CASE REPORT

TJG
The Turkish Journal of Gastroenterology

Multidetector computed tomography diagnosis of adenomyomatosis of the gallbladder

Aysel TÜRKVATAN[1], Mehmet Akif TÜRKOĞLU[2], Yusuf ÖZOĞUL[2], Alper KARACAN[1], Musa AKOĞLU[2]

Departments of [1]Radiology and [2]Gastroenterological Surgery, Yüksek İhtisas Teaching and Research Hospital, Ankara

The differentiation of gallbladder adenomyomatosis from gallbladder carcinoma is important as both conditions may present with thickening of the gallbladder wall or as a focal mass. Identification of Rokitansky-Aschoff sinuses is the key feature in making an accurate diagnosis of gallbladder adenomyomatosis on imaging studies. The diagnosis of gallbladder adenomyomatosis can be made with accurately by multidetector computed tomography when the presence of Rokitansky-Aschoff sinuses (small cystic spaces within the thickened gallbladder wall) are noted. Herein we present multidetector computed tomography findings of a 27-year-old patient with gallbladder adenomyomatosis.

Key words: Gallbladder, adenomyomatosis, Rokitansky-Aschoff sinuses, multidetector computed tomography

Çok kesitli bilgisayarlı tomografi ile tanı alan safra kesesi adenomyomatozisi

Safra kesesi adenomyomatozisinin safra kesesi karsinomundan ayırt edilmesi, bu iki durum da safra kesesinde duvar kalınlaşması veya fokal kitle ile kendini gösterebildiği için önemlidir. Görüntüleme yöntemlerinde Rokitansky-Aschoff sinüslerinin saptanması, safra kesesi adenomyomatozisinin tanısında kilit noktadır. Rokitansky-Aschoff sinüslerinin (kalınlaşmış safra kesesi duvarı içerisindeki küçük kistik alanlar) varlığı görüldüğünde, çok kesitli bilgisayarlı tomografi ile safra kesesi adenomyomatozisinin tanısı doğru olarak yapılabilir. Biz burada, safra kesesi adenomyomatozisli 27 yaşındaki bir olgunun çok kesitli bilgisayarlı tomografi bulgularını sunuyoruz.

Anahtar kelimeler: Safra kesesi, adenomyomatozis, Rokitansky-Aschoff sinüsleri, çok kesitli bilgisayarlı tomografi

INTRODUCTION

Adenomyomatosis is an acquired, benign proliferative disease of the gallbladder. It is characterized by epithelial proliferation and hypertrophy of the muscularis mucosa of the gallbladder with outpouching of the mucosa into or through the thickened muscular layer, forming the so-called Rokitansky-Aschoff sinuses (1). Rokitansky-Aschoff sinuses are actually small penetrations of the surface epithelium into the gallbladder wall that can be found in about 90% of the gallbladder specimens in the adults; if they are deep, branching, and accompanied by hyperplasia of the muscular layer, adenomyomatosis can be diagnosed (2).

Adenomyomatosis of the gallbladder presents as a focal mass or as a thickening of gallbladder wall that is difficult to distinguish from gallbladder carcinoma on imaging studies. The identification of the Rokitansky-Aschoff sinuses is the key factor in establishing a diagnosis of gallbladder adenomyomatosis. At present, magnetic resonance (MR) imaging is accepted as the most accurate modality in the delineation of Rokitansky-Aschoff sinuses (3-5). The ability of spiral computed tomography (CT) to depict these sinuses is limited due to insufficient spatial and contrast resolution (2,3). The advent of multidetector computed tomography

Address for correspondence: Aysel TÜRKVATAN
Türkiye Yüksek İhtisas Hospital, Department of Radiology, Ankara, Turkey
E-mail: aturkvatan@yahoo.com

Manuscript received: 19.04.2012 **Accepted:** 21.05.2012

Turk J Gastroenterol 2013; 24 (3): 286-289
doi: 10.4318/tjg.2013.0534

(MDCT) scanners have provided shorter image acquisition time, narrower collimation, improved temporal and spatial resolution, and near isotropic data acquisition compared with single-detector spiral CT. The presence of Rokitansky-Ashoff sinuses, which is characteristic of the gallbladder adenomyomatosis, may be clearly depicted with MDCT than spiral CT due to its higher spatial resolution. Herein we present MDCT imaging findings of gallbladder adenomyomatosis in a 27-year-old patient.

