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## Role of Ultrasonography in the diagnosis of the gallstones

**Peer review status:**

No

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**Article ID:** WMC004432

**Article Type:** Research articles

**Submitted on:** 28-Oct-2013, 09:13:05 AM GMT **Published on:** 29-Oct-2013, 04:49:07 AM GMT

**Article URL:** [http://www.webmedcentral.com/article\\_view/4432](http://www.webmedcentral.com/article_view/4432)

**Subject Categories:** RADIOLOGY

**Keywords:** ultrasonography, gallstones, bilirubin, bile, emergency, patient, diagnosis

**How to cite the article:** Kola S, Kola I, Pirraci A, Beqiri A. Role of Ultrasonography in the diagnosis of the gallstones. WebmedCentral RADIOLOGY 2013;4(10):WMC004432

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**Source(s) of Funding:**

University Hospital Center of Tirana, Albania

**Competing Interests:**

There are no conflict of interest regarding this article

# Role of Ultrasonography in the diagnosis of the gallstones

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## Abstract

Ultrasound examination is a routine examination, non-invasive, low cost and technically easy to achieve. Ultrasound examination marked a hitch leap in the diagnosis of diseases of the biliary tract and gallbladder. As a harmless examination for the health and with a high specificity on diagnosis, this examination has left almost in the past the time of conventional radiologic examinations like cholecystography prior or venous. This examinations with high costs, health hazards and technically difficult to be realized, nowadays are referred for the development of radiology values. Ultrasound examinations nowadays is used not only for the diagnostic purposes, but also therapeutic purposes. With the help of this examinations enable the drainage of collections and also percutaneous drainage of hepatic ductuses. Ultrasound examination has a sensitivity of 89% and specificity of 88% on the gallstones.

## Introduction

### Causes, epidemiology and risk factors

Imbalances in the substances that make up bile cause gallstones.

There are two main types of stones:

1. Stones composed of cholesterol, which are the most common type. These kinds of stones are not related to the level of cholesterol in the blood.
2. Stones compound of bilirubin, which are formed when red blood cells destroyed (hemolytic). This is highly related to the level of bilirubin in the bile. These kinds of stones are called pigment stones.

The formation of stones in the gall bladder is more common in women, Native Americans, Hispanics and people over 40 years old. In the formation of stones is seen to affect the inheritance.

It is believed that the following factors influence the development of stones in the gall bladder:

1. Solid organ transplantation
2. Diabetes
3. Failure of the gallbladder to even cleared out (it meets more frequently in pregnant women)
4. Hepatic cirrhosis and biliary tract infections
5. Such medical condition that force the liver to produce more bilirubin such as chronic hemolytic anemia and sickle cell.
6. Immediate weight decrease, getting a diet with lack of calories.
7. Intravenous nutrition for a long time

### Symptoms

Most of the people don't have symptoms. Gallbladder stones often may be found during a routine examination or medical procedure. However when the stone is large size and blocks the cystic duct or the common biliary duct, the patient may have a pain in the form of cramp in the upper right quadrant. This is known as a biliary colic. The pain go away if the stone move down the duodenum. Symptoms that may occur include: Pain in the right upper quadrant or in the upper center. This pain can be constant, in the form of cramp, sharp, or may spread to the back, fever, pallor of the skin. Other symptoms that appear during this illness include: Nausea and vomiting.

This study is descriptive. For its realization was used data collected from Qendra Spitalore "Mother Teresa" in Tirana, and compared with the data obtained from various international medical scientific articles. This study included patients presenting to the emergency in the first nine months of 2012. The study describes the importance of Ultrasound in the diagnosis of abdominal emergencies (gallstones), what can be identified by its specificity and sensitivity in diagnosed cases. In emergency situations gallbladder can be examined even in fasting patients. Gallbladder examination is performed with a 3.5-5 MHz probe, by scanning in subtotal position and by turning the patient in the left oblique position. Intercostal scanning are performed when the patient has more gas in the intestine. Increased presence of gas in some cases dictates the performance of the examination in prone position, in order to avoid them and to identify stones that lie in gallbladder's neck. In some cases, gallbladder stones and sludge can be

