

## CHOLESCINTIGRAPHY IN THE DIAGNOSIS AND FOLLOW UP OF HEPATOBILIARY INJURY

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Cholescintigraphy is used as a diagnostic procedure in children with suspected biliary trauma. It is a simple and reliable way to detect a liver injury accompanied by biliary leakage and is well suited to assess the effectiveness of treatment and to follow recovery. A case of nonpenetrating bicycle handlebar injury emphasizes these points.

**Key Words:** Cholescintigraphy, Bicycle handlebar, Hepatobiliary Injury

Cholescintigraphy with Tc-99m iminodiacetic acid analog (Tc-99m IDA) is a well-established hepatobiliary imaging method. It is a non-invasive technique, capable of identifying function and morphologic abnormalities of the liver and biliary tract. Currently, its principal role is evaluating adults with suspected acute cholecystitis. There are only a few references to its diagnosis capabilities in children<sup>1-3</sup> with injuries to the liver and biliary tract.<sup>4-7</sup> This report will discuss the role of cholescintigraphy and CT in treating a patient with hepatobiliary tract injury following blunt trauma.

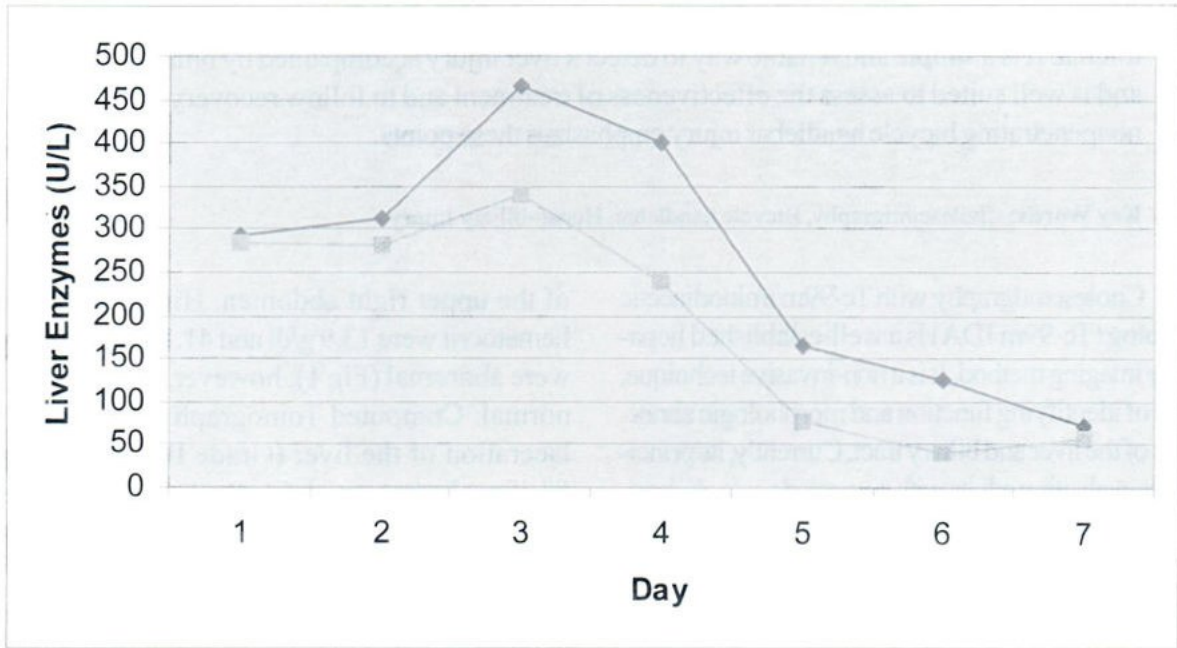
### CASE REPORT

A 12-year-old boy was admitted to the hospital as an emergency patient after he fell from his bicycle and fell on the handlebar. He complained of chest pain and vomiting. On admission, his vital signs were stable. Physical examination showed tenderness