CASE REPORT

A 27-year-old patient presented with a 2-year history of right upper quadrant abdominal pain. On physical examination, mild tenderness in the right upper abdominal quadrant was noted. Murphy's sign was negative. Laboratory tests were otherwise normal. Abdominal ultrasonography (US) revealed marked thickening of the gallbladder wall containing small intramural cystic spaces with comet tail artifacts. No calculi were detected. MDCT study was performed using a 64-detector CT scanner (Aquilion; Toshiba Medical Systems; Tokyo, Japan) with biphasic protocol consisting of arterial (22 seconds after) and portal venous (65 seconds after) phases. The main acquisition parameters were: collimation of 64x1 mm, section thickness of 1 mm, intersection spacing of 1 mm, tube voltage of 120 kv, tube current of 240 mAs, and gantry rotation time of 0.5 sec. On MDCT, a thickened gallbladder wall with low attenuation cystic spaces of various sizes within the wall, consistent with Rokitansky-Aschoff sinuses was detected. An evident thickening and marked enhancement of the mucosal layer of the gallbladder were noted (Figure 1A and B). Incidental midgut malrotation was also observed on MDCT. Although the diagnosis of gallbladder adenomyomatosis was suspected due to the presence of Rokitansky-Aschoff sinuses, the probability of gallbladder carcinoma could not be ruled out completely. The patient underwent laparascopic cholecystectomy with uneventful postoperative recovery. Histopathological examination revealed marked mucosal proliferation with Rokitansky-Aschoff sinuses, muscular hypertrophy, and scattered chronic inflammatory cell infiltration that were consistent with adenomyomatosis. There was no evidence of malignant involvement.

DISCUSSION

Adenomyomatosis of the gallbladder is a relatively common condition, that has been observed in 2%-5% of the cholecystectomy specimens (1). The disease was previously termed cholecystitis glandularis proliferans, cystic cholecystitis, adenomyoma, adenomyofibroma, intramural diverticulosis or diverticular disease of the gallbladder. It is more frequently seen in women, and the majority of patients have been reported to be in their fifth and sixth decades of life (6). Only a few cases of adenomyomatosis of the gallbladder in young patients have been reported (7). Most patients with adenomyomatosis remain asymptomatic, and the di-

Figure 1. Axial **(A)** and coronal **(B)** MDCT images show thickened of the gallbladder (GB) wall with low attenuation cystic spaces within the wall (Rokitansky-Aschoff sinuses), and marked thickening and enhancement of the mucosal layer of the gallbladder.

agnosis is usually an incidental finding, either on US performed for the detection of gallstones, or on histological examination of surgical gallbladder specimens. The most common presentation of gallbladder adenomyomatosis is right upper quadrant pain, which is similar to gallstone pain, with or without cholecystitis (6). It is possible that the pain is secondary to gallstones or inflammation. Only occasionally does adenomyomatosis not associated with cholelithiasis cause right upper quadrant pain. The other reported symptoms are dyspepsia, fatty food intolerance, nausea, vomiting and fever (8).

The pathogenesis of gallbladder adenomyomatosis is unclear. Neurogenic dysfunction of the gallbladder may create increased intracystic pressure that is thought to be responsible for the formation of Rokitansky-Aschoff sinuses (6). The association between gallbladder adenomyomatosis and gallstones ranges from 36% to 95% (9). Chronic inflammation of the gallbladder may cause gallbladder adenomyomatosis (6,8). The histopathologic findings of our patient included chronic inflammation but not gallstones.

On ultrasonography, diffuse or segmental gallbladder wall thickening with intramural diverticula are seen as anechoic spaces or as echogenic foci with acoustic shadows or reverberation artifacts (comet tail artifact) (3). MR imaging is accepted as the most accurate diagnostic tool for gallbladder adenomyomatosis characterized by the presence of Rokitansky-Aschoff sinuses (3). The 'pearl necklace' or 'string of beads' sign is the hallmark of adenomyomatosis at MR imaging. It refers to small, rounded, high signal intensity foci within the thickened wall of the gallbladder on T2-weighted sequences, that correspond to bile filled Rokitansky-Aschoff sinuses (4,5). This sign is highly specific (92%) in diagnosing of gallbladder adenomyomatosis versus gallbladder cancer. But the sign may be absent in cases of small sinuses (<3 mm) or sinuses filled with inspissated proteinaceous bile or small calculi. In such cases, its sensitivity is only 62% (5). Diffuse adenomyomatosis shows early mucosal enhancement on dynamic MR imaging, and the serosal aspect of the gallbladder can exhibit high signal intensity on T2-weighted images relative to their mucosal aspect (4,5).

On CT, adenomyomatosis of the gallbladder presents as thickening of the gallbladder wall or as a focal mass that is difficult to distinguish from gallbladder carcinoma (2,3). CT findings suggestive of gallbladder carcinoma include a focal mass replacing the gallbladder lumen, biliary obstruction at the level of the porta hepatis with ductal dilatation, direct hepatic invasion and lymphadenopathy (2). Smooth or irregular thickening of the gallbladder wall, intraluminal masses, and gallstones may be seen in both carcinoma or adenomyomatosis of the gallbladder (2). Identification of the Rokitansky-Aschoff sinuses may help distinguish between the two conditions. Although intramural fluid attenuation and non-enhancing cystic spaces in the thickened gallbladder wall suggestive of Rokitansky-Aschoff sinuses may be rarely shown on CT, the ability of spiral CT to depict the Rokitansky-Aschoff sinuses remains limited due to insufficient spatial and contrast resolution (2,3). MDCT systems offer shorter image acquisition time, narrower collimation, improved temporal and spatial resolutions and near isotropic data acquisition which is advantageous for two- and three-dimensional imaging, compared to the original single slice spiral CT. Delineation of Rokitansky-Aschoff sinuses with MDCT is better than spiral CT due to higher spatial resolution of the MDCT. In the present case, the presence of Rokitansky-Aschoff sinuses was clearly revealed by using MDCT.

