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## INTRODUCTION

Blunt abdominal trauma accounts for more than 90% of all pediatric injuries. The liver are the most commonly injured organ during blunt force trauma. Intraperitoneal bleeding due to intra-abdominal organ trauma is an immediately life threatening injury. In the past, operative management has played the primary role in controlling abdominal bleeding. During recent decades, non-operative management(NOM) is the hallmark of treatment for the vast majority of children that incur blunt liver injury.

Complications related to NOM are uncommon but include missed abdominal injury, delayed hemorrhage, haemobilia and bile leak. Bile duct stricture after blunt abdominal trauma is rare and may be overlooked. The overall complication rate is 8 – 19%, with a 2% mortality rate.

We report two cases of children who were presented with jaundice due to bile duct stricture and biloma following liver injury which required surgical intervention.

## MATERIAL and METHOD.

A total of 16 patients were found to have liver injuries from blunt trauma were treated in Department of Paediatric Surgery, Sabah Women Children Hospital from January 2011 to December 2016. Two patients developed delayed complication following the injury. Medical record of these two patients were reviewed to evaluate the patient demographic, mechanism of injury, management and the outcome.

### CASE 1

A paediatrician was referred to us a 4- year old girl with jaundice. She had history of fall while running at home and hit her abdomen at the edge of stairs 3 months earlier. After fall, she had complained of abdominal pain. Computed tomography( CT) abdomen that time showed grade IV liver injury with laceration at the segment IV and haemoperitoneum [FIG 1]. She admitted in the peripheral hospital and was referred to adult Hepatobiliary team. Following resuscitation, the child remained haemodynamically stable and was observed in intensive care unit for 4 days. She was discharged home well after 10 days hospitalization. Subsequently she was reviewed in the outpatient clinic at 2 weeks and one month post trauma and remained asymptomatic and was discharged.

Clinically she was jaundice with pale colour stool. Abdominal examination revealed mild hepatomegaly. Blood parameter showed increase total bilirubin level 218 g/dl with direct 195 g/dl and elevation in alkaline phosphatase (ALP) 752 IU/L, aspartate aminotransferase (AST) 151 IU/L and alanine aminotransferase (ALT) 93.6 IU/L.

Abdominal ultrasonography(USG) and magnetic retrograde cholangiopancreatography(MRCP) were performed and showed gross dilatation of both intrahepatic ducts and common bile duct and sudden tapering at distal bile duct. Small collection noted in the segment VII [FIG.2].

Laparotomy was performed. Mild cirrhotic changes noted in the liver. Operative cholangiogram was done perioperatively and showed complete stricture at distal bile duct. Small collection of biloma noted at left intrahepatic duct. Hepaticoduodenostomy and cholecystectomy were performed.

Histology of section from biliary tree showed area of fibrosis with presence of granulation tissue consistent with biliary stricture. Postoperatively was uneventful. She was well during her follow up and no jaundice.

### CASE 2.

A 7-year old girl was presented to us after had incident of heavy metal jack weighing 80kg felt on to her abdomen while playing at home. Her father is involved in building construction works. On arrival she was awake, not in respiratory distress but in severe abdominal pain with a heart rate 130 beats/min and blood pressure 120/90mmHg. On examination noted the abdomen to be mild distension, bruises at the epigastric, guarded and significant tenderness at the right upper quadrant. FAST showed free fluid in the pelvis.

She was managed in the intensive care unit. Contrast Computed Tomography (CT) abdomen/pelvis demonstrated grade III liver laceration with moderate free fluid. [FIG.2]. She had blood transfusion due to persistent tachycardia and dropped in Haemoglobin (Hb) level from 13.5g/dl to 10g/dl.

Subsequently her haemodynamically remain stable. She was transferred out to general ward on eight day and was discharged home a week later.

Two weeks following discharge and about one month after injury, she re-presented with complaint of abdominal pain and fever; temperature of 38.2°C. Blood parameters shows Hb 12g/dl and mild leukocytosis 14,000/μL. Liver functions test were normal. Abdominal ultrasonography(USG) was performed and revealed clear collection in the liver measuring 8.2cm x 4.1cm [FIG.4]. A percutaneous drain was placed under USG guidance with return of 120cc of bile stained fluid aspirate. Intravenous antibiotic Unasyn and Flagyl were initiated. Fluid was sent for culture and grew no organism. The amount of bile drained out progressively reducing in trend. The drain was removed after eight days. She was well and discharged home. A child remain asymptomatic during her follow-up in period of two years.