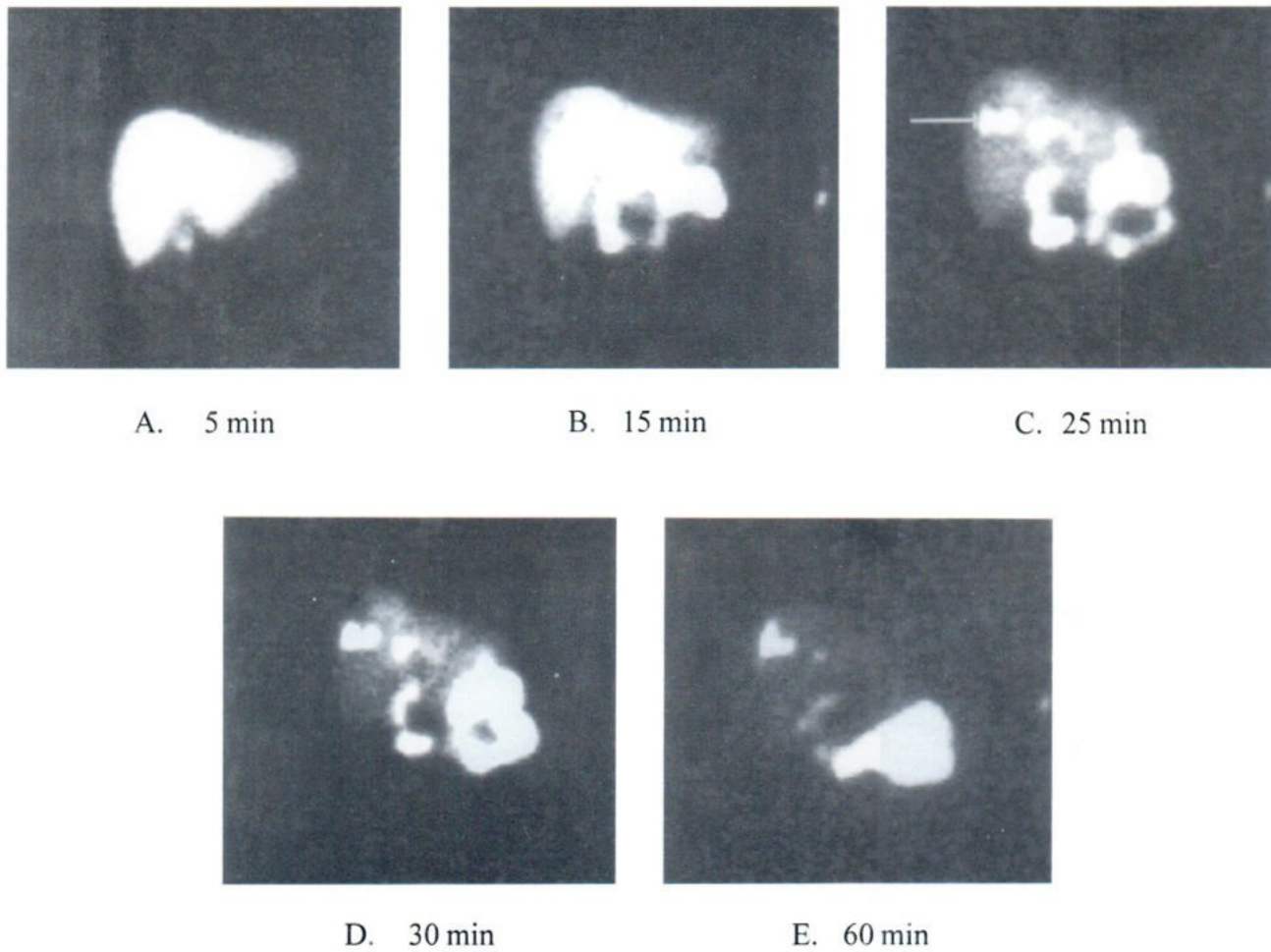
of the upper right abdomen. His hemoglobin and hematocrit were 13.9 g/dl and 41.1%. Liver enzymes were abnormal (Fig 1); however, chest x-rays were normal. Computed Tomography (CT) revealed a laceration of the liver (Grade III) adjacent to the falciform ligament with free fluid surrounding the liver (Figure 3). Therefore, cholescintigraphy with Tc-99m IDA was performed to evaluate the possibility of bile leakage (figure 2). Serial images demonstrated an area of radioactive retention at the site of laceration in the right lobe of the liver, previously noted on the CT scan. This finding was thought to represent bile leakage caused by the hepatic laceration. The patient was treated with octreotide injection. On the seventh post octreotide injection day, cholescintigraphy was repeated to evaluate effectiveness of treatment and to follow recovery. There was no further leak (figure 4), so the patient was discharged.