seen in this position only. Most gallstones are asymptomatic in 60-80% of cases; small stones give often more symptomatology than large stones. When the signs of the cystic duct obstruction are missing, the gallbladder distension explained by the presence of bacterial infection, which stimulates the gallbladder mucous to produce a large amount of thick mucus. We say that the Murphy sign is positive when we press with the probe on the gallbladder and the patient feels pain. The most common cause of cystic duct obstruction is small stones that close its lumen. When the stone passes through the cystic duct in choledoch eventually in the duodenum, biliary colic gets soother. When the stone remains in the cystic duct, inflammation leads to the development of gallbladder infection, causing erosion in the gallbladder wall. Gallbladder stones are heavy and formed inside the bladder. Stones can be small as a grain of sand or as large a golf ball.

## Methods

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the stone passes through the cystic duct in choledoch eventually in the duodenum, biliary colic gets soother. When the stone remains in the cystic duct, inflammation leads to the development of gallbladder infection, causing erosion in the gallbladder wall. Gallbladder stones are heavy and formed inside the bladder. Stones can be small as a grain of sand or as large a golf ball.

## Diagnosis

Examinations that were used for the detection of the stones in the gallbladder include:

Abdominal Ultrasonography , Abdominal CT scan , Endoscopic Retrograde

Cholangio Pancreatographia , Magnetic Resonance, Cholangiogram transhepatic percutane.

Can be used tests such as : Test of hepatic function; Pancreatic enzymes, Bilirubina.

Ultrasound confirms the diagnosis.

It determines the presence of biliary stones, the condition of the walls, mainly their thickness.

The diagnosis, also requires a patient preparation. Before the realization of the procedure the patient should be fasting at last 6 hours or more.

## Results

Ultrasound shows us the stones (2 mm on diameter) on the gallbladder like a movable sonodens area inside the gallbladder with a precision of 90-95%. In some other cases the stones are not movable, and therefore it is difficult doing the differential diagnosis between a simple polip and a small stone

Through ultrasound we can measure although dimensions (diameter) of the stone also hepatic and the biliary hepatic duct . In any case, for sure we can distinguish the half of the stones.

Gallstones have over 3 mm of length. Duplication of its wall is an ultrasonic clear sign for cholecystitis. The presence of pericholecystitis fluid, suggests for the extension of the inflammation. In emphysemator cholecystitis we can see the presence of gas on the lumen of the bladder or its prates.

As all as other complementary examinations, ultrasound data must be confirmed with the clinic signs. A normal ultrasound can not rule out the disease if surgery is clear. Endoscopy of biliary tract gives the same data as transperitoneal ultrasound.

Based on the data collected during the study, which was studied in 1700 patients presented to the emergency department of general surgery (QSU-Tirana) with the symptoms of gallstones.

Of these patients 578 underwent ultrasound (34%).  
334 patients came in positive with calcula on  
gallbladder (57,7%).

244 patients resulted without calcula in gallbladder  
(42,3%).

Based on the made interpretations resulted that the  
sensitivity of ultrasound for calculi was 89% (95% CI,  
84-91) and specificity was 88% (95% CI,82-91).

As you can see from the data, we conclude that  
ultrasound for gallbladder stone has a high sensitivity  
and specificity.

See Illustration 1

### Complications of stones in gallbladder

Occlusion of cystic duct or common biliary duct gives  
these complications:

Acute Cholecystitis, Cholangitis, Chronic Cholecystitis,  
Choledocolithiasis, Pancreatitis.

## Conclusions

Ultrasound examination is a routine examination, non  
– invasive, low cost and technically easy to achieve.  
Ultrasound examination marked a hitch leap in the  
diagnosis of diseases of the biliary tract and  
gallbladder. As a harmless examination for the health  
and with a high specificity on diagnosis, this  
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## Illustrations

### Illustration 1

Table 1

	<b>Calcula on the gallbladder Presence</b>	<b>Calcula on the gallbladder Absence</b>	<b>TOTAL</b>
<b>ED positive ultrasound</b>	294	32	326
<b>ED negative ultrasound</b>	40	212	252
<b>TOTAL</b>	334	244	578