Based on the location and extent of the disease, three morphologic forms of gallbladder adenomyomatosis have been described: diffuse, segmental, and localized. The diffuse form involves the entire gallbladder and manifests as diffuse mural thickening and luminal narrowing. In the segmental form, there is focal circumferential thickening in the midportion of the gallbladder, producing an 'hourglass' appearance. The localized form is the most common type and manifests as a focal, frequently semilunar or crescentic solid mass, usually in the fundus of the gallbladder (10). Dysplastic changes and even gallbladder carcinoma may arise from the adenomyomatous epithelium, especially in segmental form of the adenomyomatosis, but this phenomenon maybe related to the presence of gallstones and chronic inflammation. Ootani et al. (9) performed a retrospective study on 3197 consecutive cholecystectomies in which a strong association was noted between segmental type adenomyomatosis and gallbladder carcinoma. Diffuse and localised types of adenomyomatosis did not show a strong association with malignancy.

So far, cholecystectomy has not been considered the standard treatment for adenomyomatosis of

the gallbladder. In symptomatic cases, however, cholecystectomy is indicated. But the treatment for asymptomatic cases is yet to be determined. Some authors suggest that cholecystectomy should be considered in all cases with gallbladder adenomyomatosis because the association between gallbladder adenomyomatosis and carcinoma is yet to be clarified (9,11). In our case, surgery was performed due to the symptomatic status of the patient and the fact that gallbladder carcinoma could not be ruled out completely by MDCT.

In conclusion, differentiating gallbladder adenomyomatosis from gallbladder carcinoma is important since both conditions may present with thickening of the gallbladder wall or with a focal mass. Identification of Rokitansky-Aschoff sinuses is the key feature in making an accurate diagnosis of gallbladder adenomyomatosis on imaging studies. The diagnosis of gallbladder adenomyomatosis can be made with reasonable accuracy by MDCT when the presence of Rokitansky-Aschoff sinuses (small cystic spaces within the thickened gallbladder wall) are seen.

REFERENCES

1. Williams I, Slavin G, Cox A, et al. Diverticular disease (adenomyomatosis) of the gallbladder: a radiological-pathological survey. Br J Radiol 1986; 59: 29-34.
2. Ching BH, Yeh BM, Westphalen AC, et al. CT differentiation of adenomyomatosis and gallbladder cancer. Am J Roentgenol 2007; 189: 62-6.
3. Yoshimitsu K, Honda H, Aibe H, et al. Radiologic diagnosis of adenomyomatosis of the gallbladder: comparative study among MRI, helical CT, and transabdominal US. J Comput Assist Tomogr 2001; 25: 843-50.
4. Yoshimitsu K, Honda H, Jimi M, et al. MR diagnosis of adenomyomatosis of the gallbladder and differentiation from gallbladder carcinoma: importance of showing Rokitansky-Aschoff sinuses. Am J Roentgenol 1999; 172: 1535-40.
5. Haradome H, Ichikawa T, Sou H, et al. The pearl necklace sign: an imaging sign of adenomyomatosis of the gallbladder at MR cholangiopancreatography. Radiology 2003; 227: 80-8.
6. Meguid MM, Aun F, Bradford ML. Adenomyomatosis of the gallbladder. Am J Surg 1984; 147: 260-2.
7. Akçam M, Buyukyavuz I, Ciriş M, Eriş N. Adenomyomatosis of the gallbladder resembling honeycomb in a child. Eur J Pediatr 2008; 167: 1079-81.
8. Lin SH, Chang FY, Yang YS, et al. Rare gallbladder adenomyomatosis presenting as atypical cholecystitis: case report. BMC Gastroenterol 2011; 11: 106.
9. Ootani T, Shirai Y, Tsukada K, Muto T. Relationship between gallbladder carcinoma and the segmental type of adenomyomatosis of the gallbladder. Cancer 1992; 69: 2647-52.
10. Raghavendra BN, Subramanyam BR, Balthazar EJ, et al. Sonography of adenomyomatosis of the gallbladder: radiologic-pathologic correlation. Radiology 1983; 146: 747-52.
11. Di Carlo I, Toro A, Pulvirenti E, et al. An unusual association of diffuse adenomyomatosis with dysplastic adenoma in chronic calculous cholecystitis: case presentation. BMC Gastroenterol 2010; 10: 41.