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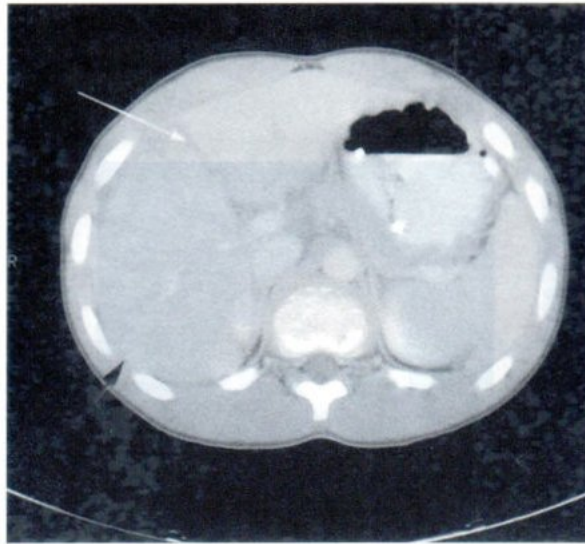
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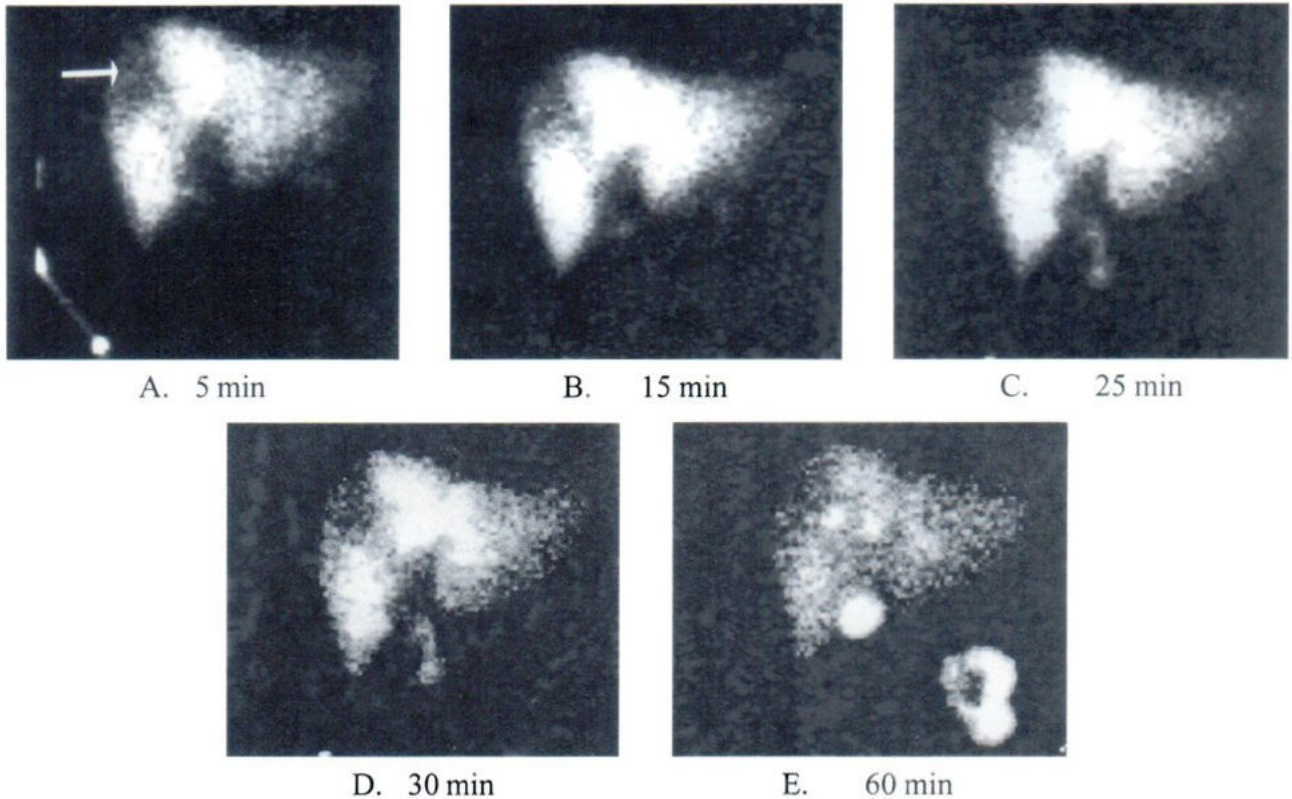
**Figure 1.** Biochemical findings in the patient during liver injury and its subsequent octreotide injection. (Black line is alanine aminotrasferase (ALT); White line is aspartate aminotransferase(AST); first day, after trauma; seventh day, post octreotide injection since 7 day and repeated cholescintigraphy)