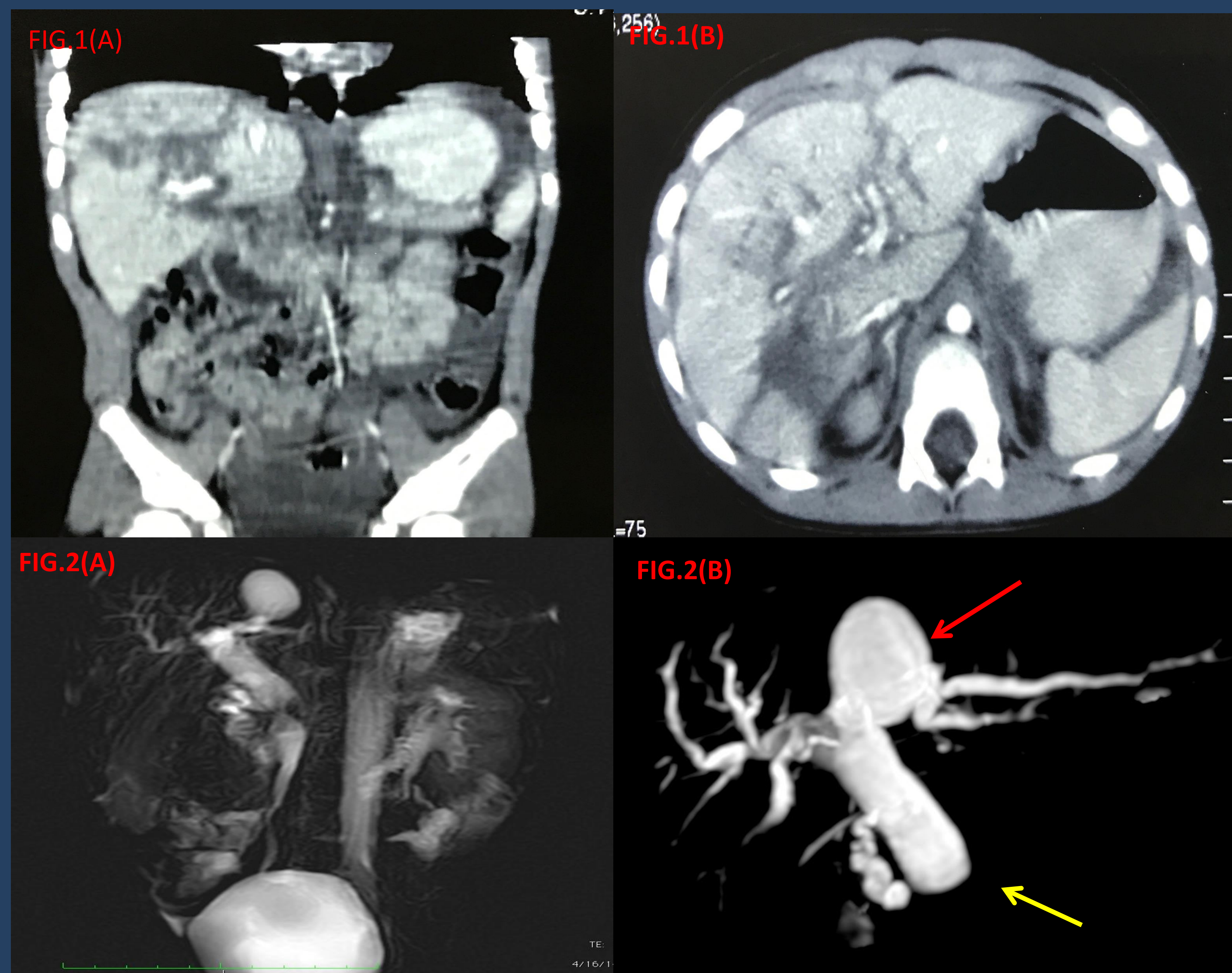


Fig.1(a) & (b) : Contrast CT abdomen/pelvis showed grade IV liver injury with laceration at the segment IV .  
 Fig.2(a) and 2(b) : MRCP done at 3 months following trauma showed gross dilatation of both intrahepatic ducts and common bile duct and sudden tapering at distal bile duct(yellow arrow). Small collection noted in the segment VII (red arrow).

