Review Articles

Agenesis of Gall Bladder

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ABSTRACT:

Although biliary system variants are common, isolated congenital absence / agenesis of gall bladder (AGB) is extremely rare. Despite an absent gallbladder, half of the patients present with symptoms similar to biliary colic. The patients without gallbladder are usually operated because a 'false' interpretation of ultrasonography. When ultrasonography reveals a 'sclero-atrophic' gallbladder or in cases of non-visualization in other imaging modalities, the need to further preoperative investigation must be in the surgeon's mind. It seems that MRCP is the most accurate non-invasive diagnostic tool to establish the diagnosis of AGB and to avoid unnecessary and risky surgery when combined with the other non- invasive investigations. When confronted with this situation on table the surgeon should abort the procedure, in absence of other pathology. Further dissection is not necessary and it may risk injury to vital structure. Diagnosis may be confirmed later by MRCP. The treatment is conservative with analgesics and anti spasmodics.

DISCUSSION

Variations in anatomy of the biliary tract is known. Agenesis of Gall Bladder (AGB) is a rare phenomenon. It was first reported by Bergman in 1702 and Lemery in 1707. Its incidence varies from 0.01 to 0.075 [1, 2, 3, 4]. There is a female preponderance for this anomaly (3:1) [5].

The gall bladder lies on the under surface of liver between segments IV and V. It develops from the caudal part of the hepatic diverticulum in the fourth week of gestation. The hepatic diverticulum is formed by an ectodermal outpouching of the distal part of foregut. As it grows the connection between the gut and the hepatic diverticulum is narrowed. Small vacuolization occur in the segment of the connection by the seventh week and they become the gall bladder and cystic duct8. Intrahepatic biliary trees with both hepatic ducts, while originate from the proximal portion of the hepatic diverticulum; the gall bladder, cystic duct and common bile duct originate from the distal portion of the diverticulum. So the probability of developing an isolated AGB without extra hepatic biliary atresia is extremely low. One theory suggests that the hepatic diverticulum bud of the foregut fails to develop properly into the gall bladder and cystic duct. The other theory suggests that following solid phase development there is failure of recanalization of the gallbladder and cystic duct. Isolated AGB results when the cystic bud does not develop[6, 7, 8]. Inappropriate migration of the gall bladder primordium will result in ectopic gall bladder [9]. AGB usually occurs together with cardiovascular and gastrointestinal anomalies because the cystic bud growth disrupts development between the sinus venus cordis and the paired omphaloenteric and umbilical veins. Very rarely rudimentary gall bladder, which is a small, hypoplastic, nonfunctional ramnant of a size of about one tenth of normally developed gall bladder is also reported [10].

The genetic basis of the development of gall bladder is still not known. It is often sporadic occurrence with no clear causes. However there are families in which the condition has occurred in several members, suggesting that there are familial hereditary forms of AGB. AGB might be associated with chromosomal aneuploidy and other malformations. AGB in trisomy 18 and in trisomy 13 have been reported [10]. It might be a heritable trait [1].

AGB occurs in isolation in 70-82 % cases. In 12.8-30 % cases AGB occurs with other anomalies which might include atresia of the bile duct or choledochal cyst (9%) and; with normal biliary system, but with distant multiple fetal anomalies (12.8-21%) [11, 12]. On fetal ultrasound examination, AGB is isolated in 12 to 28 % cases of nonvisualization. In rest of the cases it is syndromic. Isolated cases of prenatal non visualization of GB (PNVGB) on US in almost all cases results in a normal, healthy child [13]. In most cases the gall bladder will be imaged later in pregnancy or in the neonatal period. Some cases of PNVGB might be associated with cystic fibrosis