**Fig 2.** Cholescintigraphy after trauma showed bile leakage located (arrow) at the site of the right lobe of liver.



**Fig 3.** Computed tomography (CT) of the patient after trauma showed liver laceration adjacent to the falciform ligament (white arrow) and hemoperitoneum (thin layer surrounding the liver, black arrow)



**Figure 4.** Cholescintigraphy done on the seventh day after octreotide injection: There is resolution of bile leakage. Large photon-deficiency area (arrow) is noted in the area of the known liver laceration of the right lobe of the liver, possibly due to parenchymal loss secondary to infarction or fibrosis. The value of serum liver enzymes decreased at this time.

## DISCUSSION

An accurate evaluation of the injury has become increasingly important. The liver is the most commonly injured solid abdomen organ and now non-operative management in hemodynamically stable children has become the standard.<sup>8-14</sup>

In most cases, documenting the presence and the extent of the bile leakage is difficult in a child. The use of radiographic contrast media to identify this abnormality is usually hampered by overlying gas and ribs<sup>15</sup> and the inability of the child to cooperate.<sup>16</sup> Due to these limitations, a variety of imaging techniques have been employed to evaluate biliary trauma. Computed tomography (CT) and ultrasonography (US) are clinically useful procedures to evaluate hepatic injuries. The major advantage with these high-resolution modalities is that sensitivity methods of detecting intraabdominal fluid collection and other abdominal viscera and the retroperitoneum can be assessed simultaneously. Their main limitation, however, is that they are not able to demonstrate an active bile leak.<sup>17</sup> By comparison, cholescintigraphy yields information physiologically and characterizes the fluid as active bile. Furthermore, the Tc-99m IDA scan can provide information regarding the status of the hepatic capsule. If the integrity of the capsule is preserved, the bile leak will be confined. Disruption shows leakage of the bile into the peritoneal activity. It is important to realize that a bile leak is not an indication for surgery, since small leaks frequently clear spontaneously.

The presented case confirms the diagnostic value of cholescintigraphy in bile leakage and adds a new dimension to the ability to assess effectiveness of treatment and follow up the recovery of the patient. The rise in the blood level of the liver enzymes was clearly relative to the acute injury of the liver cells (Figure 1). By the seventh post octreotide injection day, the value of serum alanine aminotransferase and aspartate aminotransferase decreased from 292 U/L to 72 U/L and 285 U/L to 56 U/L respectively and

the scan showed no further leakage (Fig 4).

In conclusion, Tc-99m IDA cholescintigraphy has proved to be one of the most sensitive and highly specified tests that are available for the detection, the presence or absence of biliary leakage in the post traumatic setting. The simplicity and ease of performing cholescintigraphy as well as the relatively low radiation exposure and lack of morbidity, making radionuclide imaging ideally suited for the performance of serial studies, as the patient's clinical condition deems necessary. Therefore, IDA scan should be included in the management protocol of all patients with the initial CT scan to confirm liver trauma graded as "major".<sup>18</sup>

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