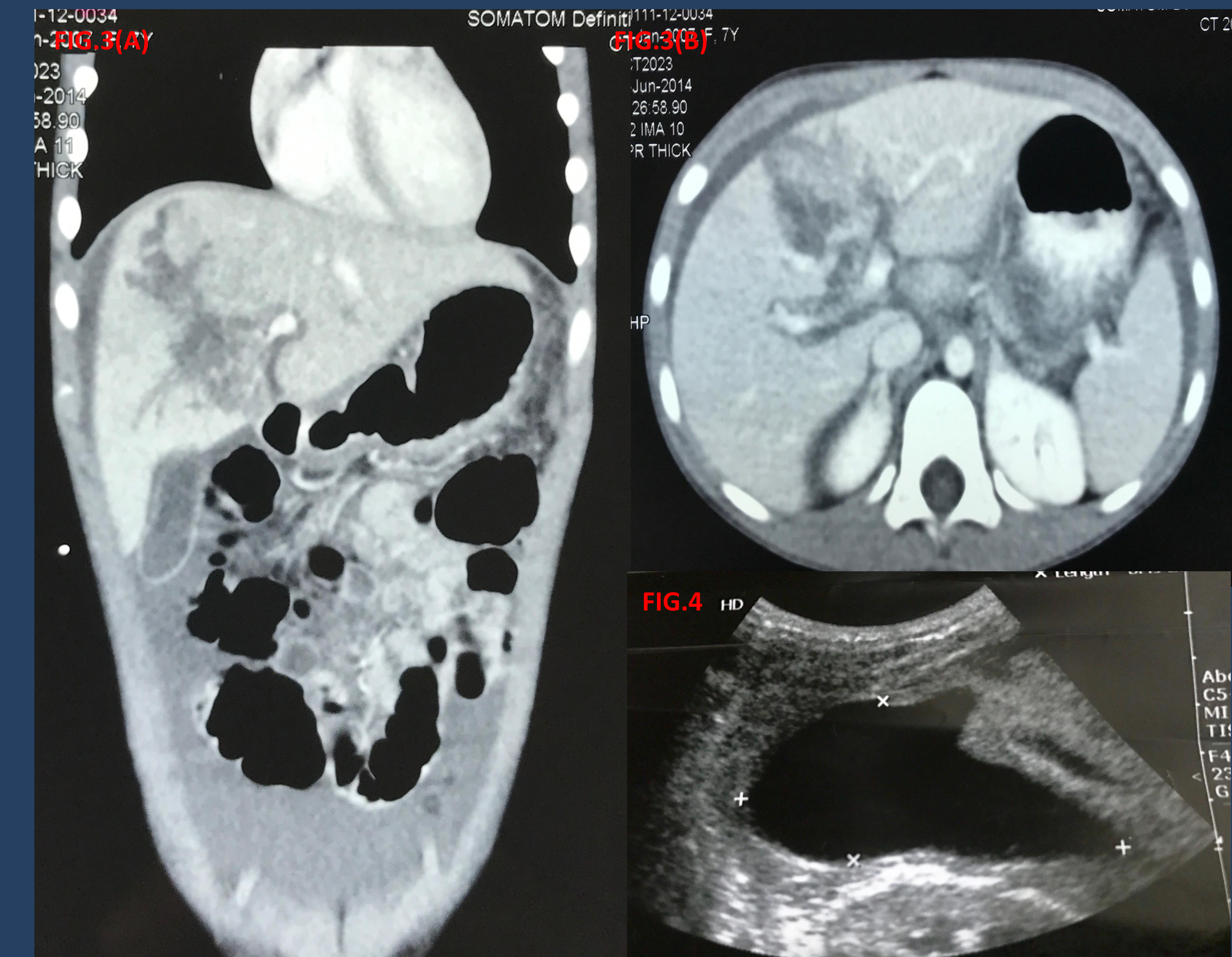


Fig.3(a) and 3(b) : CT showed multiple lacerations involving segment VI with moderate haemoperitoneum.

Fig.4 : USG Abdomen 1-month after injury demonstrated collection in the liver measuring 8.2cm x 4.1cm indicate biloma which was drained later. Drain was inserted percutaneously under USG guidance.

## DISCUSSION.

Motor vehicle accident and falls are the most common causes of intraabdominal injury in children. Multiple studies have shown that NOM of solid organ injuries in hemodynamically stable patients is effective, with a success rate of >90% reported in the field of pediatrics. The rate of NOM of blunt liver injury ranges from 50% to 85% of all such injuries reported, with an overall success rate that exceeds 80% in many institutions.

As many as 10% of patients who undergo successful NOM of blunt hepatic injury are still at risk for developing complications, such as haemobilia, hepatic artery pseudoaneurysm, gall bladder necrosis, abdominal compartment syndrome, abscess, intra- and extra- hepatic biloma and biliary fistula. Complications have occurred between 2 hours to 56 days. It remains unclear how long the patients should remain at bed rest and in the hospital, and whether these precautions prevent the occurrence of complications.

Bile leaks secondary to biliary tract injuries are more common complications with incidence of 1-6% in liver trauma. These patients often present with vague abdominal symptoms without any changes in liver biochemistry. Drain placement has been employed as both diagnostic and therapeutic intervention for biliary leak. Drainage may also alleviate symptoms from the mass effect of bilomas, and decrease the risk infection. Properly placed catheters can convert a bile leak into a controlled fistula, and may even be sufficient to resolve some leaks as demonstrated in our case.

Many cases of late hemorrhage and biliary complications occur long after the initial trauma, often after the patient has been discharged. As children have immature anatomic features and developing physiology functions therefore physicians must be aware of the potential for these complications. Children who were treated NOM in blunt liver trauma need to be followed up by paediatric surgeon to avoid any delayed in management and prevent morbidity. In conclusion, complications following blunt liver injury are rare but are diverse and often require multidisciplinary approach for treatment.

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