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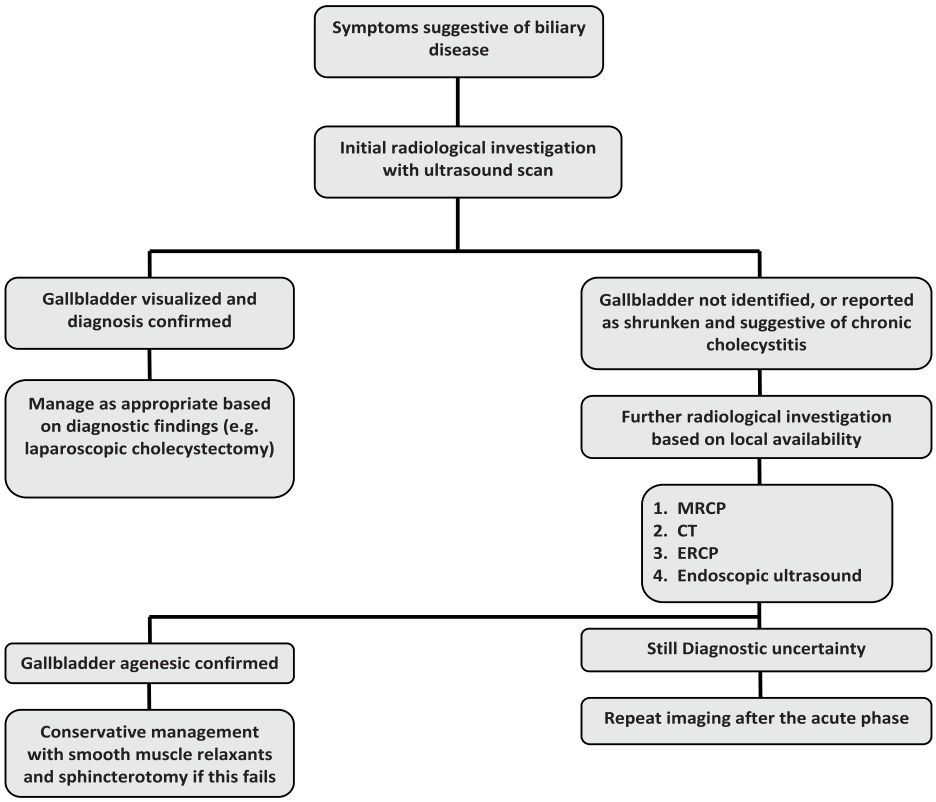
[14]. It has also been suggested that isolated PNVGB in the second trimester may be associated with biliary atresia [13, 15, 16]. Associated anomalies might be gastrointestinal, skeletal, cardiovascular and genitourinary such as ventricular septal defect, imperforate anus, duodenal atresia, malrotation of gut, pancreas divisum, hypoplasia of right hepatic lobe, duplication cysts of hepatic flexor, renal agenesis, undescended testis and syndactyly [7]. Ectopic Gall Bladder can be intra hepatic, left sided, beneath the posteroinferior surface of liver, in between the leaves of lesser omentum, retro peritoneal, retro hepatic, within the falciform ligament, retro pancreatic or in the retro duodenal area [1, 8].

Patients with associated anomalies present early in life and many succumb due to their non biliary anomalies [3]. AGB do not present characteristic symptoms; only 23% cases being symptomatic [8]. Dispite an absent gall bladder, half of the patient present with symptoms similar to biliary colic [3, 18, 19]. Most of the cases (90 %) present with right upper quadrant pain. Sixty six percent have nausea and vomiting, 37 % have fatty food intolerance, 30 % have dyspepsia and 35 % cases present with jaundice [20]. The symptoms might be due to concomitant biliary pathologies such as primary duct stones [21], adhesion in gall bladder fossa, peri portal adhesion, biliary dyskinesia [8] and very rarely stones in the remnant of cystic duct [22]. These patients may have a congenital abnormality of function in the form of a significant higher sphincter of Oddi resting pressure with regurgitation of pancreatic or duodenal contents [7]. Patients with recurrent episodes of biliary colic and otherwise normal anatomy have a significantly higher sphincter of Oddi resting pressure and an increase in the proportion of retrograde propagation of phasic muscular contraction when compared with healthy volunteers [23]. This so called biliary dyskinesia is thought to be responsible for most cases of post cholecystectomy syndrome and symptoms in AGB [3]. When a spasm of sphinter of Oddi is induced, the symptoms of biliary colic are reproduced36. Symptoms might be secondary to unrelated causes such as esophagitis or duodenitis. Eight percent of symptomatic patient have stone in common bile duct [25, 26]. Rarely expectoration of bile-tinged sputum may occur [2]. Very rarely carcinoma in CBD had been reported [27, 28]. Though it was concluded that this association is fortuitous rather than of etiologic significance [28]. Signs of peritoneal irritation are absent [2]. AGB can predispose to an increased incidence of common bile duct stones [29, 30].

A clinical presentation suggestive of gall bladder disease coupled with inability of the US to convincingly diagnose AGB, can put a surgeon in a diagnostic and intraoperative dilemma.

Ultra sound examination (US) has been a primary diagnostic tool for most of the abdominal conditions.

