Foreign Bodies in the Liver in Children

Subjects: Surgery

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Retention of foreign bodies (FB) in the liver parenchyma is a rare event in children but it can bring a heavy burden in terms of immediate and long-term complications. Multiple materials can migrate inside the liver. Clinical manifestations may vary, depending on the nature of the foreign body, its route of penetration and timing after the initial event. Moreover, the location of the FB inside the liver parenchyma may pose specific issues related to the possible complications of a challenging surgical extraction. Different clinical settings and the need for highly specialized surgical skills may influence the overall management of these children.

Keywords: liver ; foreign body ; children ; penetrating ; trauma

1. Introduction

Retention of a foreign body (FB) in the liver is a rare circumstance, however it can lead to a heavy burden in terms of immediate and long-term complications. A FB can reach the liver through three different routes: direct penetrating injury, via the gut following an ingestion, or through the bloodstream [1][2]. Multiple objects can be retrieved from the liver, such as sewing needles, hair pins or military equipment such as pellets or gun shots. In addition, some FBs may result from medical actions: insertion of a FB due to inaccurate surgical procedures or migration of medical devices [3][4][5].

Moreover, clinical signs may differ based on the type of FB, on the timing after initial injury, and on the way of entry. Hence, management of liver FBs may greatly differ.

Patients are often completely asymptomatic but the persistence of a foreign material inside the parenchyma may cause severe complications, usually infections such as liver abscess, hepatic granuloma, pseudotumor [2][6][7][8] or dislocate even over the long-term, possibly causing biliary or vascular damage [9][10][11].

Given the rarity of these events, management may be heterogeneous. Some scholars advocate for conservative treatment in case of asymptomatic FBs based on the absence of clinical manifestation even after a long follow-up, while others support an operative approach to prevent the risk of vascular damage [1][2].

2. Foreign Bodies in the Liver in Children

As reported in multiple adult and pediatric series and case reports, retained hepatic FBs are distinguished in three categories, based on the route used to reach the liver: penetrating, ingested, and bloodstream [2][12].

Medical FBs may, as well, migrate into the liver and consist in surgical objects such as clips, t-tubes, gauzes, or medical sutures which are retained in the liver parenchyma usually following surgical procedures [13][14][15][16][17].

Patients usually are younger children, less than three years old [1][2][12] ingesting sharp-edged objects such as fish bones, sharp bone pieces, cocktail sticks, and sewing needles [1][8][18][19]. A specific medical history with the intention to determine the timing and modality of ingestion is challenging for almost all patients. This difficulty is similarly reported even for older patients [20]. For those children having a detailed history related to the initial event, the median time at diagnosis is six months. Moreover, one-third of the patients are asymptomatic, and the FBs are incidentally detected, since most ingested FBs pass through the gastrointestinal tract uneventfully [2][21][22][23][24]. Bowel perforation rarely occurs following a swallowed FB, usually at the ileocecal and rectosigmoid regions in adults, or in the stomach and duodenum in children [8][12][25]. Swallowed FBs in cases as such, may migrate to the left liver, probably due to the proximity of duodenum and stomach to the left lobe [1]. Akçam et al. [26] and Azili et al. [12] described two patients with gut perforation: the first with a duodenum perforation and a pin retained in the right liver whilst the latter described a FB in the left hepatic lobe secondary to a spontaneously healed gastric perforation [12][26]. The event was described as subclinical or asymptomatic in both cases. A different subset of patients is represented by those suffering from migration of medical devices (e.g., gastrostomy

or ventricular-peritoneal shunt) and penetrating foreign bodies such as bullets or pellets. In these patients, the right lobe of the liver is the most frequent localization, probably due to its greater surface area [4][5][27][28].

Pediatric gunshot injuries are a frequent cause of death in some countries [27][29][30]. Although penetrating abdominal injuries are usually considered surgical emergencies [31] multiple manuscripts have demonstrated the safety of a non-operative approach [32][33]. Absence of metallic debris is mandatory to attempt a management may be heterogeneous conservative management: imaging with CT scan is deemed useful to obtain both trajectory information and monitor selected patients [31]. Large series usually report data from the adult population; however, the recently published World Society of Emergency Surgery (WSES) Pediatric guidelines recommend a similar approach in children with penetrating injuries [34].

