experiments.

Data are given as mean (range) unless otherwise indicated.

## 2. Results

The original literature search through the PubMed and Cochrane libraries identified 26 articles. All 26 articles were identified in the PubMed library. A further 2 articles were subsequently added after checking the bibliographies of relevant articles concerning minimally invasive operative management of BA. The 28 articles were screened according to the inclusion criteria and 18 articles remained of which 8 were excluded as they included the same patient pool. Ultimately, 10 studies were included in this systematic review with a total of 149 infants. The screening process is outlined in Fig. 1. Details of the included studies are outlined in Table 1.

In total, gender was reported in 53 infants (22 males, 31 females), giving an M: F ratio of 1: 1.4. The mean age at operation was 66 days (14–119). Operative time was recorded for 104 infants with a mean value of 261 minutes (range 120–662). The mean preoperative bilirubin was 176 (96–328) μmol/L (Table 2).

### 2.1. Mean age

All ten studies reported the mean age at operation with data available for 148 patients. The mean age at Kasai in this study was 66 (14–119) days. The youngest mean age at Kasai was in the Ure et al. series (57 days) [7] and the oldest was in the Lee et al. series (98 days) [8]. The youngest patient to undergo LKPE was in the Ure series at 14 days [7]. The oldest patient to undergo LKPE was in the Nakamura series at 119 days [9].

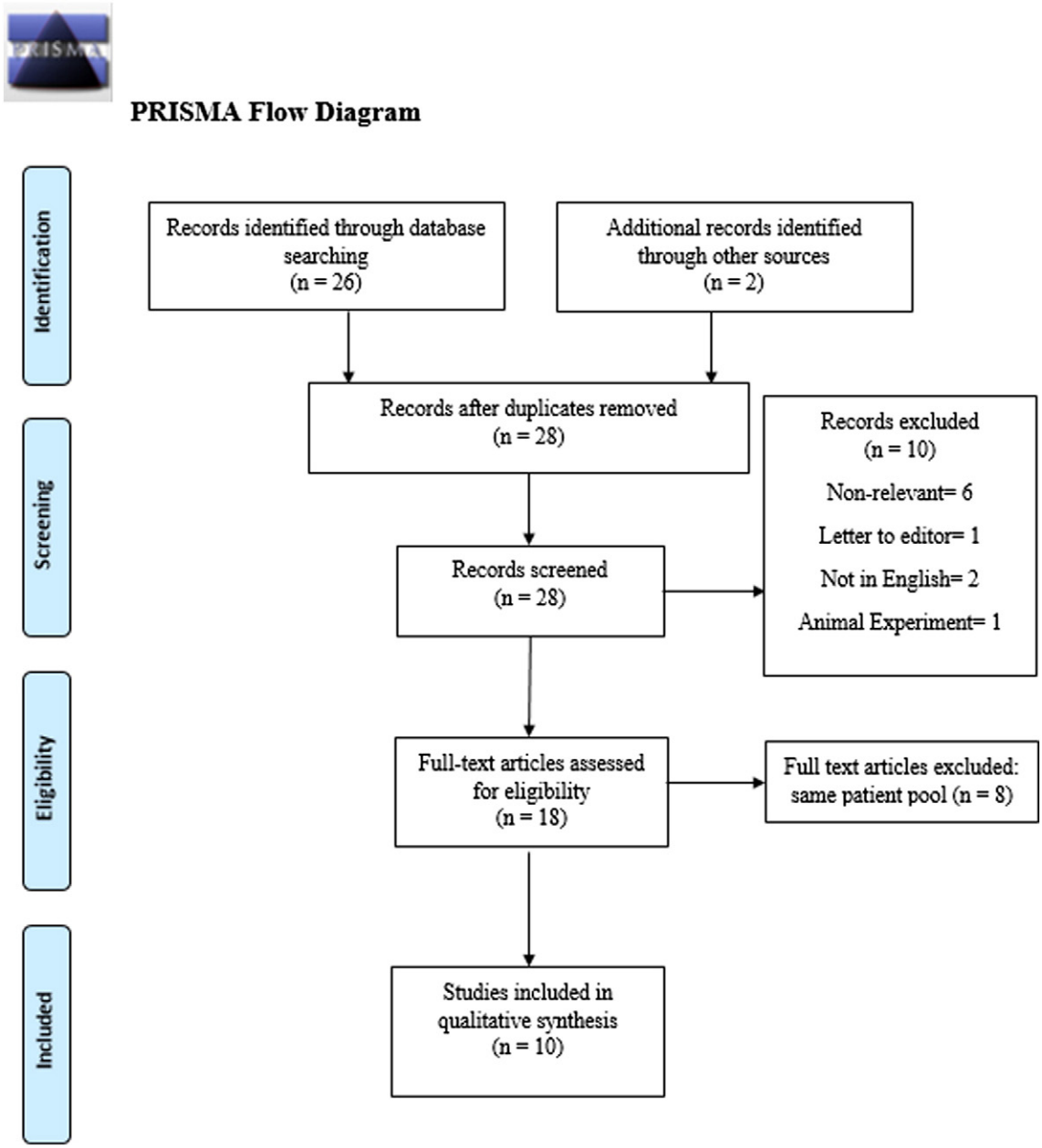


**Fig. 1.** PRISMA flow diagram.