Figure I : Suggested decisional tree for the investigation of suspected gallbladder agenesis



There are three categories of abnormal ultra sound of gall bladder: shadowy gravitational dependent opacities within the gall bladder, non visualization of gall bladder and non shadowy opacities within the lumen of the gall bladder. The accuracy of US is 100 %, 96 % and 61 % respectively in these three different categories [32]. A WES triad comprising of visualization of gall bladder wall, the echo of the stone, and the acoustic shadow has also been dicribed [31]. There is always either a recognizable segment of wall or a thin rim of bile identifying gall bladder on US [33]. However the examination conditions and the examiner's experience do not always permit such accurate appreciation. The duodenum can get misdiagnosed as sclero-atrophic or lithiasic gall bladder [8]. US can be misleading by interpreting AGB as contracted and fibrotic gall bladder [1, 2, 20, 26, 28, 29, 34, 35, 36].

MRCP is a well-established non invasive imaging method for investigating biliary tract. The result is not compromised in biliary stasis because it does not require administration of contrast to visualize bile. So it can demonstrate an excluded and/or ectopic gall bladder [8, 37]. MRCP may not yet replace US as the gold standard of acute gall bladder imaging but it has shown to be an ideal complementary study to inconclusive US studies [9]. An ERCP may fail to predict AGB and may mimic an obstructed cystic duct [2]. HIDA scan is also unhelpful since non-visualization of the gall bladder remains typical of cystic duct obstruction, as well as of agenesis [1, 5, 29, 38, 39]. If an US does not clearly identify a gall bladder, the next most appropriate investigations in order of frequency are MRCP, CT and ERCP; depending on what is available on that clinical setting. In case of inconclusive results they should be repeated once the acute phase of illness or symptoms have resolved [21]. There are some cases reported in which AGB was diagnosed preoperatively and the operation was avoided [8, 40, 41, 42].

Most symptomatic patients are scheduled for surgery on the basis of US findings of 'contracted, fibrosed' gall bladder with a diagnosis of chronic cholecystitis [36]. Due to a lack of awareness of the diagnosis, this entity puts the surgeon into a very stressful condition intraoperative [21, 43]. Failure to find the gall bladder prompts the surgeon to do laparoscopic or open exploration [1, 2, 3, 20, 26, 29, 44] or intra operative cholangiogram [36]. Confirmation of AGB at operation by meticulous dissection of entire hepatic biliary tract and operative cholangiography was suggested [2, 4, 45, 46]. Frey et al had even described steps of dissection for intra operative diagnosis [47] but this may in fact expose the biliary tract to iaotrogenic injury [29]. This also adds significant morbidity to the procedure. Intra operative ultra sound can demonstrate an ectopic gall bladder [29] but is not always available. It is suggested to abort the procedure rather than complete further exploration [36].

Progress in radiology and availability of non invasive imaging techniques like CT, MRCP and EUS provide a beneficial alternative to open exploration and intra operative cholangiography [2, 3, 4, 26, 29, 48]. Follow up with these techniques should be the next option to truly identify AGB as the sole abnormality to guide further management [5]. So even after surgical exploration a further scan is advised for reconfirmation of diagnosis [36, 49].

About 98% of patients had resolution of symptoms after exploratory non therapeutic surgery [50]. The lysis of peri portal and gall bladder fossa adhesions at operation might be the cause of post operative resolution of symptoms [18]. It is unclear how non operated patients would have had symptom resolution [5].

There is no specific guideline for management of AGB. An algorithm is suggested by Malde (figure I) [21].

Management of AGB is conservative and is often with smooth muscle relaxants and analgesics. Sphincterotomy has been successful in relieving symptoms in small number of cases [5]. Kasi et al reported resolution of symptoms by hyoscyamine extended release tablets twice a day, upto her five months' follow up [5]. Common bile duct in AGB might be dilated as a means of storing bile. These patients might have a higher sphincter of Oddi pressure [23]. Sphincterotomy could relieve this pressure and hence symptoms. Sphincterotomy is advised in refractory cases [2]. Dalvi et al suggested modification in port placement for gentle but adequate liver retraction in case of rudimentary gall bladder, as infundibulum is not available for lateral retraction for achieving critical view in calot's triangle [10].

In conclusion AGB should be thought on getting report of fibrosed, sclerotic or contracted gall bladder on routine imaging method in patients with biliary kind of pain. Non-visualization of gall bladder at laparoscopy need not prompt conversion to open exploration. The tendency to immediately proceed to open exploration should be avoided, especially when no other known biliary pathology is present. Dissection should also be avoided as these might increase morbidity. Diagnosis might be confirmed post operatively by MRCP.

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