Regardless of the nature of the FB, radiological imaging is essential to tailor the operative management.

A plain abdominal X-ray usually detects a FB [12][35][22][36][37][38][26] however it is imprecise in defining the exact position and anatomical structures involved. Therefore, further investigations, such as ultrasound or CT scan, are usually needed. A CT scan is recommended as a routine examination before surgery [39][40]. Seven out of 16 patients underwent a CT scan [2][4][35][22][36][37][38] preoperatively. When the FB is still partially retained in the gut, a gastroscopy might be proposed with both diagnostic and therapeutic intention [5][12][26]. A flowchart of patient management is summarized in **Figure 1**.

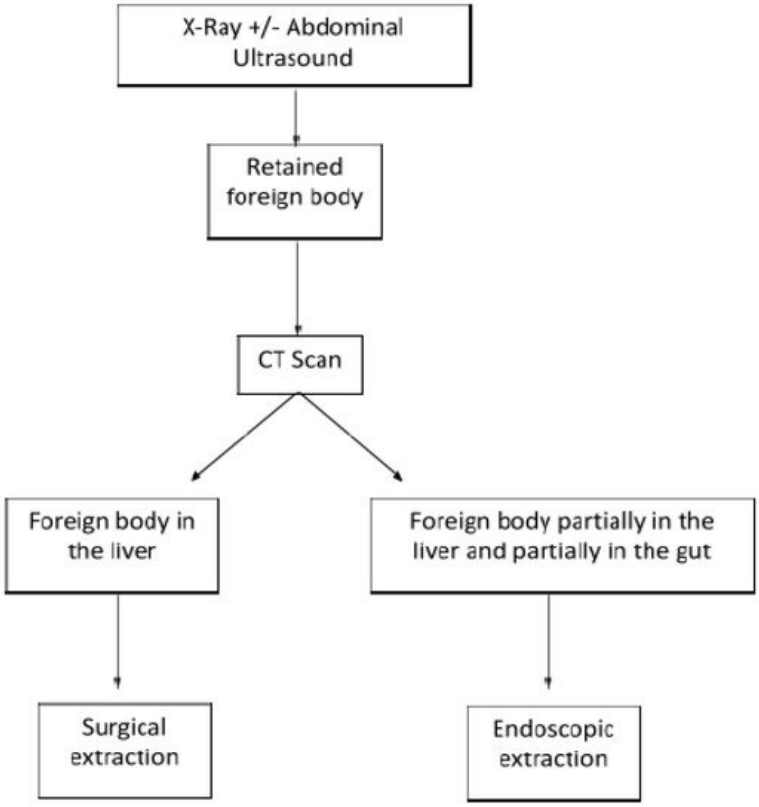

Figure 1. Flowchart for the management of pediatric liver foreign body.

As for liver penetrating injuries, pellets may enter the abdominal wall and pass through the liver on their trajectory: in this setting the liver lesion can be treated conservatively following the usual guidelines for the treatment of parenchymal laceration in blunt abdominal trauma. In the rare cases when a metallic shard remains embedded in the liver parenchyma, treatment should change according to the following management of retained FBs [2][7].

Revision of all published data on surgical management of liver FBs confirm that surgical extraction needs to be considered in all patients, mostly based on lessons learned from the adult literature [41]. Published experiences in adults have reported miscellaneous long-term complications related to retained FBs in the liver: delayed surgery may lead to liver abscess, hepatic granuloma, pseudotumor [2][6][7][8] or dislocation possibly causing biliary or vascular damage [9][10][11].

Three patients developed liver abscess due to the presence of a retained FB [35][27][42], in one case the FB migrated to the gallbladder [35] and in a second, after 14 months, the retained sewing needle migrated to the right kidney [24] In one patient the dislocation of the FB from the right liver caused a fistulation inside the transverse colon [4]. Interestingly, none of these patients developed complications following surgery.

Given the above, surgical extraction should always be proposed in highly skilled settings with an adequate ahead of schedule discussion.

3. Conclusions

Although this is a very rare event in the pediatric population, it can lead to serious clinical manifestations. Despite the paucity of cases reported in children, based on this extensive analysis of the literature, a surgical extraction of the retained FB appears to be feasible and safe, and should be recommended in order to minimize short- and long-term complications.

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